

Is it IPO returns that drive Hot Markets or is it Hot Markets that drive IPO returns?

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Abstract

We propose an empirical model of *Sentiment Index* that measures the degree (high or low) of investor sentiment in small and midcap size IPOs with *uncertainty* in pricing. We aggregate investor sentiment due to *heuristic bias* from multiple sets of sentiment proxies and measure their interdependences. Our sample data (1995 to 2007) spans over three regimes of IPO pricing mechanisms in India and supports investor sentiment and limits-to-arbitrage theories. We extend these theories to include the effectiveness of investor sentiment proxies in various settings. We find that *past IPO returns* contribute significantly to investor sentiment when *underwriter valuation* of the IPO is high but not when valuation is low. Additionally, we find that large *institutional interest* overrides other investor sentiment proxies, such as underwriter valuation, but small institutional interest does not.

Keywords: IPO underpricing, heuristics bias, uncertainty in stocks, sentiment investors, limits to arbitrage, proxy aggregation

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1. Introduction

Underpricing of IPOs is a persistent worldwide phenomenon, including in India, where Bombay Stock Exchange (BSE) has the world's largest listing of equities at approximately 4,900 companies and the National Stock Exchange (NSE) is the second fastest growing exchange in the world with a listing of approximately 1,900 companies.¹ The fact that issuers rarely complain about leaving large amounts of money on the table has long puzzled financial economists. Numerous explanations have been presented that rationalize investment banks' decision to underprice new issues. One such explanation, based on the *winner's curse hypothesis*, suggests that investors faced with information disadvantage will not buy IPOs unless they are underpriced. This is to compensate them for the risk of choosing a bad IPO. Another explanation, based on the *market feedback hypothesis*, suggests that underpricing encourages investors to reveal their own true estimate of the company's value. Investment bankers (underwriters) then use this information for book-building. That is, an underwriter "builds a book" by accepting orders from investors indicating the number of shares they desire and the price they are willing to pay. In return for this information, these investors get shares below the market price i.e., underpriced IPOs (Benveniste and Spindt (1989) and Rock (1986) studies. Similarly, there are other explanations such as the *bandwagon hypothesis* and *signaling hypothesis* which suggest that investors pay attention to other investor's demands and that goodwill created by underpriced new issues builds the investment bank's reputation (Montier, 2004).

While the above explanations suggest "intentional" or "rational" underpricing of IPOs by underwriters, in this paper we address the probability of "heuristic bias" or "sentiment investor" contributing to first day returns. Additionally, we validate market cycle and limits to arbitrage effects on IPO underpricing in existing theoretical and empirical studies of IPO underpricing. We confirm the effect of hot markets on IPO underpricing. In this regard, we focus strictly on the degree of investor sentiment due to representativeness heuristic not reflected in the offer price of an IPO. Our main objective in this paper is to determine a Sentiment Index model that aggregates and measures the interdependence of investor sentiment due to representativeness bias from multiple sets of proxies.

¹ World Federation of Exchanges, July 2007

Our method of aggregation of proxies allows for shifting of sentiment amongst proxies. For instance, we find that past IPO returns contribute significantly to investor sentiment when underwriter valuation of the IPO, as measured by IPO offer price premium on face value of IPO, is high but not when it is low. Our explanation is that even though underwriter valuation drives IPO underpricings, underwriter valuation as a proxy by itself does not sufficiently account for the degree of investor sentiment towards an IPO. Without aggregating past IPO returns with underwriter valuations, we would undermine the significance of high underwriter valuation over low underwriter valuation. Our first major contribution in this paper is to establish representativeness heuristic in IPO underpricing through aggregation of proxies.

We also test for significance of institutional involvement, as measured by percentage of allocation of shares to institutional investors, in the presence of other sentiment proxies such as underwriter valuation. We find that investor sentiment is strong when institutional involvement in the IPO is high. An interesting finding is that offer price premium is a weak sentiment proxy when institutional interest is significantly large. This suggests that sentiment investors give less importance to underwriter's valuation of the IPO in the presence of high institutional interest. To the best of our knowledge, an empirical approach to aggregating sentiment proxies based on their interdependence has not yet been documented in existing literature on IPO sentiment measurement. Our second major contribution in this paper is to propose an empirical model of aggregation of weighted proxies of investor sentiment where weights signify interdependence.

In our analysis, we also provide support to short-sales constraints as an explanation to "limits-to-arbitrage" theory to IPO underpricing. Limits-to-arbitrage is one of two conditions in behavioral finance that leads to misspricing of securities. The other condition is human psychology such as representativeness bias. The most quoted limits-to-arbitrage theory of IPO underpricing is "short-sales constraint". A competing theory is that underpricing is due to limited availability of arbitrageurs. We refute the possibility that limits-to-arbitrage is driven by institutional interest in the IPO. We find that allocation of shares to institutional investors as allowed by Securities and Exchange Commission Board of India (SEBI) in various regimes is positively correlated to IPO underpricing.

We also examine the effect of market cycles in our empirical analysis. Our results are consistent with findings in existing studies on IPO underpricing in hot markets. Market cycles are distinguished by the number and size of IPO issues. During hot market cycle, the number and size of IPOs is large and during cold market cycle, it is low. We find that underpricing is highest in the 2005 to 2007 regime period in India when IPO market was hot.

Loughran and Ritter (2002) propose a prospect theory (Kahneman and Tversky, 1979) explanation to why issuers don't get upset about leaving money on the table. The reasoning is that issuers care more about the change in their wealth than the level of their wealth. They use a sample of 3,025 IPOs listed by Securities Data Co. from 1990 to 1998 to provide empirical evidence of issuer bias towards IPO pricing. Ritter and Welch (2002) observe the influence of past performance of firms on short-run IPO prices and offer behavioral finance explanations to IPO underpricing that supports our findings.

Loughran and Ritter (2002) examine the first day returns for a sample of 3,025 IPOs from 1980-1999 relative to CSRP value-weighted market index returns. They find positive correlation between first day returns and the market index in the 15 days prior to the IPO. Baker and Wurgler (2006) construct an investor sentiment index based on six proxies namely, trading volume as measured by NYSE turnover; the dividend premium; closed-end fund discount; the number and first day returns on IPOs; and the equity shares in new issues. They also construct a change in sentiment index which basically consists of changes in the six proxies. They find that their index lines up fairly well with anecdotal accounts of bubbles and crashes since 1920. Their approach to measuring sentiment in the market is to aggregate sentiment, which they do with the six proxies, and then identify speculative and difficult to arbitrage stocks whose returns are influenced by sentiment investors. They find that when aggregate sentiment is high, subsequent market returns are low.

IPO underpricing is likely to be higher in uncertain rather than certain companies. Baker & Wurgler (2006) define uncertain companies as those which are speculative and difficult to arbitrage. The size of the IPO is a good indicator of company uncertainty (Baker and Wurgler, 2006). In the absence of company and economic fundamentals,

investors resort to sentiment driven information, such as past IPO returns, for investment decisions in small and mid-cap companies. That is, they deviate from standard corporate finance approaches to calculating company value such as Discounted Cash Flows analysis.

Dorn (2003) and Cornelli, Goldreich and Ljungqvist (2005) examine the effect of pre-IPO market prices on post-IPO prices. They find that investor sentiment is driven by IPO price action in pre-Issue market including during bookbuilding period in Europe and US. They assert that an upward trend in price movement is indication of pre-IPO investor optimism. That is, the offer price determined by the underwriter has significance in post-IPO sentiment.

Ritter and Welch (2002) examine the relation between differences in offer price relative to initial price range and mean first-day returns for 6,238 IPOs from 1980-2001. They find that average IPO underpricing is significantly above (53%) when the offer price exceeds the upper limit of the price range. Dorn (2003) studies the German Neuer Market and finds that pre-IPO sentiment according to book-building parameters such as IPO offer-price relative to issue-price range, drive post-IPO prices or first-day returns. Pre-IPO period is defined as the period before first day of IPO trading. They find that offer-price close to the upper limit of the issue-price range is reflective of positive pre-IPO investor sentiment, which in turn is indicative of post-IPO investor sentiment and leads to higher underpricing. Additionally, the duration period between issue price date and offer price date is reflective of price uncertainty. The larger the duration period and price range, the higher the price uncertainty of the IPO according to underwriter (book-building parameters). Loughran and Ritter (2002) and Lowry and Schwert (2002) propose bookbuilding theories that support strong correlation between the direction of price revisions and IPO mispricing. That is, underwriters may decide, after bookbuilding period, to price the IPO outside the price range of their initial issue price which may be restricted by Securities and Exchange Commission authorities. Underwriters have the option to revise their issue price range and list it again with the stock exchange. Lowry and Schwert (2002) find that revised prices above the original price range lead to higher underpricing. That is, pre-IPO sentiment according to bookbuilding parameter, such as revised prices, is strongly correlated to IPO underpricing.

Cornelli, Goldreich and Ljungqvist (2005) examine the pre-IPO trading behavior in the “grey-market” to identify post-IPO investor sentiment in Europe. Unlike in the US pre-IPO market, public trading of a firm’s securities prior to IPO, or grey-market trading is common in most European countries. Germany is the most active European country in grey-market trading. Pre-IPO trades are basically forward trades with IPO date as the settlement date. These trades take place through specialized brokerage firms and not through stock exchanges.

2. Behavioral components of IPO pricing

2.1 Conservatism & Representativeness heuristic biases

In psychology, representativeness can be thought of as people’s tendency to assess the similarity of two or more outcomes on relatively salient and superficial features, and then to use these assessments of similarity as a basis of judgment.² People tend to group instances into categories. Similar instances are assumed to belong to the same category and people expect effects to look like their causes. Thus headaches are more likely attributed to caffeinated drinks than caffeine free drinks. Daniel Kahneman and Amos Tversky propose that when judging the probability of some uncertain event, people often resort to heuristics, or rules of thumb, which may not be correlated at all with the variables that actually determine the event’s probability. One such heuristic is representativeness, defined as a subjective judgment of the extent to which the event in question reflects the salient features of the process by which it is generated (Kahneman & Tversky, 1972). In other words, assuming that similarities in one event lead to similarities in other events while ignoring their differences that may indicate otherwise. In the case of investment decision making, investors judge the probability of an event; IPO underpricing, by finding a comparable known event; past IPO returns, while ignoring their differences; valuation based on company prospectus and economic fundamentals. Our analysis follows this reasoning.

Behavioral biases have become a popular explanation for asset pricing anomalies in a rational decision-making paradigm. Barberis, Shleifer and Vishny (1998) propose a model in which investors’ belief about a firm’s earnings is in one of two

² Gilovich 1991, Kahneman & Tversky, 1982

“states”. In the first state, the investor believes the firm’s earnings are mean-reverting. An investor in this state will show conservatism bias and hence underreact to important news such as earnings announcements. In the second state, the investor believes the earnings to trend. An investor in this state ignores the laws of probability (Baye’s Theorem) and overreacts to a series of good/bad news he believes to be representative of a trend in price movements. In this paper, we determine investor sentiment due to representativeness heuristic from 1.) bookbuilding parameters, 2.) uncertainty due to company size i.e., small and mid-cap companies are more uncertain than large companies, 3.) first day returns of past IPOs 4.) allocation of shares to institutional investors and 5.) underwriter valuation of the IPO. We offer an extension to the model proposed by Barberis, Shleifer and Vishny (1998) to include multiple proxies for representativeness heuristics and their interdependence. For example, we find that past IPO returns, as an investor sentiment proxy, has interdependence on company uncertainty, sentiment from bookbuilding and sentiment from IPO valuation. In this regard, our model is complementary to Ljungqvist et al (2003) which is driven by hot markets and Dorn (2003) and Derrien (2005) who do not aggregate sentiment from multiple sets of proxies.

2.2 Sentiment Index

We assert that the sentiment aggregation method proposed by Baker & Wurgler (2006) does not fully capture sentiment towards IPOs. Our index uses proxies for specific sentiment towards specific stock returns i.e., sentiment due to representativeness towards uncertain IPOs. As such, the proxies are associated to each other and identify sentiment (representativeness) or lack thereof any (conservatism). We base our sentiment index on past returns, bookbuilding parameters, allocation of shares to institutional investors and underwriter valuation. We determine the degree of sentiment index and its impact on IPO mispricing. We find highest mispricing when investor sentiment is highest in all four proxies. This is consistent with Hot markets findings in existing IPO literature such as by Ljunqvist et al (2003).

2.3 Limits to arbitrage

In addition to sentiment bias, behavioral finance literature offers a limits-to-arbitrage explanation to market anomalies, such as securities' mispricings. Short-sale constraint is a limits-to-arbitrage theory of IPO underpricing (Ljungqvist, Nanda and Singh, 2003). Short-sale constraint is a restriction imposed by stock exchange authorities on institutional investors from taking a short position in IPO shares. Hence, arbitrageurs cannot take advantage of sentiment investors, whether optimistic or pessimistic, and correct any mispricing. IPO underpricing is the result of arbitrageurs unable to react to investor optimism. The justification for this constraint is to protect underwriters and issuing firms from IPO price manipulation.

We offer further support to this theory in IPO underpricings in India. Regulations on pre-IPO allocations in India have been revised twice by SEBI (Securities and Exchange Board of India) since 1995. This data offers a unique opportunity to test the effect of institutional investment pool size on investor sentiment proxies and limitation to arbitrage. The maximum amount of allocation authorized by SEBI is 50% to institutional investors, 25% to retail investors and 15% to high net-worth non-institutional investors since 1999.³ However, for large IPOs, underwriters can allocate 10% more, up to 60%, to institutional investors. Prior to 1999, when bookbuilding hadn't yet been introduced, institutional investors were allocated 75% of the IPO issue. Most behavioral finance research on IPO underpricings associate arbitrageurs to sophisticated investors such as, institutional investors (Ljungqvist, Nanda and Singh, 2003). Thereby, institutional investors are likely to account for the bulk of arbitrageurs. If allocation of shares to institutional investors during bookbuilding is an indicator of availability of institutional investors then, limited availability of arbitrageurs should, ceteris paribus, increase underpricing. On the other hand, if short-sales constraints theory holds true, then availability of institutional investors should have no affect on short-sales constraint. That is, if the number of arbitrageurs is limited, underpricing should not increase according to short-sales constraint theory. On the contrary, we find that underpricing increases when the pool of institutional investors is large during bookbuilding of IPOs. Our explanation, which is supported by empirical evidence, is that pre-IPO allocation size during bookbuilding period is a proxy of investor sentiment and not limits-to-arbitrage. This methodology of using the size of pre-IPO institutional allocation as proxy for investor

³ From SEBI website: www.sebi.gov.in

sentiment follows our methodology of aggregating investor sentiment from several sources and separating risky (uncertain) from less risky (less uncertain) IPOs.

2.4 *Uncertain companies*

Consistent with Baker and Wurgler (2006), we define uncertain companies as those which are speculative and difficult to arbitrage. IPOs fit the limitations to arbitrage condition very well. But not all IPOs can be classified as speculative. We classify speculative companies in Indian IPOs as those companies that are small and midsize market capitalization (less than US \$600M).⁴

2.5 *Hot markets and Pre and post-IPO market prices*

Hot markets is a feature of IPO market where cyclical patterns are observed in both the initial returns and volumes of IPOs brought to market. Certain sentiment pricing models in existing IPO literature are based on theories that underwriters time the market (Montier, 2004) and that underwriters price the IPO higher during Hot markets when returns are also higher (Ljungvist, Nanda and Singh, 2003). An interesting observation is that the price of the IPO is set by the optimistic investor. Since short selling is restricted because of SEC regulations and NASD Rule 3370 which prohibits brokers from taking naked short positions, the initial IPO prices may not reflect the sentiment of most pessimistic investors (Ljunqvist, Nanda and Singh, 2003). Hot markets are thus markets that exhibit an increasing trend in the number of IPOs, number of shares and first-day returns. The argument that underwriters price the IPO according to market cycles does not contradict the argument that underwriters' price the IPO according to investor sentiment towards offer price premium. Equally, it can be argued that the premium determined by the underwriter may not always reflect hot market conditions. In our empirical analysis, we control for hot markets and show that offer price premium is strongly correlated to IPO returns.

2.6 *Book-building vs. fixed price IPOs*

⁴ From SEBI website: www.sebi.gov.in

We provide evidence in support of Dorn (2003) and Cornelli et. al (2006) who find that offer price determined by the underwriter has significance in post-IPO sentiment. Additionally, we assert that underwriter's valuation decision rather than bookbuilding is the primary driver of post-IPO prices. Bookbuilding merely exposes the underwriter's valuation decision.

Book-building is a popular approach used by issuing firms and underwriters to determine an offer price of the new issue. After pre-IPO marketing efforts, underwriters start the bookbuilding process by first listing the company's initial price range with the stock exchange. The time period from the listing date to the IPO date is called the IPO subscription period. Bookbuilding takes place during subscription period. During bookbuilding, the underwriter solicits bids from investors and gathers information from grey-market or pre-IPO trading, if any (India does not have government approved grey-market trading). Depending on investor demand during bookbuilding, the underwriter, at his/her discretion, determines an offer price that may or may not fall within the initial price range. Most European country regulations require the offer price to be within the initial price range. Very similar restrictions are imposed in India. On the contrary, in the U.S., the Securities and Exchange Commission (SEC) allows a maximum deviation of 20% from the initial price range. The money left on the table in an IPO is defined as the number of shares offered multiplied by the difference in offer price and the closing price on the first day of trading. Underwriter fee is in the form of a gross spread of 7%, on the average, irrespective of the risk and proceeds of the company going public (Ritter, 2003). India has very similar underwriter fee structure.

Our empirical analysis shows strong correlation between pre-IPO optimism, as defined by bookbuilding parameters and underwriter valuation of the IPO, and first day underpricing. Although, unlike the US markets and some European markets such as the UK, issue price range in Indian IPOs is limited to 20% and offer price is restricted to be priced within the issue price range.

2.7 Grey-market trading

The IPO process in emerging market countries continue to evolve and while there is no grey-market trading in Eastern European countries, public trading in the pre-

IPO market is common in China. In India, grey-market trading is not regulated by SEBI but otherwise follows the same process as grey-market trading in Europe. The main difference is that any investor could engage in a contract to buy or sell the share at a price agreed upon during pre-IPO period. The contract has to be exercised by both parties on IPO offer date. In essence, the seller signs a forward contract with the buyer. Cornelli et. al (2005) find that pre-IPO optimism, as defined by grey-market trading, drives first day returns. Since grey-market trading in India is “unofficial” and not regulated by SEBI, information on its trading lacks credibility and hence we do not study its impact on investor sentiment. We believe that grey market trading is captured by the underwriter, to some extent, and is apparent in the offer price relative to issue price range. If grey market trading is heavy, underpricing will be higher due to greater presence of optimistic investors (Dorn, 2003) and vice versa when grey market trading is light. Including grey market trading as an additional proxy for sentiment in our sentiment index may improve our test results but in our study, bookbuilding information such as offer price relative to issue price range reveals significant correlation with IPO underpricing. It is very likely that sentiment from grey market trading is captured in other book building parameters such as, the offer price and issue price difference. This could be in the form of either underwriters accounting for sentiment in the offer price or sentiment investors including it in their overall sentiment from bookbuilding parameters. Nonetheless, we are able to establish the existence of sentiment to some extent from bookbuilding parameters such as offer price and issue price difference. These results confirm our hypothesis.

3. Hypotheses and Testing Methodology

In the model proposed by Ljungqvist et. al (2003), demand curve cycle and IPO underpricing are strongly correlated. We determine sentiment at a particular time by looking at the presence or absence of representativeness and conservatism biases in sentiment investors from several proxies. We find that when underwriter valuation is high, investors exhibit representativeness bias towards past IPO returns and when underwriter valuation is low, investors exhibit conservatism bias towards past IPO returns.

Hypothesis 1: *Past IPO returns drive first day returns of uncertain IPOs when underwriter valuation is high and not when it is low.*

Hypothesis 1 states that sentiment investors include performance of past IPO returns in their pricing of new IPO when new IPO is valued high by underwriter. It may be argued that underwriter valuation is influenced by market cycle condition. That is, high valuation indicates hot markets and low valuation indicates cold market. However, we find that, in the absence of high underwriter valuation, sentiment investors are influenced by other factors, such as institutional interest, as explained in hypothesis 2 in this section. In other words, we control for underwriter valuation driven by market cycles.

A major challenge to behavioral explanation of market “anomalies” such as IPO underpricing, is to define an approach to measure sentiment. It is difficult to pin down a particular sentiment as the cause of “irrationality” in the market. Real investors and markets are too complicated to be neatly summarized by a few selected biases (Baker and Wurgler, 2006). Put differently, a bottom-up approach of identifying a specific sentiment to explain a broader market is not realistic. Instead, Baker and Wurgler (2006) propose aggregating sentiment and tracing its effects to individual stocks. In other words, their model uses broad sentiment to explain a specific market return. They call this the top-down approach. We take a somewhat middle approach, i.e., specific-to-specific. We explain a particular investor bias i.e., due to representativeness heuristic, for a particular type of stock return i.e., uncertain IPOs.

We also offer a different approach to Baker and Wurgler (2006) on how we aggregate representativeness heuristic from multiple sets of proxies. Our approach to aggregating sentiment from several sets of proxies is to assign weights to each proxy in association to other proxies. This allows for deviation from the source of sentiment in the presence of other sources of sentiment. That is, the weight of sentiment from past IPO returns fluctuates from high to low depending on the weight of sentiment from underwriter valuation of the IPO. We assign weights based on regressions results in our empirical analysis studies. We chose a discrete model (0 and 1) of weights with 1 indicating high significance of proxy and 0 indicating low or no significance of proxy. The details are discussed in the empirical analysis and data sample section of this paper.

Hypothesis 2: *Large institutional interest in IPO overrides underwriter valuation of IPO as a sentiment proxy.*

A corollary to hypothesis 2 is that small institutional interest is a weak proxy of investor sentiment than a strong underwriter valuation of the IPO.

In addition to the effect of past IPO returns and underwriter valuation on post IPO prices, hypothesis 2 states that large institutional interest in IPOs override underwriter valuation proxy. In other words, the three sentiment proxies i.e., past IPO returns, underwriter valuation and institutional interest are interdependent. On the one hand, past IPO returns are a strong proxy for underpricing of IPOs with large institutional allocation. On the other hand, past IPO returns are a weaker proxy of investor sentiment of IPO returns with smaller institutional allocation. That is to say, simple aggregation of sentiment proxies without accounting for their interdependence partially captures the degree of investor sentiment.

We propose a simple empirical model that relates underpricing (R) of IPO to its uncertainty (U), sentiment trend from past IPO returns (T), sentiment from book-building parameters (B), underwriter valuation (V) and allocation of shares to institutional investors (A).

$$R_{it} = w_1U_i + [w_2f(T_i) + w_3f(B_i) + w_4f(V_i) + w_5f(A_i)] + \mu \quad (1)$$

Where w_i is a binary significance weight for a sentiment proxy. For instance, w_2 is significance weight for $f(T_i)$ proxy (degree of sentiment from past IPO returns at time t) and w_3 is the significance weight for $f(B_i)$ proxy (degree of sentiment from bookbuilding parameters for IPO i). Significance weight is relative to other proxies and weights and is determined as follows:

$$w_1 = 1 \quad (2)$$

$$w_2 = \begin{cases} 1 & \text{if } U_i \geq 0.5f(V_i) \text{ and } \geq 0.5 \text{ or } f(B_i) \geq 0.5 \text{ or } f(A_i) \geq 0.5 \\ 0 & \end{cases} \quad (3)$$

$$w_3 = w_4 = \begin{cases} 1 & \text{if } U_i \geq 0.5 \\ 0 & \end{cases} \quad (4)$$

$$w_5 = \begin{cases} 1 & \text{if } f(V_i) \geq 0.5, f(B_i) \geq 0.5, f(T_i) \geq 0.5 \text{ and } U_i \geq 0.5 \\ 0 & \end{cases} \quad (5)$$

Where $f(x_i)$ is a continuous function between 0 and 1. $f(x_i) \geq 0.5$ indicates that $f(x_i)$ is significant. Therefore, $f(T_i)$ is significant when $f(V_i)$ or $f(B_i)$ are significant. In equation (1), this translates to “past IPO returns contribute significantly to IPO returns when underwriter valuation of the IPO or IPO bookbuilding parameters are significant”. We can thus assert that undepricing for an IPO is most apparent when representativeness bias or sentiment due to:

- 1.) company uncertainty is high and
- 2.) past IPO returns are high (hypothesis 1) and
- 3.) bookbuilding information points to strong sentiment for the IPO and
- 4.) underwriter valuation is high (hypothesis 1) or
- 5.) allocation of shares to institutional investors is high (hypothesis 2).

Figure 1a, 1b and 1c show representativeness heuristic as applicable to Shliefer and Vishny model (1998), Ljungvist et al model (2003) and our hypothesis 1.

[Figure 1]

The scope of our model is limited to measuring the degree (high or low) of sentiment missing in the IPO offer price and not on calculating the price of the IPO itself. The main contribution of our model is to establish interdependencies amongst proxies. Our method

of analysis is not restricted by either the “rational underwriter & sentiment investor” or “sentiment underwriter & rational investor” assumptions. Most sentiment pricing models in existing behavioral finance literature rely on the first assumption. In this regard, our sentiment measurement approach complements most IPO pricing models such as unified theory of IPO pricing by Ljungqvist, Nanada and Singh (2003), Dorn (2003) and Derrien (2005).

4. Empirical Analysis and Data Sample

The data source for our analysis is Primedatabase in India. We look at a sample of 1501 IPOs from 1995 to 2007. The motivation for using Indian IPOs listed on Bombay Stock Exchange (BSE) and National Stock Exchange (NSE) is threefold. First is the global significance of BSE, which is presently the world's largest exchange in terms of equity listings, and NSE, which is the world's second fastest growing exchange. Second, it is hoped that studies on these exchanges will shed light on US and European IPO markets as BSE and NSE share common IPO listing and trading regulations and policies with US and European IPO markets. Third, the Indian IPO mechanism has gone through two major modifications since 1999. This offers a unique opportunity to test for effects not readily observable in the US and European markets such as, investor sentiment from fixed pricing vs. bookbuilding and restrictions on allocation of shares to institutional investors. Table 1 shows the summary statistics and characteristics of our data sample.

[Insert Table 1]

SEBI (Stock Exchange Board of India) operations

India has two primary stock exchanges where IPOs are listed. The larger BSE (Bombay Stock Exchange) has a listing of around 5000 companies as of 2006 and NSE (National Stock Exchange) has a listing of around 1600 companies.⁵ Prior to 1995, SEBI regulations only allowed for fixed pricing of IPOs. Under this regulation, the final IPO offer price could not be changed from the initial price. Additionally, the amount of allocation of shares to institutional and retail investors was fixed and could not be modified by either investor type.

⁵ From SEBI public issues document, 2007 (www.sebi.gov.in)

In 1999, SEBI introduced bookbuilding mechanism for pricing IPOs. In this mechanism, underwriters could define an initial price range, a maximum of 20% apart, for a duration period. During this period, underwriters received bids from both institutional and retail investors. Underwriters had the option to revise the offer price and the allocation amounts within each investor category. Unlike in the US where the offer price can exceed the price range by 20%, in India, the offer price has to be within the initial price range. The allocation amount was partitioned as 25% to retail investors, 25% to high net worth (non institutional) investors and 50% to institutional investors. However, large size issues, wherein the equity dilution through public offer is less than 25% and greater than 10% under Rule 19(2)(b) allowed for 60% of issue size to institutional investors. Although allocation partitioning could not be changed, allocation could be changed amongst investors within each partition. Retail investors were defined as those with ~US\$1000 limitation on purchases of stocks.⁶

In May 2005, SEBI revised the bookbuilding criteria with major changes to partitioning of issue allocations between smaller retail investors and high network investors. The allocation partitioning was increased to 35% to retail investors and reduced to 15% to high network investors. Institutional investors' allocation amount remained the same at 50% and 60% depending on the issue size. In October of the same year, SEBI issued a circular which imposed restrictions on changes in allocation. This meant that once underwriters had allocated shares to investors, the allocation amount could not be changed. However, the final offer price option remained the same as in the previous bookbuilding criteria i.e., the underwriter can change the price as long as it is within the initial price range. However, the amount that retail investors could purchase was increased to ~US\$2000. In this revision, SEBI also allowed hybrid listing mechanism between fixed and bookbuilding choices.⁷

These revisions by SEBI on IPO listing mechanisms offers a very unique setting to test for various conditions otherwise not readily available in the US or Europe markets. IPO pricing mechanisms such as fixed pricing and auctions are available in the US, but bookbuilding remains the primary choice of IPO listings. Bookbuilding is now the primary

⁶ From SEBI regulations circular document, 1999 (www.sebi.gov.in)

⁷ From SEBI regulations circular document, 2005 (www.sebi.gov.in)

choice of IPO pricing mechanism in India as well. The transition periods in India provides for a testing environment to shed light on IPO mechanism and in particular, IPO underpricing in the US and Europe

Additional differences in the Indian IPO market mechanism include bidding restrictions on allocations and “unofficial” grey-market trading. The restriction imposed on bidding is that once investors submit their bids for allocation of shares during bookbuilding, they cannot later change either their amount or their price. This is very different to bookbuilding in Europe where investors are free to modify or retract their initial bids. This regime shift in India markets makes it possible to control for bidding strategies and their impact on investor sentiment in our analysis.

We do not account for the impact of “unofficial” grey-market trading since it is not regulated by SEBI and the validity of its contracts is questionable.

Our empirical study is based on analysis of 1501 Indian IPOs from 1995 to 2007, listed on BSE (Bombay Stock Exchange) and NSE (National Stock Exchange), to determine investor sentiment not accounted for in IPO pricing. In this regard, we study four proxies of sentiment in connection to underpricing and each other. Namely, sentiment from hot markets, sentiment from returns in past IPOs, sentiment from bookbuilding parameters and sentiment from uncertainty in IPOs.

Underwriter Valuation sentiment proxy

We define the difference in the offer price and face value of the company or, the premium on face value, as a proxy of underwriter valuation of the IPO. It can be argued that this premium simply captures the hot market trend. Consequently, the underwriter is pricing the IPO according to market sentiment and underwriter valuation could simply be an indicator of an economic boom or bust. However, our hypothesis 1 claims that investor sentiment from underwriter valuation is a stronger assumption than simply the market cycle. That is, past IPO returns on their own do not drive new IPO returns. If underwriter valuation indeed reflected only market cycle, then hypothesis 2 would not hold either. Meaning, low underwriter valuation should translate to low returns irrespective of other proxies. The limits of this competing hypothesis become apparent

during low underwriter valuations when sentiment investors resort to other proxies such as institutional interest as per hypothesis 2. Table 2 shows the results of underwriter valuation and IPO returns. We find that first day returns are significantly high when underwriter valuation or the premium on face value is high. We run regressions in each of the three regimes i.e., 1995-1999, 1999-2005 & 2005-2007 respectively. An interesting observation is that in regime 1 (table 2.a), when IPOs were priced using only the fixed-price mechanism, underpricing is higher than in other regimes⁸. While higher underpricing through fixed pricing mechanism is consistent with both empirical and theoretical studies in Europe and US markets, the distinct differences in the three regimes in India need to be addressed. We offer a set of possibilities for the high underpricing in Regime 1 as follows:

- 1.) Underpricing is significantly high such that sentiment proxies, or a premium on face value, have little or no weight in the overall sentiment index for the IPO. In other words, underpricing correlation may not indicate investor sentiment to the full extent. However, the results do not contradict our model.
- 2.) Underwriters do not have the means to gauge the price of IPO in fixed pricing mechanism as they do in bookbuilding mechanism. Hence, they choose to underprice the IPO to ensure the success of IPO. This theory also supports “rational” theories such as the winner’s curse hypothesis. In addition, it supports explanation 1 above in that, sentiment investors give little significance to proxies knowing that IPO will already be significantly underpriced. Table 2 also shows high underpricing during regime 1 and for fixed priced IPOs in other regimes.
- 3.) Underwriters underprice the IPO because investors had other more attractive investment options such as government securities during Regime 1 period. For instance, in 1996, the rates on 91-day and 364-day Treasury Bills were 12.97 and 13.12 percent respectively.⁹

Our empirical results do not refute existing empirical studies in US and European

⁸ The test result for no-premium in regime 3 is insignificant because there was only one IPO out of 160 that had a low premium value.

⁹ Address by the Governor of the Reserve Bank of India, Mr. C. Rangarajan, at the Madras Chamber of Commerce and Industry at Chennai on 19/4/1997 (Bank of International Settlements Review, 52/1997)

markets. We concur that pre-IPO sentiment as indicated by underwriter's pricing decision, is a strong proxy of investor sentiment. However, we extend existing theories with our empirical findings and claim that underwriter valuation by itself does not fully capture investor sentiment towards IPOs. Our methodology is in line with Baker & Wurgler's (2006) aggregation model. Our model is an extension to their model in that we look to other proxies such as past IPO returns in *connection* with underwriter valuation to determine the degree of investor sentiment due to heuristic bias.

[Insert Table 2]

Institutional Investor sentiment proxy

Hypothesis 2 states that large institutional interest in IPOs is a stronger proxy of investor sentiment than market cycle proxy. When institutional investor portion of the IPO allocation is at 60% instead of at 50%, we find that underpricing is high. On the other hand, when institutional investor portion of the IPO allocation is at the standard 50%, underpricing is low. That is, our empirical studies show a strong positive correlation between the larger institutional allocation and IPO underpricing and weak correlation between the smaller institutional allocation amount and IPO underpricing. The former is consistent with both asymmetric and behavioral finance theories regarding the effect of institutional interest on sentiment investors. However, the latter has not been addressed in existing empirical studies of IPO sentiment. This is mostly due to lack of availability of regime switches in other markets including the US and Europe. Our explanation, which is the core contribution of this paper, is that sentiment proxies in empirical analysis, whether taken individually or aggregated, do not fully capture IPO sentiment unless interdependencies amongst proxies are also accounted for. As for strong correlation between large institutional investor interest and underpricing, Rock (1986) model justifies this with information asymmetry theory. In particular, according to this theory, information asymmetry is due to superior institutional investor knowledge and not necessarily due to investor sentiment. We depart from Rock's model and test for the impact of past-IPO returns on first day returns of new IPOs under numerous conditions. One of which is institutional interest. We find that first day returns are considerably lower for low institutional interest and cannot be empirically validated. This suggests that investors give substantial significance to past-IPO returns when institutional interest is high but not

when it is low. In other words, past-IPO sentiment is driven by institutional interest. Table 3 shows our empirical test results. Our results indicate that past IPO returns are strongly positively correlated to underpricing of IPOs with 60% institutional allocation amount. We test this for both high and neutral underwriter valuation and find no correlation with underpricing of IPOs with 60% institutional allocation. On the other hand, the test results indicate a weak correlation of past IPO returns and underpricing of IPOs with the standard 50% institutional allocation. Thus, indicating that institutional allocation is a sentiment proxy when the allocation percentage is large and a weak proxy when percentage allocation is low. The empirical results in table 3 validate our Hypothesis 2.

[Insert Table 3]

Past IPO sentiment proxy and Representative measurement

We look at the daily returns of past six IPOs as a sentiment proxy for past IPOs. When an investor is in “representativeness” state, there will be underpricing of IPOs and when in “conservatism” state, the IPO price will be close to the offer price. Two possible arguments are that the underwriter has either not priced in sentiment at all or perhaps to a certain extent during representative state. The latter may lead to lower underpricing in both states and will make it difficult to distinguish between the two states. However, we find that an upward trend in past six IPOs is positively correlated with underpricing when underwriter valuation is high and weakly correlated when underwriter valuation is low. The results are shown in table 2. In table 4, we validate our Hypothesis 1 showing that past IPO returns contribute significantly more when underwriter valuation is high than when it is not. Since the focus of our analysis is on the degree of sentiment not captured in the IPO offer price, we can relax the assumption that underwriters aggregate all information from bidding investors during bookbuilding into a demand curve (Cornelli, Goldreich, 2001) and use the demand curve to price the issue fairly. In other words, our method of analysis is not restricted by underwriter pricing assumptions.

Our test results show that the average of past six IPO returns are significantly strong when underwriter valuation is high indicating representativeness bias and significantly low in when underwriter valuation is low indicating conservatism bias. We also test for the average of past 6 IPO returns which indicate, to a lesser extent, both

representativeness and conservatism biases due to past IPO returns in association with underwriter valuations. The results are shown in table 2.

Book-building sentiment proxy

We show that pre-IPO sentiment during bookbuilding, uncertainty of IPO company and investors' present state of belief determine representative sentiment and drive the post-IPO market prices. In this regard, our work is not mutually exclusive to cascading theory proposed by Welch (1992) where investors pay attention to other investors, prospect theory explanation as proposed by Loughran and Ritter (2000) where investors care more about the change in their wealth rather than the level of their wealth and hot markets theory proposed by Cornelli, Goldreich and Ljungqvist (2003) where grey market sentiment is representative of retail investor sentiment in the post IPO market.

Consistent with findings in current literature on pre-IPO sentiment, such as studies by Dorn (2003) on IPOs on the Neur Market in Germany, we find that sentiment according to book-building parameters is correlated to IPO underpricing in India. Thus, indicating that pre-IPO sentiment drives post IPO pricing. However, the correlation with underpricing is even larger with uncertain companies and high underwriter valuation of the IPO. We use two proxies for pre-IPO sentiment during bookbuilding. The first proxy is the offer price relative to issue price range. The second proxy is the duration period between issue price date and offer price date. Consistent with existing literature, we find strong correlation between underpricing and the price difference. However, we find minor negative correlation between duration period and underpricing. Our explanation is that investors do not feel that duration periods indicate the success or failure of IPO as measured in terms of returns. Table 4 shows our empirical results. Duration period is weakly and negatively correlated as shown in regressions in columns 1 & 2 of table 4.

IPO uncertainty proxy

We define uncertainty in stocks as those stocks that fall in the small and mid cap categories consistent with Baker & Wurgler's model (2006). Bookbuilding parameters, such as price range and duration period, may also be used as proxies for company uncertainty. But in our analysis, we control for company size as proxy for uncertainty

thus allowing for regression of underpricing on bookbuilding parameters to be something other than company uncertainty. We claim that retail investors use bookbuilding information as an “indicator” of pricing accuracy rather than company uncertainty. Two companies could be priced accurately but if one is uncertain, then the underpricing would be higher for the uncertain company. Hence, our approach is to separate pricing uncertainty as per bookbuilding from company uncertainty as per company size. Uncertainty from bookbuilding is due to the underwriter perception of company value while uncertainty from company size is due to retail investor perception of company value. Uncertainty due to company size therefore, is a sufficient condition for validation of our hypothesis.

Consistent with Baker & Wurgler’s (2006) findings, we find strong positive correlations between uncertain stocks and IPO underpricing. Additionally, we find negative correlations between underpricing and large company stocks. Table 4 show our empirical results.

[Insert Table 4]

Baker and Wurgler (2006) also include riskiness in their definition of uncertain securities. Our findings support their theoretical and empirical findings. Our empirical studies show that IPOs in risky industries in India, such as Information Technology industry, have considerably higher underpricing than IPOs in less risky industries in India, such as Textile industry. Textile industry in India is less risky because it is a well established industry with better investor awareness of the industry. Table 4 shows our test results of IPO underpricing in different industries.

Benveniste and Spindt (1989) offer a “rational” explanation to high underpricing of small size IPOs. They justify underpricing of small companies that have little available information as a compensation by underwriters to information providers.¹⁰ We control for the “compensation” theory in our analysis by comparing returns on small companies under various conditions and find that it is strongly correlated to underwriter valuation and institutional interest. Our analysis is further supported by our aggregation model

¹⁰ Information providers in this case are institutional investors who share their valuation of the IPO to the underwriter during book-building period.

where we isolate idiosyncratic patterns, such as underwriter valuation, from systematic patterns due to asymmetric information, by comparing the cross-sectional and time variation patterns of small size companies.

5. Conclusion

Empirical evidence in this study supports the hypothesis that stocks with a high degree of uncertainty, such as small and mid-cap size companies, are subject to stronger investment sentiment. When company fundamentals are not readily available, investors exhibit a representative heuristic bias and classify present returns on IPOs based on several factors and in association with each other, such as, past returns on IPOs, underwriter valuation of the IPO, pre-IPO bookbuilding sentiment and company uncertainty. Past IPO returns are given higher weight when underwriter valuation is high and lower weight when underwriter valuation is low. That is, investment decisions are driven by representativeness heuristics based on past performance when underwriter valuation is high. Investment decisions are driven by conservatism bias and past-IPO returns are ignored when underwriter valuation is low. Additionally, in one instance, a larger than usual institutional interest in IPOs overrides underwriter valuation sentiment proxy and leads to higher underpricing. In another instance, a standard institutional interest in IPOs does not contribute to investor sentiment and has little or no effect on IPO underpricing.

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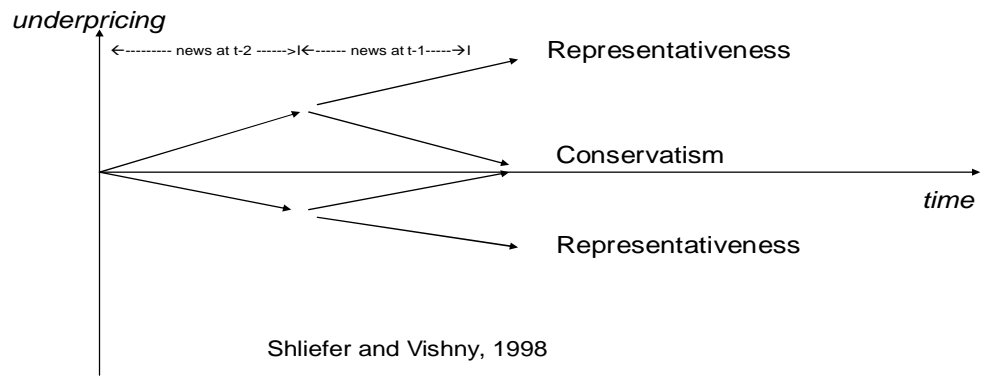


Figure 1.a



Figure 1.b

underpricing

← Institutional Interest → | ← Underwriter Valuation → | ← Past IPO Returns →

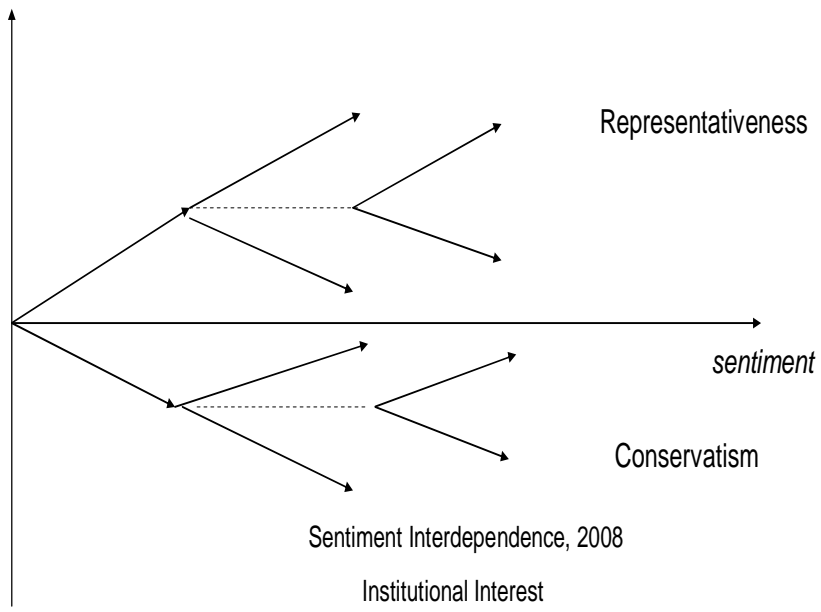


Figure 1.c

underpricing

← Underwriter valuation → | ← Institutional Interest → | ← Past IPO Returns →

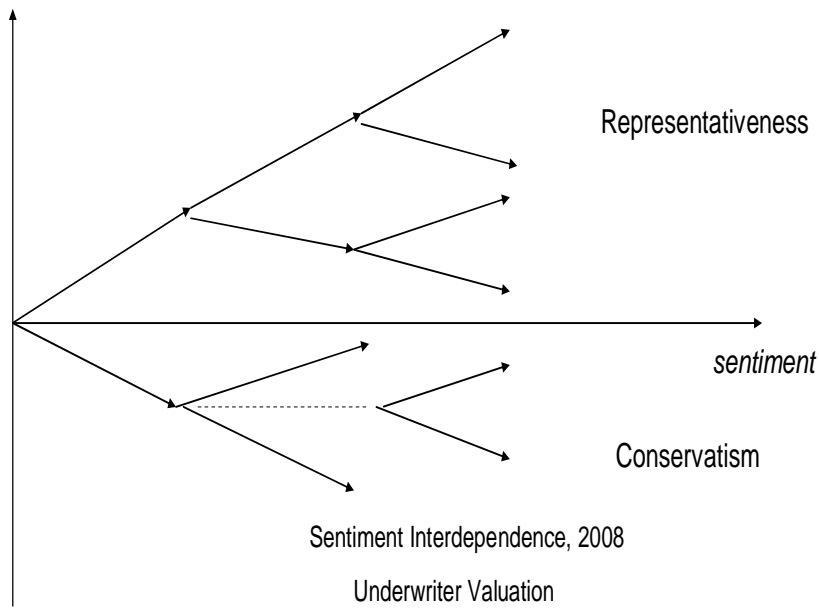


Figure 1.d

Figure 1

In Figure 1, 1.a (Shleifer & Vishny, 1998) and 1.b (Ljungqvist et al, 2003) are comparisons to our model 1.c and 1.d (Sentiment Interdependence). The main difference is that we determine representativeness heuristic from multiple sets of proxies while the other two models measure heuristic from single proxies. Shleifer and Vishny model looks at a sequence of news while Ljungqvist et al model looks at the existence of hot markets. Our model does not refute the Shleifer & Vishny model and Ljungqvist et al model but is complementary to these models. In figure 1.c, sentiment investors form a representative bias from past IPO returns when Institutional Interest in the IPO is high and conservatism bias when Institutional Interest is low. Underwriter valuation is given no significance. In figure 1.d, sentiment investors form a representative bias from past IPO returns when underwriter valuation is high. Institutional interest has great significance in returns. In other words, Institutional Interest overrides Underwriter Valuation as a driver of sentiment from past IPO returns.

Table 1.a
Characteristics of data sample

	Past 6 IPO returns (Rs. per share)	Offer/Issue ratio	Issue amount (Rs. Million)	Institutional Allocation (%)	Premium on face value (Rs. per share)
Mean	12.92342	2.581612	557.4001	52.02998	87.00459
Median	3.458333	0.000000	34.00000	50.00000	40.00000
Maximum	403.4917	150.0000	91875.00	76.50000	1090.000
Minimum	-57.83333	0.000000	7.500000	9.500000	1.000000
Std. Dev.	35.91797	11.60360	3778.804	10.38721	134.1155
Observations	1501	1501	1501	203	545

Table 1.b
Summary statistics of data sample

	Number of IPOs		
	Regime 1 (1995-1999)	Regime 2 (1999-2005)	Regime 3 (2005-2007)
All IPOs	1206	135	160
Fixed –priced IPOs	1206	83	31
Bookbuilt IPOs	0	52	129
High Underwriter Valuation	298	95	159
No premium	908	40	1
Large IPOs (>US\$600M)	0	2	3
High Institutional Allocation	0	17	28
Low Institutional Allocation	0	34	74
Info.Technology Industry	32	49	18
Pharmaceutical Industry	68	10	5
Financial Services Industry	341	3	6
Textile Industry	120	3	16

Table 1 provides descriptive statistics for the variables used in this paper. A total of 1501 IPOs from 1995 to 2007 are used in our analyses. *Large company IPOs*, *IPOs with low institutional allocation* and *bookbuilt IPOs* are exclusive to Regime 2 and Regime 3. *Positive premiums* are those with positive offer price premium over face value. *Large IPOs (>US\$600million)* is based on SEBI definition of large IPO. *Low institutional allocations* are those that are below 50% of the maximum 75% and 70% imposed by SEBI in Regime 2 and 3 respectively (columns 2 and 3). In Regime 1, *bookbuilding* mechanism was not yet available in India.

Table 2
Underpricing in IPOs relative to Underwriter Valuation

Table 2.a (Regime 1: 1995-1999)		
	(1)	(2)
Dependant variable:	(First Day Return*High Val)	(First Day Return*Low Val)
Past 6 IPO returns	1.51 (13.85)***	0.27 (5.11)***
R ²	0.14	0.02
Observations	1205	1205

***, ** and * are 1%, 5% and 10% significance levels respectively

Table 2.b (Regime 2: 1999-2005)		
	(1)	(2)
Dependant variable:	(First Day Return*High Val)	(First Day Return*Low Val)
Past 6 IPO returns	0.99 (6.76)***	0.09 (5.39)***
High Institution (dummy)	58.37 (1.53)	0.14 (0.05)
No Institution(dummy)	22.53 (0.88)	1.81 (0.67)
R ²	0.25	0.18
Observations	147	147

***, ** and * are 1%, 5% and 10% significance levels respectively

Table 2.c (Regime 3: 2005-2007)		
	(1)	(2)
Dependant variable:	(First Day Return*High Val)	(First Day Return*Low Val)
Past 6 IPO returns	-0.04 (-0.20)	0.07 (0.01)
High Institution (dummy)	105.60 (4.74)***	0.01 (8.33)***
No Institution(dummy)	-26.60 (-1.35)	0.00 (0.00)
R ²	0.19	1.00
Observations	136	136

***, ** and * are 1%, 5% and 10% significance levels respectively

This table presents tests of IPO underpricing when there is a positive premium on face value of IPOs in the three regimes in India. Table 2.a shows results during regime 1, when IPOs were priced using only fixed-price mechanism. During this regime, there were no large company IPOs (> US\$600million). We define underwriter valuation (*India rupees*) as the “premium on face value” of the IPO offer price. We cannot establish Hot markets sentiment in this regime. Our explanation is that underwriters in regime 1 heavily underpriced IPOs and hence, sentiment investors during this regime did not use sentiment proxies in our Sentiment Index model.

In Table 2.b, we test for IPO underpricing when there is a positive premium on face value of IPOs in Regime 2, when bookbuilding pricing mechanism was first introduced in

India. We see a strong correlation in underwriter valuation and IPO returns. We also see that the returns are less when there is no-premium. This is consistent with our Hypotheses 1. We also notice that underpricing in fixed-price IPOs is higher. However, we cannot confirm our empirical tests in Table 2.b because of low R^2 . Suffice to say that the test results are consistent with existing empirical and theoretical studies on bookbuilding vs. fixed-price IPOs.

In Table 2.c, we test for IPO underpricing when there is a positive premium on face value of IPOs in Regime 3, when pricing mechanism remained the same as in Regime 2 but restrictions were imposed on modification to investor bids during pre-IPO period or bookbuilding process. Since IPOs with no-premiums are rare in Regime 3, no-premium tests cannot be empirically established in these results. Otherwise, Regime 3 test results concur with results in Regime 2.

Table 3
 IPO underpricing and Institutional investor interest

Dependant variable: First day IPO returns*60%Institution allocation		
Table “.a (High Institutional interest)		
	Regime 2	Regime 3
Past 6 IPO returns	1.80 (11.38)***	1.06 (4.51)***
High Underwriter Valuation (dummy)	1.55 (0.28)	17.37 (0.21)
R ²	0.48	0.13
Observations	147	136

***, ** and * are 1%, 5% and 10% significance levels respectively

Dependant variable: First day IPO returns* 50%Institution allocation		
Table 3.b (Low Institutional interest)		
	Regime 2	Regime 3
Past 6 IPO returns	0.28 (4.76)***	0.18 (1.26)
High Underwriter Valuation (dummy)	3.26 (0.97)	12.00 (0.18)
R ²	0.16	0.01
Observations	147	136

***, ** and * are 1%, 5% and 10% significance levels respectively

Table 4 presents tests of IPO underpricing for two different institutional allocation amounts. Table 4.a shows results for 60% institutional allocation. For this amount, past IPO returns contribute significantly to IPO underpricing. In Table 4.b, we test for the impact of past IPO returns on 50% institutional allocation. The correlation is significantly weaker. Therefore, investor sentiment towards past IPOs is significant when Institutional Investor interest is high but not otherwise.

Table 4
 IPO underpricing, representativeness heuristic and limits to arbitrage.

Dependent Variable:	First day IPO return						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Past 6 IPO returns	0.42 (8.35)***	0.43 (8.49)***	0.43 (8.35)***	0.52 (9.49)***	0.42 (.8.15)***	0.38 (7.14)***	
Underwriter valuation	0.11 (3.13)**		0.35 (15.62)***		0.34 (15.28)***	0.10 (2.17)***	0.37 (16.3)
Bookbuilding issue price offer price difference	2.37 (9.03)***	3.00 (18.01)***				2.36 (9.02)***	
Bookbuilding issue date offer date duration	-0.013 (-2.03)*	-0.014 (-2.14)*				-0.01 (-1.67)	
Large Company (dummy)	-66.27 (-2.23)*	-49.88 (-1.70)	-93.19 (-3.07)**	-19.19 (-0.59)		-61.17 (-2.06)*	-77.23 (-2.5)*
Low Institutional Allocation (dummy)	-15.51 (-2.04)*	-15.45 (-2.03)*	-18.37 (-2.36)*	-25.51 (-3.04)**	-18.47 (-2.36)*	-16.85 (-2.40)*	-13.83 (-1.74)
Regime 1 (dummy)	-4.23 (-1.13)	-4.67 (-1.24)	-3.55 (-0.93)	-7.27 (-1.76)	-3.44 (-0.90)	6.30 (0.83)	-7.72 (-1.99)
Regime 3 (dummy)	-28.86 (-3.69)***	-24.74 (-3.20)**	-20.83 (-2.61)*	28.28 (3.56)**	-20.14 (-2.52)*	-0.11 (-1.94)*	-12.94 (-1.60)
Financial Services Industry (dummy)						4.19 (0.99)	
Pharmaceutical Industry (dummy)						4.71 (0.63)	
Information Technology Industry (dummy)						31.42 (4.19)***	
Textiles Industry (dummy)						0.58 (0.10)	
R ²	0.26	0.25	0.22	0.09	0.21	0.27	0.18
Observations:	1501						

***, ** and * are 1%, 5% and 10% significance levels respectively

This table presents tests of both hypothesis 1 and hypothesis 2. The dependant variable is *first day IPO return (in Indian rupees)* which is the difference in closing price on first day of IPO and final offer price of the IPO share.

For hypothesis 1, we study the affect of *past IPO returns (in Indian rupees)* and *underwriter valuation (in Indian rupees)* on the first day IPO return of uncertain

companies. Past IPO returns is the average of six most recent IPO returns. Uncertain companies are defined as small and mid cap companies below US\$600 million. There are only 5 IPOs larger than US\$600 million in the sample data. This explains the low significance of test results of *Large company (in Indian rupees)*. The two pre-IPO sentiment parameters are *Bookbuilding issue price offer price difference (in Indian rupees)* and *Bookbuilding issue date and offer date duration (in number of days)*. Higher difference in former parameter leads to higher first day returns or underpricing. On the other hand, longer duration period has the opposite affect although to a very small extent. While columns 1, 3 & 5 indicate that past IPO returns together with positive premiums condition lead to higher first day returns, the R^2 in column 4 indicates that past IPO returns alone do not fully account for first day returns and thus IPO underpricing.

For hypothesis 2, we find that first day returns are low for IPOs with fewer institutional investors as measured by the *Low Institutional Allocation dummy (IPOs with institutional investors shares allocated below the maximum allowed by SEBI)*. The lack of institutional investment is perceived by sentiment investors as lack of institutional interest and hence, the negative first day returns.

The benchmark time period for the tests is during Regime 2 (from 1999 to 2005) when bookbuilding was first introduced in India. *Regime 1 (from 1995 to 2005)* is when IPOs were priced using only fixed-price mechanism. In *Regime 3 (from 2005 to 2007)*

Fixed IPOs are common to all 3 regimes. Hence, we control for fixed-price IPOs by setting the regression benchmark in column 6 to IPOs through bookbuilding. The results are consistent with the other regressions.