

## Retail Investor Sentiment and IPO Valuation

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### **Abstract**

We examine the impact of retail investor sentiment – measured as the abnormal search volume index (SVI) from Google Trends – on the initial valuation of an IPO as measured by the midpoint of the initial price range. Focusing on initial valuation allows us to separate retail investor sentiment from institutional investor sentiment since bookbuilding has not yet begun at the time of the initial valuation. Controlling for the valuations of comparable, matching companies, we find that abnormal SVI before the initial valuation is positively related to Price/Sales, Price/EBITDA, and Price/Assets. Our results are robust to using the low, midpoint, or high of the initial price range as our IPO valuation point estimate. Thus, retail investor sentiment influences IPO valuation. We conclude that the reward to institutional investors and underwriters for their respective roles during bookbuilding may be unjustified since they free-ride on information provided by retail investors, who are not rewarded in any way and instead forced to buy shares at higher prices, on average, in the after-market.

## 1. Introduction

In the United States, much attention until recently has focused on the role of institutional investors during the IPO bookbuilding process and their impact on IPO valuation. This fact is not surprising given that the vast majority of IPO shares are allocated to institutional investors by underwriters (Aggarwal et al. (2002)). As a result, the role of individual (retail) investors has been largely ignored. The recent availability of proxies for retail investor sentiment (for example, Google's Search Volume Index, or SVI, used in Da et al. (2011)) has opened the door for examining the important supplementary role that retail investors play when a firm goes public. The interesting fact is that while retail investors may provide significant information on valuation, their efforts are likely to be unrewarded as they typically do not get allocations in the IPO and instead they are left to buy shares in the after-market at higher prices (as compared to the offer price), on average. On the other hand, both institutional investors and underwriters are rewarded for their efforts when a firm goes public. According to Benveniste & Spindt (1989), institutional investors are rewarded with underpricing for providing truthful information during bookbuilding. Similarly, underwriters are compensated for gauging the demand of and marketing the IPO to institutional investors. It is therefore possible that both these constituents free-ride on information provided by retail investors, implying that they receive more compensation than they truly deserve. While it may be argued that retail investors are less informed and thus may provide irrational (i.e. excessively optimistic or pessimistic) views compared to "more rational" institutional investors, retail investor sentiment may still matter.

In this paper, we examine the impact of retail investor sentiment on initial IPO valuation, specifically the midpoint of the initial price range. Retail investor sentiment is proxied by abnormal SVI. By focusing on initial valuation, we are able to isolate retail investor sentiment from institutional investor sentiment since bookbuilding officially begins

only after the filing of the initial prospectus containing the initial price range (see pp. 231-232 in Hanley (1993) on the Microsoft IPO). Several studies have examined IPO valuation. For example, Kim & Ritter (1999) suggest that accounting information along with comparable firm multiples should be used to value IPOs. They find that price-to-earnings, market-to-book, and price-to-sales multiples of comparable firms are not very useful in predicting valuation without making adjustments because these ratios differ widely for young firms in the same industry. In a more recent paper, Purnanandam & Swaminathan (2004) question whether IPOs are underpriced given that there is a large volume of literature showing positive underpricing for IPO firms. Based on a sample of IPOs from 1980 to 1997, they find that the median IPO was significantly overvalued at the offer price as compared to valuations based on comparable firm multiples. The focus of both the above papers, however, is on the final offer price and both papers ignore the impact of retail investor sentiment. Houston et al. (2006) find that the offer price was set at a discount relative to comparable firms during the internet bubble of 1999-2000. On the other hand, it was set at a small premium in relation to similar firms in the pre-bubble period.

Da et al. (2011) use Google's SVI as a proxy for retail investor attention. Based on a sample of 185 U.S. IPOs from 2004 to 2007, the authors find a significant upward trend in SVI beginning two to three weeks before the IPO week followed by a significant jump in SVI during the IPO week, indicating an increase in retail attention towards the stock. The SVI, however, reverts to its pre-IPO level two to three weeks after the IPO, an indication that retail attention is not permanent. The authors further find that IPOs with low abnormal SVI have an average underpricing of 10.90% while IPOs with high abnormal SVI have an average underpricing of 16.98%, and the difference is statistically significant at the 1% level. Thus, the focus of Da et al. (2011) is on examining the impact of abnormal SVI on underpricing.

Underpricing is traditionally measured relative to the offer price. It could be argued that the midpoint of the initial price range is a better estimate of the value of a firm (albeit, at an earlier stage) than the offer price since the latter reflects the reward to institutional investors. By contrast, the initial price range is set before the IPO is marketed to institutional investors. In our paper, there are two key dates:- the date when the first S-1 (or equivalent) filing (henceforth, initial filing) is made and the date when an amended filing containing the initial price range occurs (henceforth, initial price filing). The initial price filing typically occurs sometime after the initial filing. We examine the SVI before the initial filing and compare it with the SVI after the initial filing but before the initial price filing. Our abnormal SVI variable captures the difference in SVI between the latter period and former period. Our objective is to examine if retail sentiment influences the initial price stated in the prospectus.

Google Trends captures SVI on a weekly basis when search terms are popular and so our abnormal SVI variable is based on weekly comparisons. When we examine periods consisting of more than one week either before or after the initial filing, we take the average SVI. Using different measures of abnormal SVI (based on different windows pre- and post-initial filing), we find that higher abnormal SVI results in higher initial valuations (*Price-to-Sales*, *Price-to-EBITDA*, *Price-to-Assets*) after accounting for valuations of firms with similar characteristics and other control variables. Our results are robust to using the low, midpoint, or high of the initial price range as our point estimate for initial IPO valuation. Thus, retail sentiment influences initial valuation which implies that underwriters do not merely base valuation on fundamentals and peer-valuations. Institutional investors eventually step in, reveal their demand preferences, receive shares in the IPO, and are rewarded for being truthful during bookbuilding with underpricing. Further, underwriters are compensated primarily for marketing the IPO to institutional investors. On the other hand, retail investors go largely unrewarded. As our findings show, they play an important role in valuation but do

not receive IPO allocations and are forced to purchase shares in the after-market at higher prices, on average.

## **2. Retail Investor Sentiment and Google Trends**

Derrien (2005) examines the impact of investor sentiment on IPO pricing. Using a theoretical model backed by empirical evidence (a sample of 62 French IPOs between 1999 and 2001), he shows that the IPO price chosen by the underwriter is dependent on both the intrinsic value of the company (revealed by institutional investors) and noise trader sentiment. The IPO price is higher if the noise trader sentiment is more favorable. Similarly, Cornelli et al. (2006) use a theoretical model to examine the relationship between irrational retail investors and post-IPO prices. They test their model empirically using a dataset of 486 IPOs from 12 European countries (where grey market trading is prevalent) between 1995 and 2002. They use grey market prices to proxy for retail investor valuations and find that high grey market prices, a measure of over-optimism, are positively correlated with first-day IPO returns and negatively correlated with IPO performance up to one year after going public. The authors provide evidence that the grey market traders are typically retail investors and small institutions (i.e., small investors).

The frequency of search terms used in the Google search engine has been captured since 2004 and is increasingly being used by researchers as a proxy for attention by consumers and investors. To the best of our knowledge, Ettredge et al. (2005) and Cooper et al. (2005) are the first published papers that suggest that web search data may be useful in predicting economic statistics and cancer-related topics respectively. Guzman (2011) uses Google data to predict inflation. Choi & Varian (2012) – both authors are associated with Google, Inc. – describe how Google's search engine data can be used to forecast automobile sales,

unemployment claims, planning a travel destination, and consumer confidence in the short-term. Their claim is that rather than predicting the *future*, Google Trends can be used to predict the *present* (i.e., contemporaneous events). Drake et al. (2012) examine factors that influence investor demand for information around earnings announcements and find that abnormal Google search volume increases around two weeks before the earnings announcement, peaks significantly at the announcement, and continues to remain high sometime after the announcement. They also find that when investors search for more information in the period before the announcement, price and volume are significantly affected during this time as compared to at the actual announcement.

The first paper that we are aware of that uses Google Trends while examining IPOs is by Da et al. (2011) who use Google's SVI as a proxy for retail investor attention. Based on a sample of firms from the Russell 3000 index from 2004 to 2008, they find that SVI captures retail investors' attention. They test the attention theory argument proposed by Barber & Odean (2008) according to which individual investors are net-buyers of stocks that grab attention. As a result, an increase in individual investor attention (proxied by abnormal SVI) leads to positive price pressure in the short-run because of these uninformed traders. In the long-run, however, a price reversal will occur.

Da et al. (2011) further test the attention theory argument using a sample of 185 U.S. IPOs from 2004 to 2007. The authors find a significant upward trend in SVI beginning two to three weeks before the IPO week followed by a significant jump in SVI during the IPO week, indicating an increase in retail attention towards the stock. The SVI, however, reverts to its pre-IPO level two to three weeks after the IPO, an indication that retail attention is not permanent. The authors further find that IPOs with low abnormal SVI during the week prior to the IPO have an average underpricing of 10.90% while IPOs with high abnormal SVI have

an average underpricing of 16.98%, and the difference is statistically significant at the 1% level implying that higher retail sentiment is associated with greater underpricing.

In addition, Da et al. (2011) examine the impact of increased retail attention prior to the IPO on long-run IPO performance. They find that IPOs with large underpricing resulting from investor attention underperform firms with similar valuations (in terms of market capitalization and book-to-market ratios) for the period of 5-to-52 weeks after the IPO. However, IPO firms do not suffer return reversal post-IPO when large underpricing does not result from investor attention. Note that the IPO-related focus of Da et al. (2011) is on examining the impact of retail attention *just prior to the offer* on underpricing and long-run performance. In other words, retail investor attention is captured simultaneously with institutional investor attention. By contrast, we are able to isolate retail attention from institutional attention since our focus is on the pre-bookbuilding period.

### **3. IPO Valuation**

While some of the studies mentioned in the previous section examine both retail sentiment and valuation, many studies focus on valuation without considering retail investors. For example, Kim & Ritter (1999) argue that discounted cash flow analysis is not suitable for IPO firms since it is difficult to forecast cash flows for young firms. They state that accounting numbers along with comparable firm multiples “is widely recommended in both academic and practitioner publications and is standard practice in many IPO valuation case studies used in business schools” (p. 410). The authors use price-to-earnings, market-to-book, price-to-sales, enterprise value-to-sales, and enterprise value-to-operating cash flow ratios of comparable firms as benchmarks for IPO valuation. They find that historical price-to-earnings is not a reliable measure of valuation without adjustment and state that this is

because price-to-earnings ratios vary widely within an industry. On the other hand, the other ratios are more reliable and improve further when adjustments are made for profitability and growth of both the IPO firm and comparable firms. On p. 411, Kim & Ritter (1999) state the following:-

*“Our results demonstrate the value added by investment bankers in pricing issues. While they use accounting information and comparable firm multiples as benchmarks for choosing a preliminary price range, the additional information that they process about the market’s demand results in much more accurate pricing. How much of this improvement in accuracy is due to superior fundamental analysis, and how much is due merely to canvassing market demand, is an open question.”*

The above quote implies that accounting information and comparable firm multiples alone are not sufficient to ensure accurate pricing when determining the initial price range. Instead, the market’s demand for the IPO helps improve pricing accuracy. However, institutional investor demand is not available when the initial price range is set. One way to circumvent this problem is to use retail investor sentiment which is available prior to the filing of the initial price range. Thus, we expect retail sentiment to improve the accuracy in the pricing of the preliminary price range.

In a more recent paper on IPO valuation, Purnanandam & Swaminathan (2004) examine how IPOs are priced at the offer relative to their “fair value”. They compute fair values using price-to-sales, price-to-EBITDA, and price-to-earnings of non-IPO industry peers and then compare this fair value to the offer price. They come up with the surprise finding that IPOs are overvalued (median overvaluation ranges from 14% to 50%) at the offer price relative to comparable firms. The focus of Purnanandam & Swaminathan (2004), however, is on valuation at the offer rather than at the initial price range.

The decision to file for an IPO is particularly important since approximately 20% of firms that file to go public eventually withdraw or postpone the IPO (Busaba et al. (2001), Busaba (2006), Bouis (2009)), and, of these, only 10% are successful in going public a second time (Dunbar & Foerster (2008)). Since the initial valuation occurs before the roadshow begins (a firm is not legally permitted to market an IPO to investors without a preliminary prospectus), institutional investor demand is not available at the time of the initial valuation. Examining retail investor demand allows us to entertain the possibility that a firm's initial valuation is influenced by "irrational" investors. Further, Lowry & Schwert (2004) find that public information is not fully incorporated into the initial price range. Given that Google SVI data is available freely, it is interesting to re-examine the impact of public information on initial IPO valuation.

#### **4. Data and Methods**

Our initial sample consists of 1541 U.S. IPOs from Securities Data Corporation's (SDC) New Issues database that went public from 2004 to 2011. Our sample period begins in 2004 because Google's SVI, our proxy for retail investor attention, is available only from this year onwards. As in Da et al. (2011), we include only regular and common stock IPOs (CRSP share classes 10 and 11) that initially list on NYSE, Amex, and NASDAQ if the first available CRSP closing price is available within five trading days of the IPO date. We also drop financial firms (SIC code 6xxx). Our sample reduces to 674 firms as a result. Da et al. (2011) report that valid SVI values are not available for some stocks because a) individuals may not use the SDC company name to search for the stock in Google, and b) Google Trends truncates the output and returns missing values for SVIs with insufficient searches. We use

the company's name as our search term rather than the ticker symbol since it is very likely that the latter is unknown to prospective investors, especially before the initial filing.

Our company search terms in Google Trends exclude legal terminology (e.g., Inc, Corp, Co, Co Inc). We use our own judgment as to whether to include "Holding", "Holdings", or "Group" when the firm name ends in either of these terms. We also use our own discretion in some special instances (for example, in the case of "ARBINET THEXCHANGE INC", we use "ARBINET" since the former does not result in any hits even after excluding "INC" – Google Trends treats small letters and capital letters the same). Our objective is to capture a company name that someone may have entered into Google. Using the above example, a person is more likely to enter "ARBINET" as a search term than "ARBINET THEXCHANGE", while still referring to the same company. Choosing the latter may be a more precise match but it does not necessarily mean that someone who entered the former search term was not referring to the same firm. More seriously, being too specific can result in little to no SVI data.

Google Trends has both weekly and monthly SVI data. When a particular term is searched relatively less in Google, it is more likely to have monthly SVI data. On the other hand, when a term is searched frequently, it is more likely to have weekly SVI data. In our analysis, we use weekly data and do not consider monthly data for two reasons. First, even if data is available on a monthly basis, it is often the case that SVI data is available for one month only as a result of which we cannot calculate abnormal SVI. Even if monthly SVI data is available consistently for a period around the initial filing date, there is a strong possibility that the month following the month of the initial filing is the month in which the initial pricing occurs. As a result, we will not be able to capture an accurate SVI since we are trespassing into post-initial pricing territory, whereas we are interested in the period between initial filing and initial pricing. Given its shorter time-frame, weekly SVI data helps counter

this deficiency. As regards weekly SVI, we do not consider the SVI during the week in which the initial filing or initial pricing occurs. Therefore, the latest period we consider before the initial filing (or pricing) is the SVI week before the SVI week containing the initial filing (or pricing). Similarly, the earliest period that we consider following the initial filing is the SVI week after the SVI week containing the initial filing.

As in Da et al. (2011), we use abnormal SVI rather than raw SVI. The latter is not very meaningful in the cross-section because its value is computed by Google relative to other searches over the chosen period and is based on a benchmark of 100 for the maximum volume of searches. Our abnormal SVI measures are computed relative to the initial filing date. This is because we expect changes in retail sentiment to be affected by the initial filing of the IPO. For example, Gap Inc. may attract consumers both prior to and following the initial filing. Ex ante, we would expect no difference between the two. Any increase in SVI post-initial filing can be attributed to retail investor interest in the prospective IPO.

We also require valid sales, earnings before interest, taxes, depreciation, and amortization (EBITDA), earnings per share (EPS), and total assets. Since sales are non-negative (as opposed to EBITDA and EPS), we begin with the basic requirement that sales data must exist on Compustat. In addition, data for our control variables (underwriter rank, VC dummy, and industry return) must also be available. As a result of these restrictions, our final sample consists of 147 IPO firms. Given that SDC has significant errors in its data, we hand-collect the date of the initial filing, the date of the initial pricing, and the initial price range from the Securities and Exchange Commission (SEC) website.

#### 4.1 Valuation measures

We use Purnanandam & Swaminathan (2004) as a guide to create our valuation measures. For our IPO sample firms, sales, EBITDA, EPS, and assets are obtained from Compustat for the fiscal year ending just prior to the IPO. For each IPO in our sample, we identify a non-IPO industry firm with comparable sales and EBITDA profit margin (i.e., EBITDA/sales) that did not go public in the previous three years. As Purnanandam & Swaminathan (2004) point out, this results in matching “operating risks, profitability, and growth”. Additionally, sales is a proxy for size. Further, EBITDA profit margin is used to capture firms with similar profitability. Our objective is to ensure that the key fundamentals of our IPO firm and matching firm are as close to each other as possible. EBITDA profit margin has the advantage over net profit margin in that the former captures operating performance while the latter reflects non-operating performance. A firm is likely to have positive EBITDA and negative net profit and thus would be excluded from tests of the latter. This is particularly a problem given our small sample size. Nevertheless, we include *Price/EPS* as a valuation measure initially but exclude it from our key tests since there are negative or missing values for more than half our sample.

Bhojraj & Lee (2002) find that adjusting industry median multiples based on operating performance improves valuation accuracy. Further, Purnanandam & Swaminathan (2004) argue that using either a small or large list of characteristics to match firms on is not ideal. Like them, we settle on industry, sales, and EBITDA profit margin as matching criteria.

To find a match for each IPO in our sample, we begin by considering all firm-years in the Compustat database with fiscal years ending during the calendar year prior to the IPO. We then eliminate firms that went public in the three years before the IPO. From the remaining set of firm-years, we drop observations with 2-digit Compustat SIC codes that are

different from the 2-digit SIC code for the IPO company. By contrast, Purnanandam & Swaminathan (2004) use the 48 industries in Fama & French (1997) which are based on 4-digit SIC codes. We then group observations into terciles based on sales and then each tercile into another three terciles based on EBITDA profit margin. The resulting  $3 \times 3$  matrix is used to find a match for the IPO. Specifically, within the relevant sub-sample of matching firms, we find a match that is closest in sales to the IPO firm.

Our valuation measures are created based on the above match. For each firm in our IPO sample, we create four valuation measures; *Price-to-Sales* <sub>(IPO)</sub>, *Price-to-EBITDA* <sub>(IPO)</sub>, *Price-to-EPS* <sub>(IPO)</sub>, and *Price-to-Assets* <sub>(IPO)</sub>. Only observations with positive values of EBITDA and EPS are used since negative values are not meaningful. *Assets* is the book value of assets for the fiscal year ending prior to the IPO. Purnanandam & Swaminathan (2004) argue that book values tend to be low for IPO firms prior to going public and Liu et al. (2002) state that book values are poor measures of valuation. Nevertheless, we use *Price-to-Assets* <sub>(IPO)</sub> as an additional valuation measure since we are forced to eventually drop *Price-to-EPS* <sub>(IPO)</sub> because of a significant reduction in our sample size if included. The price multiples of our IPO firms are computed as follows:-

$$Price-to-Sales_{(IPO)} = \frac{\text{Midpoint of initial price range} \times \text{CRSP shares outstanding before IPO}}{\text{Prior fiscal year Sales}}$$

$$Price-to-EBITDA_{(IPO)} = \frac{\text{Midpoint of initial price range} \times \text{CRSP shares outstanding before IPO}}{\text{Prior fiscal year EBITDA}}$$

$$Price-to-EPS_{(IPO)} = \frac{\text{Midpoint of initial price range}}{\text{Prior fiscal year EPS}}$$

$$Price-to-Assets_{(IPO)} = \frac{\text{Midpoint of initial price range} \times \text{CRSP shares outstanding before IPO}}{\text{Prior fiscal year Assets}}$$

We use the midpoint of the initial price range because we are interested in capturing initial valuation, not valuation at the offer. Unlike Purnanandam & Swaminathan (2004) who use shares outstanding at the close on the offer date, we use the number of CRSP shares outstanding before the IPO (i.e., CRSP shares outstanding at the close on the offer date minus number of shares offered in the IPO) because our accounting variables are captured before the IPO. The price multiples of our matching firms are computed as follows:-

$$Price\text{-to-Sales}_{(Match)} = \frac{Market\ price \times CRSP\ shares\ outstanding}{Prior\ fiscal\ year\ Sales}$$

$$Price\text{-to-EBITDA}_{(Match)} = \frac{Market\ price \times CRSP\ shares\ outstanding}{Prior\ fiscal\ year\ EBITDA}$$

$$Price\text{-to-EPS}_{(Match)} = \frac{Market\ price}{Prior\ fiscal\ year\ EPS}$$

$$Price\text{-to-Assets}_{(Match)} = \frac{Market\ price \times CRSP\ shares\ outstanding}{Prior\ fiscal\ year\ Assets}$$

For the matching firm, as in Purnanandam & Swaminathan (2004), *Market price* is the CRSP stock price and *CRSP shares outstanding* is the number of shares outstanding at the close of the trading day prior to the issue date. The ratios we are interested in are those of the IPO firm to the matched firm based on the different multiples:-

$$Price\text{-to-Sales} = \frac{Price\text{-to-Sales}_{(IPO)}}{Price\text{-to-Sales}_{(Match)}}$$

$$Price\text{-to-EBITDA} = \frac{Price\text{-to-EBITDA}_{(IPO)}}{Price\text{-to-EBITDA}_{(Match)}}$$

$$Price\text{-to-EPS} = \frac{Price\text{-to-EPS}_{(IPO)}}{Price\text{-to-EPS}_{(Match)}}$$

$$Price\text{-to-Assets} = \frac{Price\text{-to-Assets}_{(IPO)}}{Price\text{-to-Assets}_{(Match)}}$$

#### 4.2 Descriptive statistics and univariate results

In Table 1 Panel A, we examine the summary statistics of the data. All variables are defined in the Appendix. Median *Price-to-Sales* is 1.67 and median *Price-to-EBITDA* is 1.34. Comparing them with the much bigger sample in Purnanandam & Swaminathan (2004), our values are slightly lower and higher respectively. Median *Price-to-EPS* is much higher than the corresponding number in the above study (2.17 versus 1.54). We attribute this large difference to the fact that our sample size reduces by 55 per cent (from 147 to 66) because of negative or missing values and this variable is dropped from further analysis. Finally, median *Price-to-Assets* is 2.38.

We next examine the distribution of the abnormal SVI variables. AbSVI<sub>44</sub>, the relative difference between the average SVI over the four weeks after the initial filing date and the average SVI over the four weeks before the initial filing date, has a mean of 0.13 (median 0.06). In other words, average SVI increases around the initial filing. Of the seven time periods that we use to compute the abnormal SVI, the highest abnormal SVI occurs for AbSVI<sub>11</sub> (relative difference between the SVI for the week after the initial filing date and the SVI for the week before the initial filing date). Median abnormal SVI is zero or above in six of the seven scenarios. Finally, in Panel C, we examine two IPO characteristics that may influence valuation. *Underwriter rank* is the ranking of the lead underwriter based on the Carter & Manaster (1990) ranking, updated on Professor Jay Ritter's website, and described in Loughran & Ritter (2004). If there is more than one lead underwriter, the average rank is taken. *Venture Capital* equals one if the firm is backed by a venture capitalist, and zero otherwise.

In Table 2, we examine abnormal SVI for high and low valuation firms. High (low) valuation firms have values equal to or greater (less) than the median. Panel A examines

abnormal SVI for high and low *Price-to-Sales*. Mean AbSVI<sub>44</sub> is 0.213 for high *Price-to-Sales* firms and 0.034 for their low valuation counterparts. The difference using a t-test is highly significant at the 5% level (as is using the Wilcoxon rank sum test). The same holds for most of the other abnormal SVI measures at the 10% level or better. In Panel B, *Price-to-EBITDA* shows overall similar results with high valuation firms having significantly higher abnormal SVI than low valuation firms. Our final valuation measure, *Price-to-Assets*, shown in Panel C, reveals similar findings. From a univariate perspective, the results in Table 2 show that retail investor sentiment is positively associated with initial IPO valuation.

## 5. Multivariate results

We next examine the influence of abnormal SVI on our three valuation measures in a multivariate setting. We run OLS and logit regressions with the valuation measure as the dependent variable and each abnormal SVI measure in turn as the key variable of interest. In the logit regression, the dependent variable takes the value one (zero) if the valuation measure is greater than or equal to (less than) the median. We include underwriter rank, VC dummy, and the equal-weighted buy-and-hold Ken French industry return 90 trading days prior to the initial valuation as control variables. Ex ante we expect that high reputation underwriters and the presence of venture capitalists should lead to higher valuations since these important IPO constituents help to reduce the information asymmetry between the firm and prospective investors. Recall that our valuation measures are created by matching each IPO firm with the most closely related industry match. The industry return measure, on the other hand, captures recent industry performance which may play its own role in IPO valuation.

Tables 3 & 4 show the OLS and logit regression results respectively when the midpoint of the price range is used in determining our valuation measure. In Table 3 Panel A, AbSVI\_44, AbSVI\_11, AbSVI\_22, and AbSVI\_21 have positive and significant coefficients at the 5% level indicating that high retail sentiment results in higher initial valuation of the IPO when measured by *Price-to-Sales*. On the other hand, AbSVI\_11ip, AbSVI\_22ip, and AbSVI\_21ip are not significant. Note that the latter variables are measured just prior to the setting of the initial price range. It is likely that the insignificance is because we have conveniently captured this period ex post. However, a retail investor is most likely unaware of when initial pricing will actually occur. Therefore, SVI soon after the initial filing is likely to be a better measure of retail sentiment (given that the initial filing has just occurred) than SVI before initial pricing. The results above mostly hold in the logit regressions in Table 4 Panel A.

In Table 3 Panel B, we examine the impact of abnormal SVI on *Price-to-EBITDA* using OLS. AbSVI\_44, AbSVI\_22, AbSVI\_11ip, AbSVI\_22ip, and AbSVI\_21ip are all positively significant at the 10% level or better. However, all our seven abnormal SVI measures are significant in the respective logit regression in Table 4 Panel B. Our abnormal SVI measures are once again all positively significant in our final valuation measure, *Price-to-Assets*, using OLS (Table 3 Panel C). However, only AbSVI\_11, AbSVI\_21, AbSVI\_11ip, and AbSVI\_21ip are positively significant in the corresponding logit model (Table 4 Panel C). As regards the other control variables, underwriter rank and VC dummy are positive as expected in some of our regression models. However, underwriter rank is negatively significant in Table 4 Panel B, when *Price-to-EBITDA* is our valuation measure. This result may be partly explained by the fact that high reputation underwriters are often associated with firms with negative profitability at the IPO as was the case during the internet bubble of the late 1990s. We conclude that there is strong evidence overall that retail investor sentiment

influences initial valuation. Thus, like underwriters and institutional investors, retail investors play a very important role in determining IPO valuation.

## **6. Robustness checks**

In the analysis so far, we have used the midpoint of the initial price range as our point estimate in our determination of IPO firm value. While this measure has been taken as a proxy for initial IPO valuation by many studies (for example, Hanley (1993), Lowry & Schwert (2004)), there is no logical reason why any price in the range cannot be justified as the firm's initial value point estimate. So, to examine if our results are robust to other prices in the range, we replace the midpoint of the initial price range with first the high of the range and then the low of the range and examine the impact of abnormal SVI on the newly created valuation measures. The results can be seen in Tables 5-8. In Tables 5 and 6, we use the high of the range in our OLS and logit models respectively. The results are qualitatively similar to those obtained in Tables 3 and 4. Finally, in Tables 7 (OLS) and 8 (logit), we use the low of the initial price range. Once again, the results are overall very similar to those in Tables 3 and 4. We conclude that our results are robust to considering different point estimates of initial IPO valuation based on the initial price range.

## **7. Summary and conclusion**

We examine the impact of retail investor sentiment – measured as the abnormal search volume index (SVI) from Google Trends – on the initial valuation of an IPO as measured by the midpoint of the initial price range. Focusing on initial valuation allows us to separate retail investor sentiment from institutional investor sentiment since bookbuilding has not yet

begun. Using a matched sample in order to determine IPO valuation, we find that abnormal SVI before the initial valuation is positively related to Price/Sales, Price/EBITDA, and Price/Assets. Our results are robust to using the low, midpoint, or high of the initial price range as our IPO valuation point estimate. Thus, retail investor sentiment influences IPO valuation. We conclude that the reward to institutional investors and underwriters for their respective roles during bookbuilding may be unjustified since they free ride on information provided by retail investors, who are not rewarded in any way and instead forced to buy shares at higher prices, on average, in the after-market.

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## Appendix

### Definition of Variables (based on the sequence in which they appear in the paper)

All variables are obtained from Securities Data Corporation New Issue database (SDC) unless otherwise stated. All dollar values are adjusted for inflation using the GDP Implicit Price Deflator (year 2011 values = 100.00).

*Price-to-Sales* is *Price-to-Sales (IPO)* divided by *Price-to-Sales (Match)*. *Price-to-Sales (IPO)* is midpoint of initial price range times CRSP shares outstanding before IPO divided by prior fiscal year sales of the IPO firm. *Price-to-Sales (Match)* is market price times CRSP shares outstanding (both at the close of the trading day prior to the initial filing date) divided by prior fiscal year sales of the matched firm. High (low) *Price-to-Sales* refers to values equal to or greater (less) than the median and take a value of one (zero) in the logit regression.

*Price-to-EBITDA* is *Price-to-EBITDA (IPO)* divided by *Price-to-EBITDA (Match)*. *Price-to-EBITDA (IPO)* is midpoint of initial price range times CRSP shares outstanding before IPO divided by prior fiscal year EBITDA of the IPO firm. *Price-to-EBITDA (Match)* is market price times CRSP shares outstanding (both at the close of the trading day prior to the initial filing date) divided by prior fiscal year EBITDA of the matched firm. High (low) *Price-to-EBITDA* refers to values equal to or greater (less) than the median and take a value of one (zero) in the logit regression.

*Price-to-EPS* is *Price-to-EPS (IPO)* divided by *Price-to-EPS (Match)*. *Price-to-EPS (IPO)* is midpoint of initial price range divided by prior fiscal year EPS of the IPO firm. *Price-to-EPS (Match)* is market price divided by prior fiscal year EPS of the matched firm.

*Price-to-Assets* is *Price-to-Assets (IPO)* divided by *Price-to-Assets (Match)*. *Price-to-Assets (IPO)* is midpoint of initial price range times CRSP shares outstanding before IPO divided by prior fiscal year Assets of the IPO firm. *Price-to-Assets (Match)* is market price times CRSP shares outstanding (both at the close of the trading day prior to the initial filing date) divided by prior fiscal year Assets of the matched firm. High (low) *Price-to-Assets* refers to values equal to or greater (less) than the median and take a value of one (zero) in the logit regression.

*AbSVI\_44* is the average weekly SVI over the four weeks following the week of the first IPO filing minus the average weekly SVI over the four weeks preceding the week of the first IPO filing, over the average weekly SVI over the four weeks preceding the week of the first IPO filing. The variable is set to missing if the initial IPO price range is made public either during the four-week period following the week of the first IPO filing or earlier.

*AbSVI\_11* is the SVI for the week following the week of the first IPO filing minus the SVI for the week preceding the week of the first IPO filing, over the SVI for the week preceding the week of the first IPO filing. The variable is set to missing if the initial IPO price range is made public either in the week following the week of the first IPO filing or earlier.

*AbSVI\_22* is the average weekly SVI over the two weeks following the week of the first IPO filing minus the average weekly SVI over the two weeks preceding the week of the first IPO filing, over the average weekly SVI over the two weeks preceding the week of the first IPO filing. The variable is set to missing if the initial IPO price range is made public either during the two-week period following the week of the first IPO filing or earlier.

*AbSVI\_21* is the average weekly SVI over the two weeks following the week of the first IPO filing minus the SVI for the week preceding the week of the first IPO filing, over the SVI for the week preceding the week of the first IPO filing. The variable is set to missing if the initial IPO price range is made public either during the two-week period following the week of the first IPO filing or earlier.

*AbSVI\_11ip* is the SVI for the week preceding the week of the filing with the initial IPO price range minus the SVI for the week preceding the week of the first IPO filing, over the SVI for the week preceding the week of the first IPO filing. The variable is set to missing if the first IPO filing is made public either during the week preceding the week of the filing with the initial IPO price range or later.

*AbSVI\_22ip* is the average weekly SVI over the two weeks preceding the week of the filing with the initial IPO price range minus the average weekly SVI over the two weeks preceding the week of the first IPO filing, over the average weekly SVI over the two weeks preceding the week of the first IPO filing. The variable is set to missing if the first IPO filing is made public either during the two-week period preceding the week of the filing with the initial IPO price range or later.

*AbSVI\_21ip* is the average weekly SVI over the two weeks preceding the week of the filing with the initial IPO price range minus the SVI for the week preceding the week of the first IPO filing, over the SVI for the week preceding the week of the first IPO filing. The variable is set to missing if the first IPO filing is made public either during the two-week period preceding the week of the filing with the initial IPO price range or later.

*Underwriter rank* is the ranking of the lead underwriter based on the Carter & Manaster (1990) ranking, updated on Professor Jay Ritter's website, and described in Loughran and Ritter (2004). If there is more than one lead underwriter, the average rank is taken.

*Venture Capital* equals one if the firm is backed by a venture capitalist, and zero otherwise.

*Industry return* is the equal weighted buy-and-hold Ken French industry return 90 trading days before the firm's initial pricing date.

**Table 1**  
**Summary Statistics**

The sample includes completed IPOs from 2004-2011 after excluding financial firms (SIC code 6xxx), firms that do not list on NYSE, Amex, or NASDAQ, and firms that do not have CRSP share codes 10 or 11. All variables are defined in the Appendix.

**Panel A: Valuation measures**

Variable	N	Mean	SD	P25	Median	P75	Min	Max
Price-to-Sales	147	5.09	10.89	0.65	1.67	4.35	0	73.92
Price-to-EBITDA	112	4.21	7.91	0.57	1.34	4.26	0	43.27
Price-to-EPS	66	5.02	9.33	0.65	2.17	3.48	0.06	48.24
Price-to-Assets	147	6.71	13.86	0.83	2.38	5.43	0	109.67

**Panel B: Abnormal SVI measures**

Variable	N	Mean	SD	P25	Median	P75	Min	Max
AbSVI_44	147	0.13	0.45	-0.07	0.06	0.24	-1	2.78
AbSVI_11	147	0.23	0.51	-0.03	0.15	0.39	-1	1.88
AbSVI_22	147	0.14	0.38	-0.06	0.09	0.33	-1	1.39
AbSVI_21	147	0.14	0.39	-0.05	0.08	0.29	-1	1.31
AbSVI_11ip	147	-0.02	0.35	-0.19	0	0.13	-1	2.25
AbSVI_22ip	147	-0.02	0.32	-0.16	-0.01	0.15	-1	1.62
AbSVI_21ip	147	-0.02	0.33	-0.18	0	0.09	-1	2.07

**Panel C: Other variables**

Variable	N	Mean	SD	P25	Median	P75	Min	Max
Underwriter rank	147	8.39	0.86	8	8.67	9	4	9
Venture Capital	147	0.5	0.5	0	1	1	0	1

**Table 2****Abnormal SVI and Initial IPO Valuation**

The sample includes completed IPOs from 2004-2011 after excluding financial firms (SIC code 6xxx), firms that do not list on NYSE, Amex, or NASDAQ, and firms that do not have CRSP share codes 10 or 11. All variables are defined in the Appendix.

## Panel A: Abnormal SVI and Price-to-Sales

VARIABLES	N	Low Price-to-Sales		High Price-to-Sales		p-value of t-test	p-value of rank sum test	
		Mean	Median	N	Mean			Median
AbSVI_44	71	0.034	0.020	76	0.213	0.092	0.0145	0.023
AbSVI_11	71	0.139	0.062	76	0.316	0.185	0.0315	0.0395
AbSVI_22	71	0.072	0.050	76	0.206	0.193	0.031	0.025
AbSVI_21	71	0.068	0.038	76	0.199	0.132	0.0374	0.0231
AbSVI_11ip	71	-0.069	-0.085	76	0.019	0.000	0.1218	0.0688
AbSVI_22ip	71	-0.071	-0.081	76	0.036	0.019	0.0411	0.0233
AbSVI_21ip	71	-0.069	-0.089	76	0.022	0.027	0.0976	0.0152

## Panel B: Abnormal SVI and Price-to-EBITDA

VARIABLES	N	Low Price-to-EBITDA		High Price-to-EBITDA		p-value of t-test	p-value of rank sum test	
		Mean	Median	N	Mean			Median
AbSVI_44	48	0.001	0.013	64	0.187	0.082	0.0269	0.0753
AbSVI_11	48	0.061	0.040	64	0.256	0.150	0.0213	0.0556
AbSVI_22	48	0.035	0.049	64	0.172	0.144	0.0426	0.0748
AbSVI_21	48	0.012	0.010	64	0.168	0.105	0.0219	0.0292
AbSVI_11ip	48	-0.116	-0.086	64	0.034	0.000	0.0221	0.0111
AbSVI_22ip	48	-0.094	-0.086	64	0.052	0.000	0.0192	0.0132
AbSVI_21ip	48	-0.115	-0.103	64	0.042	0.027	0.0116	0.0029

Panel C: Abnormal SVI and Price-to-Assets

VARIABLES	Low Price-to-Assets			High Price-to-Assets			p-value of t-test	p-value of rank sum test
	N	Mean	Median	N	Mean	Median		
AbSVI_44	59	0.039	0.000	88	0.185	0.087	0.0443	0.0132
AbSVI_11	59	0.117	0.042	88	0.307	0.190	0.0246	0.0109
AbSVI_22	59	0.065	0.038	88	0.192	0.164	0.0506	0.0284
AbSVI_21	59	0.035	0.013	88	0.202	0.141	0.0095	0.0049
AbSVI_11ip	59	-0.102	-0.087	88	0.029	0	0.0164	0.0074
AbSVI_22ip	59	-0.072	-0.07	88	0.022	0.009	0.076	0.0254
AbSVI_21ip	59	-0.11	-0.105	88	0.037	0.037	0.0048	0.0008

**Table 3**

**Impact of retail investor sentiment on initial IPO valuation based on midpoint of range (OLS)**

The sample includes completed IPOs from 2004-2011 after excluding financial firms (SIC code 6xxx), firms that do not list on NYSE, Amex, or NASDAQ, and firms that do not have CRSP share codes 10 or 11. All variables are defined in the Appendix.

**Panel A: Valuation using Price-to-Sales**

VARIABLES	(1) Price-to-Sales	(2) Price-to-Sales	(3) Price-to-Sales	(4) Price-to-Sales	(5) Price-to-Sales	(6) Price-to-Sales	(7) Price-to-Sales
AbSVI_44	2.930** (1.301)						
AbSVI_11		5.335** (2.288)					
AbSVI_22			5.691** (2.588)				
AbSVI_21				6.441** (2.801)			
AbSVI_11ip					2.190 (1.741)		
AbSVI_22ip						1.549 (1.617)	
AbSVI_21ip							2.336 (2.096)
Underwriter rank	1.113 (0.677)	0.826 (0.570)	1.116* (0.672)	1.019 (0.631)	1.253* (0.741)	1.286* (0.768)	1.309* (0.771)
Venture Capital	1.714 (1.838)	1.456 (1.823)	1.526 (1.817)	1.521 (1.810)	2.025 (1.880)	1.967 (1.924)	1.932 (1.925)
Industry return	-0.119 (7.882)	1.391 (7.684)	-0.0165 (7.737)	-0.0441 (7.654)	-0.930 (8.289)	-0.551 (8.162)	-1.091 (8.420)

Constant	-5.469 (4.942)	-3.936 (4.388)	-5.845 (5.063)	-5.098 (4.756)	-6.303 (5.335)	-6.614 (5.484)	-6.714 (5.485)
Observations	147	147	147	147	147	147	147
Adjusted R-squared	0.008	0.055	0.034	0.046	-0.002	-0.005	-0.002

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Panel B: Valuation using Price-to-EBITDA**

VARIABLES	(1) Price-to- EBITDA	(2) Price-to- EBITDA	(3) Price-to- EBITDA	(4) Price-to- EBITDA	(5) Price-to- EBITDA	(6) Price-to- EBITDA	(7) Price-to- EBITDA
AbSVI_44	2.137* (1.138)						
AbSVI_11		3.099 (2.005)					
AbSVI_22			4.093* (2.204)				
AbSVI_21				3.699 (2.349)			
AbSVI_11ip					2.758* (1.525)		
AbSVI_22ip						3.215** (1.420)	
AbSVI_21ip							2.870* (1.535)
Underwriter rank	0.527 (0.569)	0.426 (0.532)	0.599 (0.573)	0.520 (0.551)	0.725 (0.594)	0.910 (0.645)	0.807 (0.623)

Venture Capital	1.661 (1.637)	1.720 (1.621)	1.569 (1.629)	1.746 (1.632)	1.950 (1.639)	1.760 (1.658)	1.843 (1.662)
Industry return	0.632 (5.907)	1.382 (5.971)	0.461 (5.797)	0.576 (5.782)	-0.384 (6.130)	-0.247 (6.175)	-0.547 (6.209)
Constant	-1.160 (4.347)	-0.715 (4.168)	-1.949 (4.469)	-1.281 (4.280)	-2.524 (4.439)	-4.065 (4.817)	-3.163 (4.624)
Observations	112	112	112	112	112	112	112
Adjusted R-squared	0.001	0.019	0.021	0.015	-0.001	0.002	-0.001

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

### Panel C: Valuation using Price-to-Assets

VARIABLES	(1) Price-to-Assets	(2) Price-to-Assets	(3) Price-to-Assets	(4) Price-to-Assets	(5) Price-to-Assets	(6) Price-to-Assets	(7) Price-to-Assets
AbSVI_44	4.123* (2.131)						
AbSVI_11		3.836* (2.168)					
AbSVI_22			5.479** (2.507)				
AbSVI_21				5.072* (2.604)			
AbSVI_11ip					6.166*** (2.077)		
AbSVI_22ip						6.944*** (2.509)	

AbSVI_2lip							6.366***
							(2.313)
Underwriter rank	1.439*	1.266	1.464*	1.396*	1.764**	2.065**	1.910**
	(0.804)	(0.765)	(0.794)	(0.784)	(0.849)	(0.945)	(0.890)
Venture Capital	0.724	0.768	0.692	0.779	1.133	0.841	0.882
	(2.269)	(2.323)	(2.303)	(2.327)	(2.243)	(2.251)	(2.274)
Industry return	-8.724	-7.634	-8.623	-8.662	-11.02	-10.68	-11.38
	(9.369)	(9.501)	(9.319)	(9.351)	(9.673)	(9.666)	(9.743)
Constant	-5.428	-4.468	-5.882	-5.264	-7.485	-9.925	-8.548
	(5.715)	(5.534)	(5.708)	(5.630)	(5.988)	(6.785)	(6.277)
Observations	147	147	147	147	147	147	147
Adjusted R-squared	0.012	0.013	0.017	0.014	0.017	0.019	0.016

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table 4**

**Impact of retail investor sentiment on initial IPO valuation based on midpoint of range (Logit)**

The sample includes completed IPOs from 2004-2011 after excluding financial firms (SIC code 6xxx), firms that do not list on NYSE, Amex, or NASDAQ, and firms that do not have CRSP share codes 10 or 11. All variables are defined in the Appendix.

**Panel A: Valuation using Price-to-Sales**

VARIABLES	(1) Price-to-Sales	(2) Price-to-Sales	(3) Price-to-Sales	(4) Price-to-Sales	(5) Price-to-Sales	(6) Price-to-Sales	(7) Price-to-Sales
AbSVI_44	1.114** (0.543)						
AbSVI_11		0.669* (0.385)					
AbSVI_22			0.856* (0.490)				
AbSVI_21				0.841* (0.486)			
AbSVI_11ip					0.848 (0.518)		
AbSVI_22ip						1.073* (0.577)	
AbSVI_21ip							0.835 (0.576)
Underwriter rank	-0.255 (0.216)	-0.283 (0.214)	-0.246 (0.211)	-0.260 (0.212)	-0.207 (0.196)	-0.158 (0.197)	-0.191 (0.200)
Venture Capital	1.255*** (0.359)	1.258*** (0.357)	1.251*** (0.359)	1.262*** (0.357)	1.310*** (0.360)	1.273*** (0.361)	1.279*** (0.359)
Industry return	-0.267 (1.156)	-0.0936 (1.149)	-0.272 (1.161)	-0.279 (1.141)	-0.597 (1.193)	-0.583 (1.206)	-0.637 (1.187)

Constant	1.492 (1.813)	1.676 (1.784)	1.418 (1.763)	1.532 (1.775)	1.232 (1.613)	0.829 (1.610)	1.117 (1.646)
Observations	147	147	147	147	147	147	147
Pseudo R-squared	0.0953	0.0869	0.0859	0.0857	0.0823	0.0866	0.0809

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Panel B: Valuation using Price-to-EBITDA**

VARIABLES	(1) Price-to- EBITDA	(2) Price-to- EBITDA	(3) Price-to- EBITDA	(4) Price-to- EBITDA	(5) Price-to- EBITDA	(6) Price-to- EBITDA	(7) Price-to- EBITDA
AbSVI_44	1.156* (0.611)						
AbSVI_11		0.989** (0.462)					
AbSVI_22			0.944* (0.562)				
AbSVI_21				1.240** (0.608)			
AbSVI_11ip					1.585** (0.730)		
AbSVI_22ip						1.286* (0.674)	
AbSVI_21ip							1.748** (0.813)
Underwriter rank	-0.521* (0.282)	-0.554** (0.272)	-0.496* (0.275)	-0.527* (0.279)	-0.461* (0.268)	-0.381 (0.280)	-0.418 (0.274)

Venture Capital	1.328*** (0.450)	1.333*** (0.451)	1.294*** (0.441)	1.343*** (0.448)	1.394*** (0.457)	1.306*** (0.449)	1.359*** (0.458)
Industry return	-0.0887 (1.174)	0.0901 (1.187)	-0.148 (1.186)	-0.157 (1.180)	-0.395 (1.328)	-0.395 (1.301)	-0.565 (1.332)
Constant	4.095* (2.374)	4.277* (2.287)	3.886* (2.320)	4.114* (2.360)	3.739* (2.224)	3.066 (2.320)	3.412 (2.268)
Observations	112	112	112	112	112	112	112
Pseudo R-squared	0.106	0.110	0.0970	0.110	0.115	0.103	0.117

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Panel C: Valuation using Price-to-Assets**

VARIABLES	(1) Price-to-Assets	(2) Price-to-Assets	(3) Price-to-Assets	(4) Price-to-Assets	(5) Price-to-Assets	(6) Price-to-Assets	(7) Price-to-Assets
AbSVI_44	0.882 (0.674)						
AbSVI_11		0.763* (0.405)					
AbSVI_22			0.798 (0.513)				
AbSVI_21				1.188** (0.528)			
AbSVI_11lip					1.447** (0.634)		
AbSVI_22ip						0.845 (0.596)	

AbSVI_2lip								1.623** (0.686)
Underwriter rank	-0.329 (0.244)	-0.363 (0.244)	-0.318 (0.238)	-0.341 (0.242)	-0.290 (0.222)	-0.252 (0.233)	-0.258 (0.223)	-0.258 (0.223)
Venture Capital	1.611*** (0.385)	1.609*** (0.385)	1.602*** (0.383)	1.620*** (0.386)	1.688*** (0.389)	1.622*** (0.382)	1.644*** (0.391)	1.644*** (0.391)
Industry return	0.503 (1.041)	0.708 (1.067)	0.510 (1.062)	0.517 (1.076)	0.160 (1.210)	0.262 (1.143)	0.00321 (1.214)	0.00321 (1.214)
Constant	2.286 (2.034)	2.469 (2.030)	2.178 (1.981)	2.326 (2.018)	2.097 (1.849)	1.754 (1.935)	1.871 (1.847)	1.871 (1.847)
Observations	147	147	147	147	147	147	147	147
Pseudo R-squared	0.121	0.126	0.119	0.134	0.135	0.116	0.139	0.139

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table 5**

**Impact of retail investor sentiment on initial IPO valuation based on high of range (OLS)**

The sample includes completed IPOs from 2004-2011 after excluding financial firms (SIC code 6xxx), firms that do not list on NYSE, Amex, or NASDAQ, and firms that do not have CRSP share codes 10 or 11. All variables are defined in the Appendix.

**Panel A: Valuation using Price-to-Sales**

VARIABLES	(1) Price-to-Sales	(2) Price-to-Sales	(3) Price-to-Sales	(4) Price-to-Sales	(5) Price-to-Sales	(6) Price-to-Sales	(7) Price-to-Sales
AbSVI_44	3.195** (1.401)						
AbSVI_11		5.713** (2.436)					
AbSVI_22			6.125** (2.761)				
AbSVI_21				6.931** (3.002)			
AbSVI_11ip					2.335 (1.852)		
AbSVI_22ip						1.644 (1.716)	
AbSVI_21ip							2.488 (2.220)
Underwriter rank	1.175 (0.722)	0.869 (0.609)	1.180 (0.716)	1.076 (0.673)	1.326* (0.791)	1.360* (0.818)	1.386* (0.822)
Venture Capital	1.902 (1.948)	1.633 (1.930)	1.705 (1.924)	1.700 (1.916)	2.242 (1.994)	2.181 (2.040)	2.143 (2.041)
Industry return	-0.243 (8.331)	1.374 (8.109)	-0.133 (8.174)	-0.163 (8.085)	-1.108 (8.766)	-0.701 (8.626)	-1.279 (8.901)

Constant	-5.750 (5.283)	-4.113 (4.698)	-6.158 (5.409)	-5.354 (5.082)	-6.644 (5.709)	-6.972 (5.857)	-7.081 (5.862)
Observations	147	147	147	147	147	147	147
Adjusted R-squared	0.010	0.056	0.035	0.048	-0.001	-0.004	-0.001

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Panel B: Valuation using Price-to-EBITDA**

VARIABLES	(1) Price-to- EBITDA	(2) Price-to- EBITDA	(3) Price-to- EBITDA	(4) Price-to- EBITDA	(5) Price-to- EBITDA	(6) Price-to- EBITDA	(7) Price-to- EBITDA
AbSVI_44	2.307* (1.204)						
AbSVI_11		3.314 (2.127)					
AbSVI_22			4.384* (2.333)				
AbSVI_21				3.964 (2.493)			
AbSVI_11ip					2.984* (1.624)		
AbSVI_22ip						3.471** (1.510)	
AbSVI_21ip							3.110* (1.637)
Underwriter rank	0.537 (0.606)	0.429 (0.567)	0.614 (0.610)	0.530 (0.587)	0.751 (0.633)	0.951 (0.687)	0.840 (0.663)

Venture Capital	1.825 (1.735)	1.892 (1.717)	1.730 (1.725)	1.919 (1.728)	2.137 (1.736)	1.933 (1.755)	2.022 (1.760)
Industry return	0.659 (6.245)	1.461 (6.316)	0.476 (6.126)	0.599 (6.111)	-0.440 (6.478)	-0.290 (6.526)	-0.619 (6.560)
Constant	-1.047 (4.644)	-0.570 (4.451)	-1.891 (4.765)	-1.176 (4.567)	-2.521 (4.746)	-4.182 (5.141)	-3.217 (4.935)
Observations	112	112	112	112	112	112	112
Adjusted R-squared	0.003	0.021	0.023	0.017	0.001	0.003	-0.000

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

### Panel C: Valuation using Price-to-Assets

VARIABLES	(1) Price-to-Assets	(2) Price-to-Assets	(3) Price-to-Assets	(4) Price-to-Assets	(5) Price-to-Assets	(6) Price-to-Assets	(7) Price-to-Assets
AbSVI_44	4.435* (2.265)						
AbSVI_11		4.101* (2.306)					
AbSVI_22			5.868** (2.666)				
AbSVI_21				5.444* (2.778)			
AbSVI_11ip					6.582*** (2.213)		
AbSVI_22ip						7.406*** (2.670)	

AbSVI_2lip							6.797***
							(2.462)
Underwriter rank	1.522*	1.338	1.549*	1.476*	1.870**	2.190**	2.025**
	(0.855)	(0.814)	(0.844)	(0.834)	(0.903)	(1.005)	(0.946)
Venture Capital	0.845	0.894	0.812	0.904	1.285	0.973	1.017
	(2.406)	(2.462)	(2.441)	(2.467)	(2.378)	(2.386)	(2.411)
Industry return	-9.204	-8.039	-9.096	-9.138	-11.65	-11.29	-12.04
	(9.947)	(10.09)	(9.894)	(9.929)	(10.26)	(10.26)	(10.34)
Constant	-5.717	-4.693	-6.205	-5.542	-7.915	-10.52	-9.050
	(6.086)	(5.896)	(6.076)	(5.995)	(6.377)	(7.222)	(6.682)
Observations	147	147	147	147	147	147	147
Adjusted R-squared	0.013	0.014	0.017	0.014	0.017	0.019	0.017

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table 6**

**Impact of retail investor sentiment on initial IPO valuation based on high of range (Logit)**

The sample includes completed IPOs from 2004-2011 after excluding financial firms (SIC code 6xxx), firms that do not list on NYSE, Amex, or NASDAQ, and firms that do not have CRSP share codes 10 or 11. All variables are defined in the Appendix.

**Panel A: Valuation using Price-to-Sales**

VARIABLES	(1) Price-to-Sales	(2) Price-to-Sales	(3) Price-to-Sales	(4) Price-to-Sales	(5) Price-to-Sales	(6) Price-to-Sales	(7) Price-to-Sales
AbSVI_44	1.114** (0.543)						
AbSVI_11		0.669* (0.385)					
AbSVI_22			0.856* (0.490)				
AbSVI_21				0.841* (0.486)			
AbSVI_11ip					0.848 (0.518)		
AbSVI_22ip						1.073* (0.577)	
AbSVI_21ip							0.835 (0.576)
Underwriter rank	-0.255 (0.216)	-0.283 (0.214)	-0.246 (0.211)	-0.260 (0.212)	-0.207 (0.196)	-0.158 (0.197)	-0.191 (0.200)
Venture Capital	1.255*** (0.359)	1.258*** (0.357)	1.251*** (0.359)	1.262*** (0.357)	1.310*** (0.360)	1.273*** (0.361)	1.279*** (0.359)
Industry return	-0.267 (1.156)	-0.0936 (1.149)	-0.272 (1.161)	-0.279 (1.141)	-0.597 (1.193)	-0.583 (1.206)	-0.637 (1.187)

Constant	1.492 (1.813)	1.676 (1.784)	1.418 (1.763)	1.532 (1.775)	1.232 (1.613)	0.829 (1.610)	1.117 (1.646)
Observations	147	147	147	147	147	147	147
Pseudo R-squared	0.0953	0.0869	0.0859	0.0857	0.0823	0.0866	0.0809

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Panel B: Valuation using Price-to-EBITDA**

VARIABLES	(1) Price-to- EBITDA	(2) Price-to- EBITDA	(3) Price-to- EBITDA	(4) Price-to- EBITDA	(5) Price-to- EBITDA	(6) Price-to- EBITDA	(7) Price-to- EBITDA
AbSVI_44	1.100* (0.575)						
AbSVI_11		0.944** (0.451)					
AbSVI_22			0.928* (0.552)				
AbSVI_21				1.221** (0.595)			
AbSVI_11ip					1.513** (0.714)		
AbSVI_22ip						1.211* (0.662)	
AbSVI_21ip							1.678** (0.790)
Underwriter rank	-0.622** (0.302)	-0.653** (0.293)	-0.597** (0.295)	-0.629** (0.300)	-0.566* (0.293)	-0.490 (0.303)	-0.525* (0.297)

Venture Capital	1.300*** (0.454)	1.305*** (0.455)	1.266*** (0.446)	1.315*** (0.452)	1.364*** (0.461)	1.280*** (0.454)	1.334*** (0.463)
Industry return	-0.322 (1.167)	-0.159 (1.175)	-0.378 (1.180)	-0.394 (1.173)	-0.603 (1.311)	-0.608 (1.288)	-0.768 (1.317)
Constant	5.024** (2.543)	5.189** (2.463)	4.805* (2.485)	5.051** (2.534)	4.697* (2.446)	4.056 (2.524)	4.386* (2.474)
Observations	112	112	112	112	112	112	112
Pseudo R-squared	0.108	0.111	0.101	0.113	0.116	0.104	0.118

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Panel C: Valuation using Price-to-Assets**

VARIABLES	(1) Price-to-Assets	(2) Price-to-Assets	(3) Price-to-Assets	(4) Price-to-Assets	(5) Price-to-Assets	(6) Price-to-Assets	(7) Price-to-Assets
AbSVI_44	0.882 (0.674)						
AbSVI_11		0.763* (0.405)					
AbSVI_22			0.798 (0.513)				
AbSVI_21				1.188** (0.528)			
AbSVI_11ip					1.447** (0.634)		
AbSVI_22ip						0.845 (0.596)	

AbSVI_2lip								1.623** (0.686)
Underwriter rank	-0.329 (0.244)	-0.363 (0.244)	-0.318 (0.238)	-0.341 (0.242)	-0.290 (0.222)	-0.252 (0.233)	-0.258 (0.223)	-0.258 (0.223)
Venture Capital	1.611*** (0.385)	1.609*** (0.385)	1.602*** (0.383)	1.620*** (0.386)	1.688*** (0.389)	1.622*** (0.382)	1.644*** (0.391)	1.644*** (0.391)
Industry return	0.503 (1.041)	0.708 (1.067)	0.510 (1.062)	0.517 (1.076)	0.160 (1.210)	0.262 (1.143)	0.00321 (1.214)	0.00321 (1.214)
Constant	2.286 (2.034)	2.469 (2.030)	2.178 (1.981)	2.326 (2.018)	2.097 (1.849)	1.754 (1.935)	1.871 (1.847)	1.871 (1.847)
Observations	147	147	147	147	147	147	147	147
Pseudo R-squared	0.121	0.126	0.119	0.134	0.135	0.116	0.139	0.139

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table 7**

**Impact of retail investor sentiment on initial IPO valuation based on low of range (OLS)**

The sample includes completed IPOs from 2004-2011 after excluding financial firms (SIC code 6xxx), firms that do not list on NYSE, Amex, or NASDAQ, and firms that do not have CRSP share codes 10 or 11. All variables are defined in the Appendix.

**Panel A: Valuation using Price-to-Sales**

VARIABLES	(1) Price-to-Sales	(2) Price-to-Sales	(3) Price-to-Sales	(4) Price-to-Sales	(5) Price-to-Sales	(6) Price-to-Sales	(7) Price-to-Sales
AbSVI_44	2.664** (1.202)						
AbSVI_11		4.958** (2.141)					
AbSVI_22			5.258** (2.417)				
AbSVI_21				5.951** (2.602)			
AbSVI_11ip					2.045 (1.631)		
AbSVI_22ip						1.454 (1.519)	
AbSVI_21ip							2.183 (1.972)
Underwriter rank	1.050* (0.632)	0.783 (0.531)	1.053* (0.627)	0.963 (0.590)	1.180* (0.691)	1.211* (0.718)	1.232* (0.721)
Venture Capital	1.525 (1.728)	1.279 (1.716)	1.347 (1.710)	1.343 (1.704)	1.807 (1.766)	1.753 (1.808)	1.721 (1.810)
Industry return	0.00553 (7.436)	1.409 (7.262)	0.0999 (7.302)	0.0744 (7.225)	-0.752 (7.815)	-0.400 (7.699)	-0.904 (7.941)

Constant	-5.188 (4.603)	-3.759 (4.082)	-5.532 (4.719)	-4.842 (4.432)	-5.962 (4.964)	-6.257 (5.115)	-6.346 (5.112)
Observations	147	147	147	147	147	147	147
Adjusted R-squared	0.007	0.053	0.032	0.044	-0.003	-0.005	-0.003

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Panel B: Valuation using Price-to-EBITDA**

VARIABLES	(1) Price-to- EBITDA	(2) Price-to- EBITDA	(3) Price-to- EBITDA	(4) Price-to- EBITDA	(5) Price-to- EBITDA	(6) Price-to- EBITDA	(7) Price-to- EBITDA
AbSVI_44	1.967* (1.072)						
AbSVI_11		2.885 (1.883)					
AbSVI_22			3.802* (2.075)				
AbSVI_21				3.435 (2.206)			
AbSVI_11ip					2.533* (1.426)		
AbSVI_22ip						2.959** (1.331)	
AbSVI_21ip							2.630* (1.434)
Underwriter rank	0.517 (0.532)	0.423 (0.497)	0.584 (0.536)	0.511 (0.516)	0.699 (0.555)	0.870 (0.604)	0.773 (0.583)

Venture Capital	1.496 (1.540)	1.548 (1.526)	1.409 (1.533)	1.573 (1.535)	1.762 (1.542)	1.588 (1.560)	1.665 (1.564)
Industry return	0.605 (5.571)	1.303 (5.628)	0.446 (5.469)	0.553 (5.454)	-0.327 (5.784)	-0.204 (5.825)	-0.475 (5.859)
Constant	-1.274 (4.053)	-0.860 (3.887)	-2.008 (4.175)	-1.387 (3.995)	-2.526 (4.134)	-3.947 (4.496)	-3.109 (4.314)
Observations	112	112	112	112	112	112	112
Adjusted R-squared	-0.000	0.018	0.020	0.014	-0.002	0.000	-0.003

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

### Panel C: Valuation using Price-to-Assets

VARIABLES	(1) Price-to-Assets	(2) Price-to-Assets	(3) Price-to-Assets	(4) Price-to-Assets	(5) Price-to-Assets	(6) Price-to-Assets	(7) Price-to-Assets
AbSVI_44	3.810* (1.998)						
AbSVI_11		3.571* (2.030)					
AbSVI_22			5.090** (2.348)				
AbSVI_21				4.701* (2.431)			
AbSVI_11lip					5.750*** (1.942)		
AbSVI_22ip						6.481*** (2.349)	

AbSVI_2lip							5.935***
							(2.165)
Underwriter rank	1.356*	1.195*	1.379*	1.316*	1.659**	1.939**	1.794**
	(0.754)	(0.717)	(0.744)	(0.735)	(0.796)	(0.886)	(0.835)
Venture Capital	0.604	0.641	0.571	0.653	0.981	0.708	0.747
	(2.133)	(2.183)	(2.165)	(2.187)	(2.108)	(2.116)	(2.138)
Industry return	-8.244	-7.229	-8.150	-8.186	-10.38	-10.07	-10.72
	(8.792)	(8.911)	(8.745)	(8.774)	(9.082)	(9.076)	(9.149)
Constant	-5.139	-4.244	-5.560	-4.987	-7.054	-9.334	-8.045
	(5.346)	(5.173)	(5.340)	(5.267)	(5.599)	(6.349)	(5.875)
Observations	147	147	147	147	147	147	147
Adjusted R-squared	0.011	0.013	0.016	0.013	0.017	0.018	0.016

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Table 8**

**Impact of retail investor sentiment on initial IPO valuation based on low of range (Logit)**

The sample includes completed IPOs from 2004-2011 after excluding financial firms (SIC code 6xxx), firms that do not list on NYSE, Amex, or NASDAQ, and firms that do not have CRSP share codes 10 or 11. All variables are defined in the Appendix.

**Panel A: Valuation using Price-to-Sales**

VARIABLES	(1) Price-to-Sales	(2) Price-to-Sales	(3) Price-to-Sales	(4) Price-to-Sales	(5) Price-to-Sales	(6) Price-to-Sales	(7) Price-to-Sales
AbSVI_44	1.070** (0.530)						
AbSVI_11		0.653* (0.386)					
AbSVI_22			0.814* (0.484)				
AbSVI_21				0.818* (0.485)			
AbSVI_11ip					0.976* (0.536)		
AbSVI_22ip						1.186** (0.594)	
AbSVI_21ip							0.972 (0.600)
Underwriter rank	-0.294 (0.224)	-0.321 (0.222)	-0.284 (0.218)	-0.298 (0.220)	-0.243 (0.200)	-0.189 (0.201)	-0.224 (0.204)
Venture Capital	1.336*** (0.361)	1.338*** (0.359)	1.332*** (0.361)	1.343*** (0.359)	1.394*** (0.362)	1.352*** (0.363)	1.358*** (0.361)
Industry return	-0.388 (1.163)	-0.215 (1.155)	-0.391 (1.168)	-0.397 (1.148)	-0.752 (1.213)	-0.730 (1.228)	-0.804 (1.204)

Constant	1.829 (1.874)	2.002 (1.848)	1.746 (1.821)	1.861 (1.837)	1.541 (1.644)	1.104 (1.640)	1.405 (1.677)
Observations	147	147	147	147	147	147	147
Pseudo R-squared	0.102	0.0945	0.0928	0.0933	0.0945	0.0985	0.0931

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Panel B: Valuation using Price-to-EBITDA**

VARIABLES	(1) Price-to- EBITDA	(2) Price-to- EBITDA	(3) Price-to- EBITDA	(4) Price-to- EBITDA	(5) Price-to- EBITDA	(6) Price-to- EBITDA	(7) Price-to- EBITDA
AbSVI_44	1.081* (0.570)						
AbSVI_11		0.928** (0.445)					
AbSVI_22			0.907* (0.547)				
AbSVI_21				1.134* (0.579)			
AbSVI_11ip					1.608** (0.747)		
AbSVI_22ip						1.305* (0.685)	
AbSVI_21ip							1.695** (0.808)
Underwriter rank	-0.543* (0.281)	-0.575** (0.272)	-0.521* (0.275)	-0.549** (0.278)	-0.486* (0.269)	-0.405 (0.281)	-0.443 (0.274)

Venture Capital	1.215*** (0.441)	1.225*** (0.442)	1.189*** (0.434)	1.232*** (0.439)	1.287*** (0.447)	1.199*** (0.442)	1.248*** (0.448)
Industry return	-0.126 (1.163)	0.0452 (1.173)	-0.179 (1.173)	-0.185 (1.163)	-0.412 (1.319)	-0.419 (1.293)	-0.573 (1.313)
Constant	4.287* (2.366)	4.461* (2.286)	4.094* (2.322)	4.309* (2.348)	3.955* (2.238)	3.265 (2.329)	3.623 (2.277)
Observations	112	112	112	112	112	112	112
Pseudo R-squared	0.0975	0.100	0.0893	0.0988	0.109	0.0968	0.108

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

### Panel C: Valuation using Price-to-Assets

VARIABLES	(1) Price-to-Assets	(2) Price-to-Assets	(3) Price-to-Assets	(4) Price-to-Assets	(5) Price-to-Assets	(6) Price-to-Assets	(7) Price-to-Assets
AbSVI_44	0.882 (0.674)						
AbSVI_11		0.752* (0.402)					
AbSVI_22			0.758 (0.506)				
AbSVI_21				1.157** (0.522)			
AbSVI_11ip					1.315** (0.599)		
AbSVI_22ip						0.749 (0.568)	

AbSVI_2lip								1.498** (0.647)
Underwriter rank	-0.268 (0.228)	-0.301 (0.228)	-0.258 (0.222)	-0.279 (0.225)	-0.227 (0.210)	-0.198 (0.221)	-0.197 (0.212)	
Venture Capital	1.641*** (0.383)	1.640*** (0.383)	1.634*** (0.381)	1.651*** (0.384)	1.712*** (0.385)	1.654*** (0.379)	1.671*** (0.387)	
Industry return	0.424 (1.047)	0.629 (1.072)	0.425 (1.065)	0.436 (1.077)	0.0550 (1.199)	0.190 (1.136)	-0.0912 (1.204)	
Constant	1.735 (1.892)	1.918 (1.891)	1.638 (1.849)	1.770 (1.877)	1.520 (1.743)	1.261 (1.834)	1.309 (1.759)	
Observations	147	147	147	147	147	147	147	147
Pseudo R-squared	0.124	0.129	0.121	0.136	0.134	0.117	0.138	

Robust standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1