

Investor Sentiment and IPO Pricing during Pre-Market and Aftermarket Periods: Evidence from Hong Kong

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This version: April 28, 2012

Abstract

Using a sample of 293 IPOs in Hong Kong, we separately measure pre-market sentiment and aftermarket sentiment and examine their impact on IPO pricing in a two-stage framework. We find that underwriters only partially adjust offer price to reflect pre-market sentiment and the money left on the table is positively related to the anticipated deterioration of investor sentiment in the aftermarket stage. We also show that aftermarket sentiment causes a further price run up in the secondary market. Overall, our findings suggest that institutional investors play an important role in re-distributing shares in the secondary market and underwriters take into consideration of investor sentiment during pre-market and aftermarket stages in pricing IPOs.

JEL Classification Code: G02; G14

Keywords: Investor sentiment; IPO pricing; Aftermarket trading; Institutional investors

1. Introduction

IPO underpricing phenomenon has been studied extensively in the finance literature. So far, evidence has shown that investor sentiment is an important determinant for IPO pricing and underwriters take advantage of investor sentiment by setting the offer price above its intrinsic value (Derrien, 2005; Cornelli et al., 2006; Ljungqvist et al., 2006; Cook et al., 2006; and Dorn, 2009). In this study, we show that it is important to examine investor sentiment separately during pre-market and aftermarket stages.

A recent study by Chen and Wilhelm (2008) focuses on the transition from pre-market bookbuilding to the secondary market trading, to account for the sequential arrival of informed traders. Underwriters adopt a staged distribution strategy in order to circumvent the restriction of a uniform offer price and to extract greater surplus from the informed investors over time. We adopt the two-stage framework to address for the possibility that sentiment investors may arrive sequentially and pre-market sentiment may continue or reverse during the aftermarket period. The transition from primary to secondary markets gives rise to an important role played by regular (institutional) investors to gradually re-sell shares to sentiment investors in the secondary market (Ljungqvist et al., 2006). Thus, to extract greater surplus from sentiment investors over time, underwriters adopt a similar staged distribution strategy. However, the fact that most of prior IPO studies on investor sentiment use initial return (offer-to-close return) on the first day of trading implies that the transition process from pre-market stage to aftermarket trading has not been sufficiently considered.

In this study, we fill this gap by measuring separately pre-market and aftermarket sentiment and examining their impacts on IPO pricing in the two-stage framework. We

address two important questions: First, whether and how the compensation for regular investors would explain the partial adjustment to investor sentiment? In their theoretical model, Ljungqvist et al. (2006) show that underwriters partially adjust the offer price to reflect not only investor sentiment but also the risk associated with investor sentiment. The greater the probability for a “hot” IPO to end prematurely, the more the money left on the table for regular investors. By partitioning the transition process into pre-market and aftermarket stages, we can empirically test their prediction. In particular, if institutional investors anticipate a deterioration of investor sentiment in the aftermarket, they would demand a higher compensation for re-selling shares in the secondary market. Second, why would investors (sentiment investors in particular) pay an even higher price than the offer price when trading starts in the secondary market? If investor sentiment persists into the aftermarket stage and divergence of opinion increases, sentiment investors would be willing to chase the hot issues as long as more optimistic sentiment investors are expected to arrive sequentially.

Hong Kong provides a unique institutional setting to study investor sentiment and its impact on IPO pricing. First, Hong Kong IPOs have a Dual Tranche system with the Public tranche for retail investors and the Placing tranche for institutional investors. The retail demand for the public tranche is more likely to indicate investor sentiment. Thus, the availability of oversubscription rate for the public tranche allows us to have an effective proxy for pre-market sentiment. The fact that retail investors have a prominent presence also makes Hong Kong an ideal place to study the impact of investor sentiment on IPO pricing¹. Second, the Clawback provision in Hong Kong IPOs implies that the

¹ Huang et. al (2011) suggests that Asian markets are more prone to investor overconfidence.

allocation to institutional investors is inversely related to retail demand (or pre-market investor sentiment). The clawback provision generates a greater variation in the fractional allocation to regular (institutional) investors in Hong Kong, as compared with a more stable allocation of 70% in the US. This allows us to examine how regular investors are compensated in the presence of sentiment swing.

Our study proceeds as follows. First, we posit that underwriter revises offer price to incorporate pre-market sentiment. We find supporting evidence that offer price revision is positively related to oversubscription rate and investor attention. However, offer-to-open return remains positively related to pre-market sentiment, suggesting a partial adjustment of offer price to pre-market sentiment.

Second, we posit that institutional investors are compensated for their role in the staged distribution in the secondary market. We show that offer-to-open return (or the money left on the table) is positively related to the deterioration of investor sentiment from pre-market to aftermarket periods. Our findings provide an explanation for the observed partial adjustment phenomenon and confirm the predictions by Derrien (2005) and Ljungqvist et al. (2006).

Third, we posit that aftermarket sentiment pushes stock price higher. We use small trade order imbalance and turnover as proxies for aftermarket sentiment. While small trade order imbalance captures investor overconfidence, the divergence of opinion captured by trading volume in conjunction with short-sales constraints causes overpricing (Miller, 1977). Our findings support our prediction of a positive impact of aftermarket sentiment on secondary market returns.

Our study makes the following important contributions: First, by focusing on the transition from primary market to secondary market, we capture the change in investor sentiment surrounding the IPO listing. Second, we identify the sources of investor sentiment at different stages: Investor attention appears to drive retail demand at the pre-market stage, whereas the divergence of opinion in conjunction with short-sales constraints leads to overpricing in the secondary market. Third, by connecting pre-market sentiment to aftermarket sentiment, the two-stage framework allows us to establish the relationship between the compensation for institutional investors and the (anticipated) reversal of investor sentiment over time. We shed lights on the important role played by institutional investors in re-distributing new shares in the secondary market.

The rest of paper proceeds as follows. Section 2 reviews related studies and develops our hypotheses. Section 3 presents the institutional setting for Hong Kong IPOs. Section 4 describes the data and discusses the measurement of investor sentiment. Section 5 presents the empirical results. Section 6 conducts further analysis. Section 7 concludes.

2. Related research and hypothesis development

In this study, we adopt the two-stage framework of Chen and Wilhelm (2008) in order to address for the dynamics of investor sentiment over the transition from pre-market to aftermarket stages. While Chen and Wilhelm focus on the transition to account for the sequential arrival of informed traders, we investigate the impact of sequentially arriving sentiment investors on IPO pricing. By reviewing related research on IPO pricing, we can generate empirical predictions under the two-stage framework.

We first examine the impact of pre-market investor sentiment on IPO offer price. Derrien (2005) and Ljungqvist et al. (2006) show that underwriters would set the offer price above a firm's intrinsic value to take advantage of investor sentiment. Empirical studies tend to support their prediction. Using the number of news headlines as a proxy for investor sentiment during the road-show period, Cook et al. (2006) find a positive relationship between numbers of news headlines and the offer price revision. Using abnormal *Google Search Volume Index* (ASVI) to proxy investor attention, Da et al. (2011) find that ASVI is positively related to the first-day IPO return. We make the following prediction for the impact of pre-market sentiment on offer price revision.

H1: *IPO offer price revision is positively related to pre-market sentiment.*

The partial adjustment of offer price is a well-known phenomenon and there are a number of explanations. Benveniste and Spindt (1989) propose that underwriter reward the informed investors for revealing their private information by partially incorporating the private information into the offer price. Hanley (1993) confirms their partial updating hypothesis. Loughran and Ritter (2002) use prospect theory to explain the partial adjustment phenomenon by arguing that investors' preference for wealth depends on whether it is long-held or recently acquired. Edelen and Kadlec (2005) show that partial adjustment of the offer price would increase the probability of IPO completion; when the marginal benefit of increasing the probability of success is high, the issuer would set a lower offer price to ensure the success of the offer. Bradley and Jordan (2002) and Lowry and Schwert (2004) find that public information is not fully incorporated into the offer

price. In this study, we link pre-market investor sentiment to the partial adjustment of the offer price.

H2: *Offer price partially adjusts to pre-market investor sentiment: Offer-to-open return is positively related to pre-market sentiment.*

We further examine the causes for the partial adjustment in the offer price. Prior research suggests that the role played by regular investors in re-distributing shares in the secondary market is associated with the partial adjustment. Specifically, Ljungqvist et al. (2006) suggest that regular investors are compensated for the risk of re-distributing shares in the secondary market. Derrien (2005) argues that sentiment is only partially incorporated into the offer price because underwriters intend to strike a balance between taking advantage of sentiment investors and costly price support during the aftermarket stage.

To the extent that under-adjustment in the offer price is intended to be the compensation for institutional investors, there should be a connection between the compensation and the risk facing institutional investors. On the one hand, if high pre-market sentiment is expected to persist over the aftermarket stage, underwriter can afford to set the offer price more aggressively to take advantage of sentiment investors and regular investors may settle for a smaller compensation because they can re-sell their holdings at an even higher price in the secondary market. On the other hand, if high pre-market sentiment is expected to deteriorate in the aftermarket stage, underwriter needs to leave more money on the table to compensate regular investors for the risk of deteriorating sentiment in the aftermarket stage.

H3: *The offer-to-open return is positively related to the reversal in investor sentiment from high pre-market sentiment to low aftermarket sentiment.*

Finally, we investigate whether aftermarket sentiment drives up stock prices in the secondary market trading. As informed and sentiment investors trade the newly listed shares, an increase in divergence of opinion in conjunction with short sales constraints may lead to a speculative premium, because stock prices are more likely to be driven by optimistic investors (Miller, 1977). Using pre-IPO grey market prices to measure retail investors' valuation, Cornelli et al. (2006) and Dorn (2009) show that over-optimistic retail investors push up the IPO's closing price on the first day of trading beyond its intrinsic value. Chan (2010) find that small trade order imbalance is positively related to aftermarket returns. Bradley et al. (2009) find that information asymmetry and retail sentiment lead to an open-to-close return of 2.3% on the first day of trading. We make the following prediction:

H4: *Aftermarket sentiment is positively related to open-to-close return.*

3. Institutional Setting for Hong Kong IPO

In this section, we provide a brief introduction to institutional details for listing in Hong Kong Stock Exchange (HKEx) and discuss a number of important features for Hong Kong IPOs, in particular, the availability of pre-market retail demand and the clawback mechanism.

A majority of IPOs in Hong Kong are conducted using a Double Tranche (DT) mechanism since 2001². The *Placing* Tranche is restricted for institutional investors, whereas the *Public* Tranche is intended to attract retail investors. The public tranche is

² IPOs in Hong Kong up to the late 1990s were conducted using a single localized offering with a fixed offer price, except for IPOs with large market capitalization.

further divided equally into two pools, A and B. Shares in Pool A are allocated to investors who apply for HK\$5 million or less, while shares for Pool B are allocated to investors who apply for more than HK\$5 million. Multiple applications for different pools are prohibited. Thus, the demand for the public tranche allows us to measure investor sentiment during the pre-market stage.

The minimum allocation to the public tranche is generally set at 10% of the total number of shares offered in the IPO. Thus, the initial allocation to the placing tranche is 90% of the total number of shares offered. When there is insufficient demand in the public tranche, shares may be transferred from public tranche to placing tranche. However, when investor sentiment is high and the public tranche is over-subscribed, the clawback provision in the HKEx ensures a re-allocation of shares from the placing tranche to the public tranche to satisfy the public demand for IPO shares.

The objective of the clawback provision is to ensure a sufficiently large allocation to retail investors when pre-market investor sentiment is high. The HKEx and SFC (Securities and Futures Commission) establish a formula for the clawback arrangement. Normally, the clawback provision increases the fraction of shares under public tranche to 30%, 40% and 50% respectively when the demand for public tranche is at least 15 times, 50 times or 100 times respectively. If the total offer size exceeds HK\$10 billion, the HKEx may grant a waiver to reduce the minimum allocation to the public tranche under the claw-back arrangement.

The clawback provision has the following implications: On the one hand, the clawback provision may restrict the discretionary allocation to regular investors, not only reducing the risk for holding the inventory by regular investors but also discourage the

revelation of private information from the book-building process. On the other hand, the clawback provision provides extra incentives for retail investors to participate in the IPO and to reveal their information and/or sentiment.

It is common that IPOs in Hong Kong are offered with an indicative price range (i.e., variable offer prices). The offer price is normally determined through a book-building process for the placing tranche and the upper bound of price range is binding. The final offer price is generally set on the day after the closing of the placing tranche and is the same for both the public and the placing tranches. Applicants for the public tranche are required to pay the maximum offer price together with brokerage fees and levies. If the offer price range is reduced prior to the closing date of the application for public tranche, the company is required to make an announcement. Without such an announcement, the final offer price may not be set outside of the price range stated in the prospectus. Thus, the upper price bound is binding, similar to European IPOs (Jenkinson et al., 2006).

The HKEx has two listing boards: the Main Board and GEM (Growth Enterprises Market was introduced in 1999). Applicant for the Main Board listing must have a trading record of not less than three financial years and meet one of the three criteria on profit, market capitalization, revenue and cash flow³. The HKEx also attracts a significant number of China-affiliated IPOs. A firm with business in mainland China (or

³ The three listing criteria include (1) Profit Test: At least HK\$50 million in the last 3 financial years with profits of at least HK\$20 million in the most recent year, aggregate profits of at least HK\$30 million in the 2 years before that, and at least HK\$200 million at the time of listing. (2) Market Cap/Revenue Test: At least HK\$4 billion at the time of listing and at least HK\$500 million for the most recent audited financial year. (3) Market Cap/Cash flow Test: At least HK\$2 billion at the time of listing, at least HK\$500 million for the most recent audited financial year and a positive cash flow from operation of at least HK\$100 million for the three preceding financial years.

PRC) can be listed by offering either H-shares or red-chip shares. An H-share listing is for a company incorporated in mainland China, whereas a red-chip listing is for a company incorporated outside of mainland China but having most of its business in mainland China⁴.

The Listing Rules require companies to have a public float of at least 25% of the issuer's total issued share capital. Where an issuer has more than one class of securities or more (for example, a firm may have A shares listed on the stock exchanges in mainland China and H shares listed on the HKEx), the total securities of the issuer held by the public at the time of listing must be at least 25% of the issuer's total issued share capital. Moreover, the companies usually grants an over-allotment option to the underwriters for issuing additional shares up to 15% of the number of shares initially available for the IPO. The allocation of these additional shares is at the discretion of underwriters but generally to the placing tranche.

Price stabilization activities in Hong Kong are only permitted for IPOs with the offer value of HK\$100 million or more. Issuers normally appoint a stabilizing manager to stabilize the share price after listing by undertaking primary stabilizing actions (e.g., purchasing shares in the secondary market to minimize any reduction in share price below offer price) and ancillary stabilizing actions. Primary stabilizing action is carried out during the period from the commencement of trading on the HKEx and the 30th day

⁴ Chapter 19A of the Listing Rules deals with H-share listing with additional requirements: (1) PRC issuers are expected to present their annual accounts in accordance with Hong Kong or international financial reporting standards; (2) the articles of association of PRC issuers must contain provisions which will reflect the different nature of domestic shares and H shares and the different rights of their respective holders; and (3) disputes involving holders of H shares and arising from a PRC issuer's articles of association, or from any rights or obligations conferred or imposed by the Company Law and any other relevant laws and regulations concerning the affairs of the PRC issuer, are to be settled by arbitration in either Hong Kong or the PRC at the election of the claimant.

after the end of the offer. Purchases in the secondary market to close out a prior short position are viewed as primary stabilizing actions. In order to qualify under the PS Rules, the prior short position should be created in order to carry out primary stabilization. A stabilizing manager may also carry out ancillary stabilizing actions which include: over allocation of securities; the exercise of over-allotment options; and liquidations of net long positions created through primary stabilizing purchases.

The Price Stabilization Rules (PS Rules) require prior, interim and post stabilization disclosure. For example, the stabilizing manager is required to disclose any exercise of over-allotment options. More importantly, the PS Rules require that the maximum price for any primary stabilizing action is the offer price. Thus, stabilizing actions can only be taken when share price falls below the offer price. If underwriters set the offer price too high and the “hot” market ends prematurely, price stabilization actions would be costly (Derrien, 2005).

4. Data and measurements

4.1. Data

We initially find 567 IPOs listed on the main board of HKEx from 1999 to 2009. Given our intention to use the oversubscription rate for the public tranche to proxy for investor sentiment, we limit our sample to IPOs using Double Tranche mechanism and book-building method with the price range disclosed in their prospectuses.

We hand-collect IPO prospectus and the *Factbook* from the HKEx website to obtain offer price, price range, oversubscription rate for public tranche, proceeds for public tranche and placing tranche, offering structure and price stabilization activities.

We further exclude IPOs of closed-end funds, REITs, unit offering, companies switching from growth enterprises market (GEM) to the main board⁵. Since the Hong Kong Securities and Futures Ordinance came into force on April 1, 2003, which substantially change the regulation and disclosure requirements on price stabilization activities, we eliminate the offerings before April 2003. Our final sample comprises 293 IPOs from April 2003 to December 2009.

Following Da et al. (2011), we calculate the *Google Search Volume Index (SVI)*. Da et al. (2010) show that this aggregate Google search measure is a direct measure of (retail) investor attention. The *SVI* starts from 2004 and records the user-initiated search volume of a key word. Using the Chinese ticker names of IPO stocks as key words in the Google search, we calculate the abnormal *Google Search Volume Index (ASVI)*, defined as the difference between the search volumes during the book-building week and its median in the previous eight weeks. Whenever *ASVI* is included in the regression, our sample is therefore further reduced to 158 IPOs.

We obtain daily prices and trading volume from the *Datastream*. We obtain intraday transaction prices and quotations from the HKEx to determine daily opening prices⁶, daily return volatility and daily order imbalance by small traders. In relation to our two-stage framework, we calculate offer-to-open return (i.e., the return from offer price to the opening price on the first day of trading) for pre-market period and open-to-close return (i.e., the return from the opening price to the closing price on the first day of

⁵ Empirical studies normally filter out IPOs with an offering price below \$5. However, such a filter is not practical since stocks with a price below \$5 have a significant presence on the HKEx.

⁶ The daily opening price is determined in a call market, i.e., the pre-opening session (30 minutes before the morning trading session). Orders are accumulated over a period of time and matched at the order matching period to generate the opening price.

trading) for aftermarket period. We use the average first-day return of five latest IPOs (*PRE_IPO_RTN*) to proxy for market-wide sentiment. We obtain the annual market share of underwriters from the Bloomberg to measure the reputation of the lead underwriter (*UWREP*).

4.2. Investor sentiment measures

In this study, we intend to capture investor sentiment for pre-market and aftermarket stages. Previous studies use various proxies to gauge investor sentiment: oversubscription rate for the public tranche (Derrien, 2005); the number of news headlines (Cook et al., 2006); prices in the pre-IPO grey market (Cornelli et al., 2006); and the market-level indexes of consumer sentiment and confidence (Hrnjic and Sankaraguruswamy, 2010).

We use two proxies for pre-market sentiment. First, the availability of oversubscription rate for retail tranche allows us to measure pre-market retail demand for an IPO. Thus, we use oversubscription rate (*SUBRATE*) as our primary proxy for pre-market sentiment. Second, we use abnormal *Google Search Volume Index* (*ASVI*) as our secondary proxy for pre-market sentiment. Da et al. (2011) argue that *Google Search Volume Index* is a direct and unambiguous measure of investor attention. We obtain the *Google Search Volume Index* (*SVI*) of company names in Chinese for our IPO sample and compute the abnormal *SVI* (*ASVI*) by calculating the percentage difference between the *SVI* in one week before the listing day and the median *SVI* during the eight weeks earlier⁷.

⁷ <http://www.google.com/insights/search/#>

We use two proxies for aftermarket sentiment. First, we use small trade order imbalance (*SMALLNET*) as our primary proxy for aftermarket sentiment. Following Lee and Ready (1991) procedure, we classify trades into buyer-initiated and seller-initiated by comparing the transaction price with the midpoint of concurrent bid-ask quote. We use dollar-value cut-off points at HK\$50,000 and HK\$500,000 to classify each of the trades into small, medium, and larger trades. Under the small trade category, we use the order imbalance between buyer-initiated and seller-initiated trades to generate the net-buying measure for small trade group and then scale it by the total dollar trading volume.

Second, we use turnover on the first day of trading to proxy for aftermarket sentiment (*TURNOVER*). Baker and Stein (2004) argue that liquidity is a proxy for sentiment because sentiment investors systematically underestimate the information contained in adverse trading decision, thus make the adverse price impact lower and result in more liquidity in market. We obtain the turnover by dividing trading volume by the total number of shares outstanding.

4.3. Descriptive statistics

Table 1 provides the descriptive statistics of our sample. The average offer price is HK\$3.89 and the mean offer proceeds are approximately HK\$4,145 million. More than half of the firms (55%) on the main board use prestigious investment bank as their underwriter (*UWREP=1*) and about 20% of IPOs in our sample are H-share offerings. The mean of initial return (offer-to-close return) on the first day is 14.34%. However, once the initial return is decomposed into pre-market (offer-to-open) return and aftermarket (open-to-close) return, offer-to-open return dominates the initial return (13.39%) and open-to-close return has a mean close to zero (0.77%).

The IPO market in Hong Kong appears to be highly influenced by investor sentiment. The average oversubscription rate is 171 times higher than the number of shares assigned for the public tranche. Although oversubscription is common in Hong Kong, some IPOs are undersubscribed; the lowest subscription rate is merely 7%. The offer price revision has a mean of 3.66%, indicating that underwriters typically increase the offer price after gathering private information from the book-building process.

There is a significant variation in the price range for Hong Kong IPOs, ranging from 7% to 67% of the mid-point offer price, and the average price range is 25%. This is in contrast to the price range in the US, which is normally set at US\$2 (Kutsuna et al., 2009). We use a dummy variable, *TOP*, which equals one if the offer price reaches the upper bound of the price range. About 42% of IPOs are priced at the upper bound (i.e., *TOP* = 1). None of the IPOs in our sample are priced outside of the price range.

Table 2 reports the correlation matrix. The offer price revision (*REVISION*) is positively correlated with each of the two pre-market sentiment measures: oversubscription rate (*SUBRATE*) and abnormal *Google Search Volume Index* (*ASVI*), suggesting that underwriters taking into account pre-market investor sentiment when setting the offer price. However, both *SUBRATE* and *ASVI* are positively correlated with offer-to-open returns (*OTO*), suggesting that the offer price revision is only partial and the offer price does not fully reflect pre-market investor sentiment. While aftermarket trading volume (*TURNOVER*) is positively correlated with either *ASVI* or *SUBRATE*, small trade order imbalance (*SMALLNET*) is only weakly correlated with pre-market sentiment measures. The latter suggests that pre-market investor sentiment may not persist during the aftermarket period. The market-adjusted open-to-close return on the

first day of trading is significantly and positively correlated with aftermarket sentiment measures (either *SMALLNET* or *TURNOVER*), suggesting that aftermarket sentiment leads to a significant secondary market return. The one-year market-adjusted return is negatively correlated with pre-market sentiment and aftermarket sentiment measures.

[Insert Tables 1 and 2 about here]

4.4. Change in investor sentiment during pre-market and aftermarket stages

In this section, we investigate the extent to which pre-market sentiment persist (or reverse) during the aftermarket period. We sort our full sample into high and low pre-market sentiment (*SUBRATE*) sub-samples based on the median of subscription rate. We then sort our sample into high and low aftermarket sentiment (*SMALLNET*) sub-samples based on the median of small trade order imbalance.

Table 3 presents the two-by-two contingency table for pre-market and aftermarket sentiment. An interesting pattern emerges. Out of 146 IPOs with high pre-market sentiment, 74 IPOs (or a relative frequency of 25.26%) continue to have high aftermarket sentiment, whereas 72 IPOs (or a relative frequency of 24.57%) change to have low aftermarket sentiment. Thus, IPOs with high pre-market sentiment are evenly split between high and low aftermarket sentiment. In the cases of high pre-market sentiment turning into low aftermarket sentiment (denoted as *H_L*), underwriters are likely to carry out costly price stabilization actions and institutional investors are likely to face the risk of a lower re-sale price⁸. We investigate the implication of the deterioration in investor sentiment on IPO pricing in the following section.

[Insert Table 3 about here]

⁸ In Hong Kong, primary stabilization actions take place only when share price falls below the offer price.

5. Empirical results

In this section, we investigate whether and how investor sentiment affects IPO pricing in the two-stage framework. We first examine whether pre-market sentiment positively affects offer price revision. After documenting offer price is only partially adjusted to pre-market sentiment, we then examine whether the money left on the table is driven by the (anticipated) decline in investor sentiment for the aftermarket stage. We also examine whether aftermarket sentiment leads to further overpricing.

5.1. Pre-market sentiment and offer price revision

Hypothesis 1 predicts a positive relationship between pre-market sentiment and offer price revision. In this section, we use the oversubscription rate (*SUBRATE*) and abnormal Google search volume index (*ASVI*) to proxy for pre-market investor sentiment. We test their impact on the offer price revision. In addition, we also include several control variables into our regressions to control for IPO characteristics that would influence the offer price revision.

Table 4 presents the regression with the offer price revision as the dependent variable. The two pre-market sentiment measures are our variables of interest. The coefficients of oversubscription rate (*SUBRATE*) are positive and significant at the 1% level, suggesting that pre-market sentiment positively influences the offer price revision. Similarly, the coefficients of abnormal Google search volume index (*ASVI*) are positive and significant at the 1% level. The impact of pre-market sentiment is also economically significant. On average, a one standard deviation increase in the subscription rate leads to a 3.47% higher offer price relative to initial midpoint price. Our finding suggests that

attention-induced price pressure hypothesis of Barber and Odean (2008) holds for IPOs in Hong Kong.

We also control for market-wide investor sentiment and ex-ante value uncertainty. Since the bullishness of investors towards an IPO is affected by the market condition (Derrien, 2005), we control for the market-wide pre-market sentiment by including the average first-day return of five latest IPOs before the IPO (*PRE_IPO_RTN*) in the regression. The coefficients of *PRE_IPO_RTN* are positive and significant at the 1% level, consistent with the notion that market-wide sentiment affects the offer price revision. As value uncertainty negatively influences the offer price (Kutsuna et al., 2009), we include price range in the regression to proxy for ex-ante value uncertainty. The coefficients of price range (*RANGE*) are negative and significant at the 5% or 1% level. Economically, increasing price range by one standard deviation will cause the offer price to drop by 1.42% - 1.79%.

Overall, the results in Table 4 confirm that underwriter takes into consideration of pre-market investor sentiment, as measured by oversubscription and abnormal Google search volume index. Both firm-specific and market-wide pre-market sentiments cause the underwriter to revise the offer price upward.

[Insert Table 4 about here]

5.2. Partial adjustment to pre-market sentiment

In this section, we first investigate whether underwriters adjust the offer price fully to incorporate pre-market investor sentiment. We regress the offer-to-open return on pre-market sentiment measures to test our Hypothesis 2. Then, we investigate whether

underwriters compensate regular investors for bearing the risk that pre-market sentiment may decline during the aftermarket period.

Table 5 presents the regression with the offer-to-open return as the dependent variable. Note that our dependent variable differs from prior studies such as Hanley (1993) that first-day return (the return from offer price to closing price on the first day of trading) is used to indicate the partial adjustment of offer price. The coefficients of *PRE_IPO_RTN* are positive but insignificant, suggesting that the offer price is likely to fully incorporate market-wide investor sentiment. Turning to our variable of interest, we include the oversubscription rate as the proxy for firm-specific investor sentiment during the pre-market period. The coefficients of oversubscription rate (*SUBRATE*) are positive and significant at the 1% level, suggesting that underwriters only partially respond to pre-market sentiment when setting the offer price. The results are consistent with the partial adjustment to investor sentiment in prior studies (Derrien, 2005; Cornelli et al., 2006).

To understand why underwriters set a conservative offer price, we investigate whether the deterioration in investor sentiment over the transition from pre-market to aftermarket stage explain the money left on the table for IPO subscribers. In particular, we are interested in IPOs initially with high pre-market sentiment. Ljungqvist et al. (2006) Chen and Wilhelm (2008) model the role of regular (institutional) investors in re-selling new shares to sentiment investors in the aftermarket. They predict that the compensation for regular investors is linked to the probability of high pre-market sentiment turning sour in the aftermarket stage.

The previous results in Table 3 suggest that a portion of the “hot” IPOs with high pre-market sentiment actually turning “cold” during the aftermarket stage. We use a

dummy variable, H_L , to capture the change in investor sentiment, from the base case of a persistent high investor sentiment over pre-market and aftermarket periods ($H_L = 0$), to the restricted case in which high pre-market sentiment turns into low aftermarket sentiment (the case in which $H_L = 1$). To focus on the IPOs with high pre-market sentiment, we include another dummy variable, PRE_LOW , to control for the IPOs with low pre-market sentiment.

Our dependent variable is the offer-to-open return, which captures the money left on the table (including the compensation for regular investors). As shown in columns 2 and 3 of Table 5, the coefficients of oversubscription rate ($SUBRATE$) remain positive and significant at the 1% level. The coefficients of H_L are positive and significant at the 1% or 5% level. To the extent that H_L reflects the anticipated decline in investor sentiment, our evidence supports the explanation by Ljungqvist et al. (2006) for the partial adjustment phenomenon. In addition, the coefficients on the interaction term ($SUBRATE \times H_L$) are positive and significant at the 5% or 10% level, suggesting only a weak relationship between oversubscription rate and offer-to-close return. This is probably due to the fact that the clawback provision in Hong Kong in the presence of oversubscription mechanically reduces the risk for regular investors to hold the inventory.

Among control variables, we use price range ($RANGE$) as a proxy for pre-market value uncertainty and use the first-day return volatility ($VOLATILITY$) as proxy for aftermarket uncertainty. While the coefficient of $RANGE$ is positive but insignificant, the coefficient of $VOLATILITY$ is positive and significant at the 1% level. These results confirm that for IPOs that are “hot” in the pre-market stage and subsequently turn “cold” in the aftermarket stage, underwriters would leave more money on the table.

Overall, Table 5 provides empirical evidence supporting our Hypotheses 2 and 3. To the extent that underwriters are capable of anticipating a reversal in investor sentiment, our results suggest that underwriters tend to compensate regular investors for bearing the risk of deteriorating sentiment during the transition from primary market to secondary market.

[Insert Table 5 about here]

5.3. Aftermarket sentiment and secondary market returns

In this section, we investigate whether aftermarket sentiment further drives IPO overpricing in the secondary market. Table 6 reports the regression with the open-to-close return as the dependent variable. We include two measures of aftermarket sentiment: small trade order imbalance and turnover. The coefficients of *SMALLNET* are positive and significant at the 1% level, suggesting that optimistic and overconfident small traders are likely to drive the secondary market return. Similarly, the coefficient of *TURNOVER* is positive and significant at the 1% level. As *TURNOVER* is likely to be driven by the divergence of opinion among traders, our result also suggests that it is the source of the positive open-to-close return. Based on the parameter estimates in column 1, a one standard deviation increase in the small trade order imbalance leads to a 4.44% increase in the open-to-close return. In column 2, a one standard deviation change in turnover ratio leads to a 2.56% change in open-to-close return in the same direction. Thus, aftermarket sentiment affects open-to-close return with both statistical and economical significance.

An interesting result is that pre-market sentiment (*SUBRATE*) loses its power in explaining the open-to-close return. This is in contrast to previous studies with the offer-to-close return as the dependant variable. It appears that the opening price can fully

incorporate pre-market sentiment when trading starts in the secondary market. Another interesting variable is *VOLATILITY*, which is used as the proxy for aftermarket uncertainty (Falconieri et al., 2009). The coefficients of *VOLATILITY* are positive and significant at the 1% level, suggesting that aftermarket uncertainty contributes to secondary market return. The result is consistent with the finding of Falconieri et al. (2009). The coefficients of the offer-to-open return are negative and significant at the 1% level. The IPOs with low open-to-close return appear to have high offer-to-open return, after controlling for aftermarket sentiment and other factors. This evidence confirms the prediction of Ljungqvist et al. (2006) on the partial adjustment.

To understand how institutional investors trade in the aftermarket period, we also incorporate large trade order imbalance (*LARGENET*) into the regression. Chan (2010) finds that medium and large trades explain aftermarket price movement in the cold or neutral market, while small trades can only predict share price in hot market. As shown in column 3 of Table 6, the coefficient of *LARGENET* is positive and significant at the 1% level.

Our further analysis in Table 7 reveals that the correlation coefficients between *SMALLNET* and *LARGENET* are positive and significant for *H_H* sub-sample, and negative but insignificant for *H_L* sub-sample. This indicates that retail and institutional investors trade in the same direction with both high pre-market sentiment and high aftermarket sentiment (*H_H*), but in the opposite direction with high pre-market sentiment and low aftermarket sentiment (*H_L*). Our results are in contrast to the US finding in Chan (2010) that *SMALLNET* and *LARGENET* work in the opposite direction for their impact on that open-to-close return. The fact that the clawback provision reduces

the allocation to regular investors when pre-market sentiment is high implies that if regular investors anticipate a momentum of sentiment over aftermarket period they would purchase more shares in the secondary market along with retail investors.

Overall, our results show that aftermarket sentiment results in a further price run up once the secondary market trading starts. In contrast, pre-market sentiment no longer has any impact on open-to-close return in the secondary market. The net buying by large traders also reinforces small trade order imbalance when aftermarket sentiment is high.

[Insert Tables 6 and 7 about here]

6. Further Analysis

6.1. Investor attention and retail demand

In this section, we investigate the potential source of pre-market retail demand for IPOs. Prior studies suggest that investor attention is a major factor in determining the purchase decision by individual investors (Barber and Odean, 2008 and Barber et al., 2009). Kaustia and Knupfer (2008) show that investors overweight their personal experiences in IPO and the reinforcement learning drives investor sentiment. Da et al. (2011) show that abnormal Google search volume index (*ASVI*) is a direct and timely measure of investor attention. Using it to proxy for individual investor attention, Da et al. find increased investor attention leads to high initial return and subsequent long-run underperformance of IPOs. Therefore, we expect that investor attention would drive the retail demand for IPOs.

Table 8 presents the regression with the oversubscription rate (*SUBRATE*) as the dependent variable. Among the control variables, the coefficient of price range (*RANGE*)

is negative and significant at the 5% level, suggesting that ex-ante value uncertainty negatively affects the retail demand. The coefficient of market capitalization (*SIZE*) is negative and significant at the 5% level. This is probably linked to the fact that small-cap IPOs are subject to more speculative trading. H-share IPOs appear to generate greater interests among retail investors, as indicated by a significantly positive coefficient of *H_SHARE* dummy variable.

Our key variable of interest is investor attention (*ASVI*). As expected, the coefficient of *ASVI* is positive and significant at the 1% level. This suggests that retail investors' attention indeed increases the retail demand of the IPO. Similarly, the coefficient of the most recent IPO returns (*PRE_IPO_RTN*) is also positive and significant at the 1% level. Overall, our findings confirm that the attention-grabbing IPOs are more subject to the demand by retail (sentiment) investors.

[Insert Table 8 about here]

6.2. Long-run underperformance

As noted in the previous section, both pre-market sentiment and aftermarket sentiment affect positively the offer-to-open return and open-to-close return on the first day of trading. To the extent that IPOs are overpriced as a result of pre-market and aftermarket sentiment, we would expect that the IPOs with greater pre-market and aftermarket sentiment to more severely underperform in the long run, as over-optimistic sentiment fades away and short-sale constraints are lifted⁹.

⁹ Previous research provides both theoretical argument (Ritter and Welch, 2002; Ljungqvist et al. 2006) and empirical evidences (Derrien, 2005; Cornelli et al., 2006; Agarwal et al., 2008; Dorn, 2009; Da et al., 2011) for IPO long-run underperformance.

Table 9 presents the market-adjusted returns over 6 months, 1 year and 18 months. The average one-year market-adjusted return is -0.74% for the full sample. We are particularly interested in sub-sample of “hot” IPOs during the pre-market stage. An interesting pattern emerges. When the high pre-market sentiment turns sour in the aftermarket period (i.e., *H_L* sub-sample), the average of one-year market-adjusted return is 0.05%. In contrast, when the high pre-market sentiment persists in the aftermarket period (i.e., *H_H* sub-sample), the average of one-year market-adjusted return is -11.54%.

To examine whether pre-market and aftermarket sentiment measures can explain the long-run underperformance of IPOs, we run the regression with the one-year market-adjusted return as the dependent variable. We focus on various measures of investor sentiment. As shown in Table 10, the coefficients of *TURNOVER* are negative and significant at the 5% level. The coefficients of *SMALLNET* are negative and significant at the 5% level. This is in line with Barber et al. (2009) that purchases by small investors push up price and result in a subsequent price reversal in the long run. In contrast, the coefficients of pre-market sentiment proxy, *SUBRATE*, are not significant. This differs from the finding of Agarwal et al. (2008) using Hong Kong IPOs that the oversubscription rate is negatively related to long-run performance. It is likely that our aftermarket sentiment measures subsume pre-market sentiment. The coefficients of *SIZE* are positive and significant at the 5% or 1% level. Sentiment investors are more likely to speculate on small-cap firms, which are more subject to information asymmetry (Ritter and Welch, 2002; Ofek and Richardson, 2003; and Kumar and Lee, 2006). Thus, IPOs with large market capitalization are less likely to underperform in the long run. Overall,

Tables 9 and 10 confirm that aftermarket sentiment contributes to the IPO underperformance in the long run.

[Insert Tables 9 and 10 about here]

7. Conclusion

In this study, we examine the impact of investor sentiment over pre-market and aftermarket stages on IPO pricing. By allowing investor sentiment to evolve over the transition from primary market to secondary market trading, we are able to answer empirically whether the money left on the table is linked to a shift in investor sentiment from pre-market stage to aftermarket stage.

Our findings can be summarized as follows: To the extent that the demand in the public tranche reveals pre-market investor sentiment, underwriters capitalize on pre-market investor sentiment by revising the offer price upward. Investor attention appears to drive the pre-market demand for IPO in the public tranche. However, the offer price revision is only partial in the sense that pre-market sentiment positively affects the money left on the table. More importantly, we show that underwriters set a more conservative offer price for those IPOs where high pre-market sentiment turns sour in the aftermarket stage. Thus, we confirm the prediction of Ljungqvist et al. (2006) that the partial adjustment is designed to compensate regular investors for the risk in investor sentiment.

We show that aftermarket sentiment pushes up the stock price further, suggesting that investors who participate in the early stage would benefit from the sequential arrival of sentiment investors. The long-run underperformance further confirms that over-optimistic sentiment eventually fades away and overpricing is corrected over time.

However, the presence of investor sentiment during pre-market and aftermarket stages makes it possible for underwriters to successfully implement a staged distribution strategy.

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Table 1 Descriptive Statistics

The final sample consists of 293 IPOs in Hong Kong from April 2003 to December 2009. *OFFER* is the final offer price in HK dollar. *PLACING* is the proportion of shares finally allocated to the Placing Tranche in an IPO. *SUBRATE* is the number of shares subscribed by investors divided by the number of shares assigned to the Public tranche. *PRE_IPO_RTN* is the average first-day return of five latest IPOs before the IPO. *RANGE* is the price range announced in its prospectus scaled by its midpoint price. *SIZE* is the logarithm of total assets. *PROCEEDS* is the logarithm of the amount of money raised in millions of HK dollars. *UWREP* is a binary variable which equals one if one of the lead managers is among the top ten based on the ranking of underwriting market share. *H_SHARE* is a binary variable equals one if an IPO is an H-share offering, and zero otherwise. *REVISION* is the offer price divided by the midpoint of initial price range minus one. *TOP* is a binary variable that equals one when the offer price is set at the upper bound of the price range. *ADJIR* is the market-adjusted offer-to-close return on the first day of trading. *OTO* is the offer to open return, that is, the open price on the first day of trading divided by the offer price minus one. *SMALLNET* is the buyer-initiated small trades minus seller-initiated small trades divided by the total dollar trading volume on the first day of trading. *TURNOVER* is the total trading volume divided by the number of shares outstanding on the first day of trading. *LARGENET* is the buyer-initiated large trades minus seller-initiated large trades divided by the total dollar trading volume on the first day of trading. *ADJOTC* is the market-adjusted open-to-close return on the first day of trading. *VOLATILITY* is the standard deviation of intraday prices on first day of trading normalized by the offer price. *ASVI* is the abnormal *Google Search Volume Index*, defined as the search volume index during the book-building week minus the median of search volume index in the previous eight weeks. *ADJRTN_6M*, *ADJRTN_1Y*, and *ADJRTN_18M* are 6-month, 1-year and 18-month buy-and-hold market-adjusted returns from the closing price on the first day of trading.

Variables	N	Mean	Median	Max	Min	Std Dev
<i>OFFER</i>	293	3.89	2.73	37.00	0.43	3.97
<i>PLACING</i>	293	68.82	70.00	99.34	50.00	17.15
<i>SUBRATE</i>	293	171.55	68.00	1703.00	0.07	247.71
<i>PRE_IPO_RTN</i>	293	13.58	9.65	61.92	-13.59	14.31
<i>RANGE</i>	293	25.00	24.93	66.67	7.00	8.30
<i>SIZE</i>	293	21.95	21.72	29.65	18.01	1.94
<i>PROCEEDS</i>	293	7.05	7.10	11.74	1.01	1.63
<i>UWREP</i>	293	0.55	1	1	0	0.50
<i>H_SHARE</i>	293	0.20	0	1	0	0.40
<i>REVISION</i>	293	3.66	6.94	20.42	-33.33	10.10
<i>TOP</i>	293	0.42	0	1	0	0.49
<i>ADJIR</i>	293	14.34	6.29	190.87	-23.06	25.77
<i>OTO</i>	293	13.39	6.77	122.22	-27.62	21.13
<i>SMALLNET</i>	293	-0.26	-0.15	15.66	-51.58	4.93
<i>TURNOVER</i>	293	0.50	0.34	5.84	0.00	0.60
<i>LARGENET</i>	293	-2.10	-0.13	51.75	-61.85	12.14
<i>ADJOTC</i>	293	0.77	-0.12	76.02	-25.05	10.72
<i>VOLATILITY</i>	293	3.31	2.41	23.45	0.35	2.87
<i>ASVI</i>	158	75.02	41.67	900.00	-52.84	116.55
<i>ADJRTN_6M</i>	293	-1.56	-6.27	182.94	-100.15	47.09
<i>ADJRTN_1Y</i>	293	-0.74	-16.28	243.45	-108.91	68.49
<i>ADJRTN_18M</i>	293	2.87	-19.22	531.65	-132.33	104.22

Table 2 Correlation Matrix

PLACING is the proportion of shares finally allocated to the Placing Tranche in an IPO. *SUBRATE* is the number of shares subscribed by investors divided by the number of shares assigned to the Public tranche. *PRE_IPO_RTN* is the average first-day return of five latest IPOs before the IPO. *RANGE* is the price range announced in its prospectus scaled by its midpoint price. *SIZE* is the logarithm of total assets. *PROCEEDS* is the logarithm of the amount raised in millions of HK dollars. *UWREP* is a binary variable which equals one if one of the lead managers is among the top ten based on the ranking of underwriting market share. *H_SHARE* is a binary variable that equals one if an IPO is an H-share offering, and zero otherwise. *REVISION* is the offer price divided by the midpoint of initial price range minus one. *TOP* is a binary variable that equals one when the offer price is set at the upper bound of the price range. *ADJIR* is the market-adjusted offer-to-close return on the first day of trading. *OTO* is the offer to open return, that is, the open price on the first day of trading divided by the offer price minus one. *SMALLNET* is the buyer-initiated small trades minus seller-initiated small trades divided by the total dollar trading volume on the first day of trading. *TURNOVER* is the total trading volume divided by the number of shares outstanding on the first day of trading. *LARGENET* is the buyer-initiated large trades minus seller-initiated large trades divided by the total dollar trading volume on the first day of trading. *ADJOTC* is the market-adjusted open-to-close return on the first day of trading. *VOLATILITY* is the standard deviation of intraday prices on first day of trading normalized by the offer price. *ASVI* is the abnormal *Google Search Volume Index*, defined as the search volume index during the book-building week minus the median of search volume index in the previous eight weeks. *ADJRTN_1Y* is 1-year buy-and-hold market-adjusted returns from the closing price on the first day of trading.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	
<i>PLACING</i>	(1)	1														
<i>SUBRATE</i>	(2)	-0.5778	1													
<i>PRE_IPO_RTN</i>	(3)	-0.3249	0.2741	1												
<i>RANGE</i>	(4)	0.0963	-0.1240	-0.1183	1											
<i>SIZE</i>	(5)	0.1551	0.0489	0.1355	-0.2452	1										
<i>PROCEEDS</i>	(6)	0.0171	0.1324	0.1656	-0.2151	0.8494	1									
<i>REVISION</i>	(7)	-0.6497	0.4350	0.3369	-0.2131	0.1022	0.1881	1								
<i>OTO</i>	(8)	-0.4338	0.5709	0.3255	-0.0043	0.0337	0.1229	0.3785	1							
<i>SMALLNET</i>	(9)	-0.0582	0.0022	-0.0121	-0.0104	0.0524	0.0532	0.1187	0.0514	1						
<i>TURNOVER</i>	(10)	-0.4035	0.4065	0.1540	0.0194	0.0043	0.1982	0.3268	0.4670	0.1167	1					
<i>LARGENET</i>	(11)	-0.2406	0.1444	0.0162	0.0109	-0.1159	-0.0792	0.1436	0.1659	0.1749	0.1779	1				
<i>ADJOTC</i>	(12)	0.0035	-0.0261	-0.0821	-0.0183	-0.0448	-0.0537	-0.0268	0.0207	0.4641	0.1922	0.3610	1			
<i>VOLATILITY</i>	(13)	-0.1851	0.1723	0.1678	0.0737	-0.2180	-0.1483	0.1082	0.5107	0.1583	0.3182	0.2468	0.3427	1		
<i>ASVI</i>	(14)	-0.3035	0.3685	0.0450	0.1471	0.0192	0.0182	0.2951	0.2540	0.0435	0.1667	0.0839	-0.0087	0.0003	1	
<i>ADJRTN_1Y</i>	(15)	0.1692	-0.1020	-0.1224	-0.0419	0.1235	0.0567	-0.1087	-0.0711	-0.0663	-0.1343	-0.1364	-0.0591	-0.0834	-0.1253	1

Table 3 Pre-Market Sentiment and Aftermarket Sentiment

This table reports two-by-two contingency table and relative frequency (%) are shown in parenthesis. The full sample is sorted by oversubscription rate (*SUBRATE*) as pre-market sentiment measure. IPOs with *SUBRATE* above (below) its sample median are classified as IPOs of “High” (“Low”) pre-market sentiment. The full sample is then sorted by small trade order imbalance (*SMALLNET*) as aftermarket sentiment measure. IPOs with *SMALLNET* above (below) with median are classified as IPOs of “High” (“Low”) aftermarket sentiment.

Pre-market Sentiment	Aftermarket Sentiment		Total
	High	Low	
High	74 (25.26%)	72 (24.57%)	146 (49.83%)
Low	73 (24.91%)	74 (25.26%)	147 (50.17%)
Total	147 (49.83%)	146 (50.17%)	293 (100.00%)

Table 4 Pre-Market Sentiment and Offer Price Revision

The dependant variable, *REVISION* is the offer price divided by the midpoint of initial price range minus one. *SUBRATE* is the number of shares subscribed by investors divided by the number of shares assigned to the Public tranche. *ASVI* is the abnormal *Google Search Volume Index*, defined as the search volume index during the book-building week minus the median of search volume index in the previous eight weeks. *PRE_IPO_RTN* is the average first-day return of five latest IPOs before the IPO. *RANGE* is the price range announced in its prospectus divided by its midpoint price. *SIZE* is the logarithm of total asset. *UWREP* is a binary variable which equals one if one of lead managers is among the top ten based on the ranking of underwriting market share. *H_SHARE* is a binary variable equals one if an IPO is an H-share offering, and zero otherwise. Robust *t*-statistics are in parentheses. *, ** and *** represent significance at the 10%, 5% and 1% level.

Dependent Variable: <i>REVISION</i>		
Variables	Model 1	Model 2
<i>SUBRATE</i>	0.014*** (6.58)	
<i>ASVI</i>		0.028*** (4.24)
<i>PRE_IPO_RTN</i>	0.159*** (4.22)	0.202*** (3.88)
<i>RANGE</i>	-0.171*** (-2.66)	-0.216** (-2.35)
<i>SIZE</i>	-0.128 (-0.33)	-0.503 (-0.94)
<i>UWREP</i>	1.396 (1.10)	0.830 (0.43)
<i>H_SHARE</i>	0.185 (0.12)	1.001 (0.45)
Constant	5.299 (0.64)	15.05 (1.28)
Observations	293	158
R-square	0.265	0.207

Table 5 Investor Sentiment and Offer-to-Open Return

The dependant variable, *OTO*, is defined as the open price on the first day of trading divided by the offer price minus one. *H_L* is a binary variable which equals one if pre-market sentiment is above its median and aftermarket sentiment is below its median. *SUBRATE* is the number of shares subscribed by individual investors divided by the number of shares assigned to the Public tranche. *SUBRATE*×*H_L* is the interaction term of *SUBRATE* and *H_L*. *PRE_LOW* is a binary variable which equals one for an IPO low pre-market sentiment and zero otherwise. *SUBRATE*×*PRE_LOW* is the interaction term of *SUBRATE* and *PRE_LOW*. *PRE_IPO_RTN* is the average first-day return of five latest IPOs before the IPO. *RANGE* is the price range announced in its prospectus divided by its midpoint price. *VOLATILITY* is the standard deviation of intraday prices on first trading day normalized by the offer price *SIZE* is the logarithm of total asset. *UWREP* is a binary variable which equals one if one of lead managers is among the top ten based on the ranking of underwriting market share. *H_SHARE* is a binary variable equals one if an IPO is an H-share offering, and zero otherwise. *REVISION* is the offer price divided by the midpoint of initial price range minus one. Year dummies are included but omitted in the report. Robust *t*-statistics are in parentheses. *, ** and *** represent significance at the 10%, 5% and 1% level.

Dependent Variable: <i>OTO</i>			
Variables	Model 1	Model 2	Model 3
<i>H_L</i>		10.56** (1.99)	11.97*** (2.93)
<i>SUBRATE</i>	0.040*** (5.78)	0.052*** (6.92)	0.045*** (6.11)
<i>SUBRATE</i> × <i>H_L</i>		0.027** (2.05)	0.023* (1.82)
<i>PRE_LOW</i>		-1.591 (-0.42)	1.673 (0.53)
<i>SUBRATE</i> × <i>PRE_LOW</i>		0.129 (1.37)	0.032 (0.47)
<i>PRE_IPO_RTN</i>	0.147 (1.59)	0.157* (1.67)	0.081 (0.99)
<i>RANGE</i>	0.125 (0.96)	0.126 (1.00)	
<i>VOLATILITY</i>			3.150*** (5.61)
<i>SIZE</i>	-0.859 (-1.29)	-1.028 (-1.62)	0.356 (0.58)
<i>UWREP</i>	1.931 (0.81)	2.608 (1.06)	0.834 (0.39)
<i>H_SHARE</i>	3.488 (0.91)	3.037 (0.82)	2.059 (0.62)
<i>REVISION</i>	0.24** (1.97)	0.063 (0.44)	0.087 (0.75)
Constant	19.28 (1.37)	21.58 (1.58)	-14.25 (-1.10)
Observations	293	293	293
R-square	0.387	0.412	0.562

Table 6 Investor Sentiment and Open-to-Close Return

The dependant variable, *ADJOTC*, is the market-adjusted open-to-close return. *SMALLNET* is the buyer-initiated small trades minus seller-initiated small trades divided by the total dollar trading volume on the first trading day. *TURNOVER* is the total trading volume divided by the number of shares outstanding on the first day of trading. *VOLATILITY* is the standard deviation of intraday prices on first day of trading normalized by the offer price. *LARGENET* is the buyer-initiated large trades minus seller-initiated large trades divided by the total dollar trading volume on the first day of trading. *SUBRATE* is the number of shares subscribed by individual investors divided by the number of shares assigned to the Public tranche. *PRE_IPO_RTN* is the average first-day return of five latest IPOs before the IPO. *RANGE* is the price range announced in its prospectus divided by its midpoint price. *SIZE* is the logarithm of total asset. *UWREP* is a binary variable which equals one if one of lead managers is among the top ten based on the ranking of underwriting market share. *H_SHARE* is a binary variable that equals one if an IPO is an H-share offering, and zero otherwise. *REVISION* is the offer price divided by the midpoint of initial price range minus one. *TOP* is a binary variable that equals one when offer price is set at the upper bound of the price range. *OTO* is the offer to open return, that is, the open price on the first day of trading divided by the offer price minus one. Year dummies are not significant and omitted in report. Robust *t*-statistics are in parentheses. *, ** and *** represent significance at the 10%, 5% and 1% level.

Dependant Variable: <i>ADJOTC</i> Variables	Model 1	Model 2	Model 3
<i>SMALLNET</i>	0.901*** (8.30)		0.826*** (7.85)
<i>TURNOVER</i>		4.259*** (3.54)	
<i>VOLATILITY</i>	1.452*** (6.35)	1.730*** (7.02)	1.276*** (5.74)
<i>LARGENET</i>			0.216*** (4.95)
<i>SUBRATE</i>	0.002 (0.62)	-0.000 (-0.10)	0.001 (0.31)
<i>PRE_IPO_RTN</i>	-0.139*** (-3.00)	-0.144*** (-2.84)	-0.125*** (-2.80)
<i>RANGE</i>	-0.081 (-1.20)	-0.077 (-1.04)	-0.080 (-1.24)
<i>SIZE</i>	-0.227 (-0.57)	0.153 (0.35)	-0.036 (-0.092)
<i>UWREP</i>	0.771 (0.58)	0.340 (0.23)	0.381 (0.30)
<i>H_SHARE</i>	1.620 (0.95)	0.752 (0.40)	1.542 (0.94)
<i>REVISION</i>	-0.113 (-1.53)	-0.069 (-0.86)	-0.121* (-1.71)
<i>TOP</i>	1.817 (1.13)	1.347 (0.76)	1.282 (0.83)
<i>OTO</i>	-0.111*** (-3.07)	-0.164*** (-4.02)	-0.108*** (-3.10)
Constant	5.308 (0.60)	-2.687 (-0.27)	1.958 (0.23)
Observations	293	293	293
R-square	0.366	0.241	0.418

Table 7 Trading Behavior of Small and Large Investors

This table reports small and large order imbalance. *SMALLNET* is the buyer-initiated small trades minus seller-initiated small trades divided by the total dollar trading volume on the first trading day. *LARGENET* is the buyer-initiated large trades minus seller-initiated large trades divided by the total dollar trading volume on the first day of trading. *H_H* represents the IPOs with high pre-market sentiment and high aftermarket sentiment. *H_L* represents IPOs with high pre-market sentiment and low aftermarket sentiment. *, ** and *** represent significance at the 10%, 5% and 1% level.

	<i>H_L</i> (Obs=73)	<i>H_H</i> (Obs=74)	All (Obs=293)
Mean of <i>SMALLNET</i>	-3.24	3.18	-0.26
Mean of <i>LARGENET</i>	-4.07	4.52	-2.10
Correlation between <i>SMALLNET</i> and <i>LARGENET</i>	-0.0038	0.3105***	0.1749***

Table 8 Investor Attention and Retail Demand

This is regression with oversubscription rate as the dependant variable. *SUBRATE* is the number of shares subscribed by investors divided by the number of shares assigned to the Public tranche. *ASVI* is the abnormal *Google Search Volume Index*, defined as the search volume index during the book-building week minus the median of search volume index in the previous eight weeks. *PRE_IPO_RTN* is the average initial return of five latest IPOs before the IPO. *RANGE* is the price range announced in its prospectus divided by its midpoint price. *SIZE* is the logarithm of total assets. *UWREP* is a binary variable that equals one if one of lead managers is among the top ten based on the ranking of underwriting market share. *H_SHARE* is a binary variable that equals one if an IPO is an H-share offering, and zero otherwise. Year dummies are not significant and omitted in report. Robust *t*-statistics are in parentheses. *, ** and *** represent significance at the 10%, 5% and 1% level.

Dependant Variable: <i>SUBRATE</i>	
Variables	Model 1
<i>ASVI</i>	0.784*** (3.50)
<i>PRE_IPO_RTN</i>	5.438*** (2.94)
<i>RANGE</i>	-3.805** (-2.48)
<i>SIZE</i>	-24.86** (-2.15)
<i>UWREP</i>	11.94 (0.26)
<i>H_SHARE</i>	121.2** (2.23)
Constant	659.5*** (2.71)
Observations	158
R-square	0.335

Table 9 IPO Long-Run Underperformance

H_H subsample includes IPOs with high pre-market sentiment and high aftermarket sentiment. *H_L* subsample includes IPOs with high pre-market sentiment and low aftermarket sentiment. *ADJOTC* is the market-adjusted open-to-close return. *ADJRTN_6M*, *ADJRTN_1Y*, and *ADJRTN_18M* are 6-month, 1-year and 18-month buy-and-hold market-adjusted returns from the closing price on the first day of trading.

Panel A: Market-adjusted returns for full sample				Obs:293
Returns	Mean	Median	Min	Max
<i>ADJOTC</i>	0.77	-0.12	-25.05	76.02
<i>ADJRTN_6M</i>	-1.56	-6.27	-100.15	182.94
<i>ADJRTN_1Y</i>	-0.74	-16.28	-108.91	243.45
<i>ADJRTN_18M</i>	2.87	-19.22	-132.33	531.65
Panel B: Market-adjusted returns for <i>H_L</i> subsample				Obs:74
Returns	Mean	Median	Min	Max
<i>ADJOTC</i>	-6.33	-4.35	-25.05	4.52
<i>ADJRTN_6M</i>	0.24	-5.26	-81.81	182.94
<i>ADJRTN_1Y</i>	0.05	-22.34	-108.91	243.45
<i>ADJRTN_18M</i>	-2.57	-21.48	-107.98	352.94
Panel C: Market-adjusted returns for <i>H_H</i> subsample				Obs:73
Returns	Mean	Median	Min	Max
<i>ADJOTC</i>	7.40	5.75	-16.84	29.95
<i>ADJRTN_6M</i>	-7.00	-11.55	-74.66	91.03
<i>ADJRTN_1Y</i>	-11.54	-21.76	-105.30	197.10
<i>ADJRTN_18M</i>	-4.65	-30.19	-104.28	531.65

Table 10 Investor Sentiment and Long-Run Underperformance

This table examines the determinants of long-run IPO underperformance. The dependant variable, *ADJRTN_1Y*, is 1-year and buy-and-hold market-adjusted returns from the close price on the first day of trading. *SMALLNET* is the buyer-initiated small trades minus seller-initiated small trades divided by the total dollar trading volume on the first day of trading. *TURNOVER* is the total trading volume divided by the number of shares outstanding on the first day of trading. *SUBRATE* is the number of shares subscribed by individual investors divided by the number of shares assigned to the Public tranche. *VOLATILITY* is the standard deviation of intraday prices on first day of trading normalized by the offer price. *SIZE* is the logarithm of total asset. *UWREP* is a binary variable that equals one if one of lead managers is among the top ten based on the ranking of underwriting market share. *H_SHARE* is a binary variable that equals one if an IPO is an H-share offering, and zero otherwise. Year dummies are included but omitted in report. Robust *t*-statistics are in parentheses. *, ** and *** represent significance at the 10%, 5% and 1% level.

Dependant Variable: <i>ADJRTN_1Y</i>		
Variables	Model 1	Model 2
<i>SMALLNET</i>	-2.355** (-2.31)	
<i>TURNOVER</i>		-12.238** (-2.410)
<i>SUBRATE</i>	-0.016 (-0.87)	-0.015 (-0.74)
<i>VOLATILITY</i>	0.819 (0.51)	0.828 (0.50)
<i>SIZE</i>	7.793*** (2.62)	7.658** (2.56)
<i>UWREP</i>	-8.054 (-0.83)	-7.729 (-0.79)
<i>H_SHARE</i>	-8.854 (-0.68)	-8.422 (-0.64)
Constant	-159.2** (-2.50)	-156.6** (-2.46)
Observations	293	293
R-square	0.133	0.133