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Media sentiment and IPO underpricing☆

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ABSTRACT

During an IPO the issuing firm experiences a dramatic visibility shock caused by a large amount of information released to the public. In this context the media play a pivotal role in conveying information to investors who mostly rely on second-hand and simplified news. We argue that the way in which news is presented may shape retail investors' beliefs and in turn drive the demand for share and first-day returns. Based on over 2800 US IPOs and over 27,000 newspaper articles we show that (a) positive tones are positively associated with IPO underpricing; (b) this effect is stronger when news is reported close to the IPO date or (c) by more reputable newspapers.

1. Introduction

The pricing of IPOs as well as the price behavior during the first day of trade has been a widely investigated phenomenon since Ibbotson (1975). Since the earliest studies, the information asymmetry between the issuer and the underwriter on the one side and the investors on the other side has been pivotal in explaining the existence of underpricing. Quite surprisingly, in spite of the importance of the role of information asymmetry, past research has devoted little attention to the relationship between media information production and IPO valuation. As an exception, leveraging on the Merton (1987) argument of investor attention, Liu et al. (2014a and 2014b) show that IPO media coverage (i.e., number of newspaper articles) affects a number of IPO phenomena, such as stock's long-term value, liquidity, analyst coverage, institutional investor ownership, and the level of underpricing.

However, the impact of the media is not likely to be limited to the amount of information reported but likewise to the way media outlets treat the news. We argue that the tone (sentiment) used in the articles may change the reader's perception and contribute to shaping investor belief. More precisely, a benevolent or considerate media tone could increase investor interest, the demand for shares and, in turn, the IPO underpricing. Following this intuition, we attempt to provide an answer to four main questions. First, is the tone used by the media to report the news associated with the observed level of underpricing? Second, if media sentiment is associated with price behavior on the first day of trading, is the timing of the news likewise important? Or, in other words, is a certain tone used in the proximity of the IPO date more effective than the same sentiment far in advance of the offer? Third, are media outlets all equally important in affecting the IPO underpricing or do more reputable (or widespread) newspapers exhibit a greater role in shaping investor perception of the IPO (measured as the IPO performance around the offer)?

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Fourth, does media sentiment contain an explanatory power over and beyond the tones used in the IPO filings? Loughran McDonald (2013) show that the negative sentiment embedded in the S-1 forms is positively associated with the observed level of underpricing. Accordingly, if the media are influenced by the tone employed in the compulsory filings, the effect captured by the newspaper sentiment might only be an indirect proxy of the S-1 tones.

IPOs are a particularly interesting framework for investigating the role of the amount and the quality of information produced by the media, since before the listing the issuing firm is generally little known among retail investors; on the contrary, in the process of going public those firms experience a potential dramatic change in visibility, and the degree to which this occurs is greatly determined by the type of media coverage. As not all IPO firms receive equal attention from the media, we attempt to disentangle the effect of tone from the coverage in determining the observed level of underpricing, controlling for the other traditionally investigated firm and deal characteristics.

Within the different media channels, we restrict the analysis to the role of the printed newspaper because, differently from other media, space is very limited and valuable (Tewksbury and Althaus, 2000). Rationing in space directly leads to rationing in news coverage making the information reported more visible (Bucher and Schumacher, 2006; Tewksbury and Althaus, 2000). From the reader's perspective, having a definitive set of news allows the information content to be processed. This effect is obviously greater, ceteris paribus, if the newspaper reputation increases and the total space available in the newspaper decreases.

Another desirable feature of newspapers is audience discrimination. In this regards we are more interested in measuring the information flow towards the general public or retail (mass) investors rather than focusing on the specialized information directed to professionals (institutional investors). The difference between retail and professional investors is a pivotal concept in this study. In fact, we argue that information delivered by different means of communication to different kinds and segments of audience is able to produce different effects as measured by stock market valuations. We argue that informed investors, who have access to more detailed information and possess a greater ability in processing raw information, are less affected by the way financial newspapers present and convey the information on an IPO firm.

We analyze the news coverage and tone in over four hundred U.S. newspapers, for 2814 IPOs in the period 1995–2013. For each new issue we consider any news published in the selected media outlets in the time span ranging from the filing to the first trading date. This procedure allows us to collect and examine over 27,000 newspaper articles. We measure the tone of the news detecting the degree of positiveness, negativeness and uncertainty (positive, negative and uncertain sentiment). We find that a positive sentiment is positively associated with the level of observed underpricing, suggesting that first-day returns increase in response to a more benevolent press (we argue, as an effect of the larger generated demand).[1] This effect goes over and above what can be explained by the amount of news related to the IPO (as in Liu et al., 2014a) and its economic magnitude is likewise important as one standard deviation increase in the positive tone generates a 2.5% rise in the IPO underpricing. These results remain robust even after having controlled for potential endogeneity issues (if the newspaper tone is endogenously determined with the IPO underpricing) and the sentiment of the compulsory SEC filings (as documented in Loughran and McDonald, 2013).

We believe this study contributes to the increasing stream of literature (Pollock and Rindova, 2003; Tetlock, 2007; Pollock et al., 2008; Bhattacharya et al., 2009; Tetlock, 2011; Engelberg and Parsons, 2011; Dougal et al., 2012; Solomon, 2012; Garcia, 2013; Chahine et al. 2015; Ahmad et al. 2016) that looks at the relationship between media and finance and, more specifically, at the economic effects of the way newspapers present information. Furthermore, this paper sheds some light on the importance of the timing of news and the reputation of the newspaper in producing sizeable economic effects. Confirming the intuition that investor attention is greatest around the first-day of trading and more stimulated by leading newspapers, we document that the impact of newspaper positive tones (and to some extent the coverage) is increasingly important as news is disclosed in the proximity of the IPO date and published by more reputable (and widespread) newspapers.

This paper is organized as follow: Section 2 contains a literature review of the two streams of related literature (IPO and the Media and finance) and puts forward some possible testable hypotheses. Section 3 illustrates the data and the methodology employed, as well as the descriptive statistics. Section 4 presents the empirical results and Section 5 concludes.

2. Related research and hypotheses development

In the literature the role of the media has become increasingly relevant. The cost of collecting, filtering and analyzing financial information acts as a barrier for uninformed investors, who can hence only rely on information that is publicly available and easy to access. Newspapers respond to both these characteristics as they (a) select - due to a scarcity of printed space - a limited amount of information and (b) present the information in a way that becomes accessible (comprehensible) to their readers. Over the last decade several scholars have investigated the effects of media reporting, regarding the idea that the media can both enhance the level of information among market participants and produce cognitive bias.

Evidence about the problem of misreporting are documented in Djankov et al. (2003), and Mullainathan and Shleifer (2005), who suggest the risk of having media with concentrated ownership, government-friendly attitude, and audience bearing biased news. The presence of systematically slanted news has been proven to be effective and potentially dangerous in terms of outcomes, as individuals who are not correctly informed tend to make second best decisions. DellaVigna and Kaplan (2007) show how Republican friendly news reporting by the Fox News channel has critically changed the electoral outcomes in several U.S.

[1] Similarly to Liu et al. (2014a) we investigate whether media tones are associated with other IPO dimensions, finding only weak or not-existent relationships.

electoral districts. The media may also influence the audience when they do not produce high-level products in terms of quality of information. This trait makes the media potentially harmful but also potentially important as a defense against illicit and damaging behavior, able to permanently jeopardize an organization's reputation. Dyck et al. (2013) present a model in which the media successfully prevent legislators from acting against the public interest. Several papers (Miller, 2006; Dyck et al., 2008; Dyck et al., 2010) show how the media may be able to act as a watchdog against fraud, expropriations and other harmful behavior.

A different stream of literature has instead examined the relationship between the media and asset pricing, from a wide set of viewpoints. Tetlock (2007) shows how media pessimism leads to downward pressure (followed by a reversal) on market prices and high market trading volume, while Fang et al. (2014) evidence how mutual funds with a higher propensity to buy media-covered stocks exhibit a lower performance. In a more recent paper, Tetlock (2011) documents that individual investors overreact to stale news, suggesting that the media plays a role even when disclosing already available information. Liu et al. (2014b) show that IPO media coverage is associated with several IPO dimensions, confirming the conjecture that, as an effect of investor attention, the media produces an impact even when news does not contain genuinely new information.

The channels through which the media exercise an influence on stock markets have been likewise proposed. The media may exert a corporate governance role by conveying important information about irregular affairs (Dyck et al., 2010; Dyck et al., 2008), or it may influence general confidence in investors, generating a common sense of trust or an absence of trust on market makers (Stulz 1999; Moy and Pfau, 2000; Palomino et al., 2009). Most importantly, the media conveys a huge amount of information to financial markets, exercising their prominent role of collecting, elaborating, and dealing pieces of news. This also holds for initial public offerings as well as many other corporate events.

Previous studies have investigated the role of information production during the IPO process. In the process of an IPO the issuing firm directly (through announcements or compulsory filings) or indirectly (through the news reported in the media) becomes visible to a large community of potential investors. Some scholars have documented the informative effect of compulsory filings (Loughran and McDonald, 2013) or prospectuses (Hanley and Hoberg, 2010), others have instead focused on the role of media coverage as a way to enhance investor attention on the IPO (Liu et al., 2014a,b). In contrast, in this paper we aim at shedding some light on the effect of the quality (sentiment) of the newspaper IPO coverage, controlling for the amount (media coverage) of news reported around the offer.

Explaining IPO patterns and specifically the dynamics of IPO underpricing has been long debated in the financial literature and several rationales have been offered. However, the pivotal role of information and informative asymmetries represents a common thread in most of the arguments used. Starting from the evidence that some investors are better informed than others, Rock (1986) develops a model based on the lemon-model by Akerlof (1970). Rock argues that uniformed investors, being less able to assess the IPO quality, tend to overweight their portfolios with non-valuable IPOs, thus suffering a sort of winner curse. In equilibrium uninformed investors earn zero initial returns while informed investors earn returns that can just cover the cost sustained in acquiring information. Consistently with this view, Aggarwal et al. (2002) show that institutional investors earn greater returns than retail investors.

The magnitude of underpricing is not only related to the amount of available information around the IPO process but also to the precision (quality) of the information disclosed. Initial public offerings associated with a greater level of uncertainty - especially about the IPO value itself - result in higher expected underpricing (Ritter, 1984; Beatty and Ritter, 1986). Consistent with this argument several scholars (Ross, 1977; Hughes, 1986; Allen and Faulhaber, 1989) point out the importance for IPO issuers of signalling their quality to prospective investors as a means of reducing the expected underpricing. Along this line, hiring reputable underwriters (Booth and Smith, 1986) or being VC-backed (Megginson and Weiss, 1991; Lee and Wahal, 2004) has been shown to be an indirect way to signal the IPO quality. Hence, if the amount of information spread by the media may serve as a way to make the issuing firm more visible to the uninformed investors, the way in which the same information is reported may likewise produce important and potentially diverse effects. Given particular information reported in a newspaper, the tone used in the article may dramatically change the perception of the reader (investor) regarding the IPO quality/pricing and accordingly modify the investment behavior. Following this intuition we postulate a relationship between article sentiment and underpricing. Specifically, we argue that a more positive (negative) sentiment, everything else being constant, makes retail investors more (less) inclined to demand shares, which in turn increases (decreases) the price of the first trading day.

However, the timing of media coverage could be likewise important. In the light of the visibility hypothesis (investor attention) we could argue that the same media tone used at different moments of the IPO process may lead to unequal effects. While in the proximity of the IPO date investor attention to the offer is generally high, far before the first trading date (retail) investors are unlikely to be equally interested in the newspaper coverage on a particular IPO. As a result, we conjecture that the effect of newspaper sentiment becomes stronger as the IPO date approaches.

The media convey a large set of information to the market and, specifically, to retail/non-professional investors who are not otherwise able or willing to autonomously and independently reach important and valuable information. The value of the information provided by the media comes from the costly selection activity among the virtually endless amount of available information and from potentially uncovering insider information. It is not uncommon that journalists, particularly from reputable media providers, have special and reserved informative sources that would not disclose their information unless it were in an anonymous way guaranteed by journalists themselves (what Dyck and Zingales (2003) call the quid pro quo condition). The information content of media articles is hence richer than publicly available information, selected by highly reputed newspaper organizations and commented by specialist and highly-trained financial journalists. A pivotal characteristic of media outlets is their reputational capital, together with the spread of their readership. These dimensions are likely to be greatly important in determining an impact on investor perception of an IPO. On the one side, more extensive newspaper circulation allows the news to

reach a larger set of potential investors. On the other side, a more reputable newspaper is likely to possess a more effective capacity to influence the audience, especially when the complexity of the topic (such as the quality of the IPO issuing firm) requires skills and knowledge that only a more specialized press can offer. Along this line we postulate that the effect of tones embedded in news reported by more reputable and geographically dispersed outlets should produce, everything else being constant, a greater impact upon the IPO pricing.[2]

3. Data and methodology

3.1. Data sample

We collect a sample of 2814 IPOs in the U.S. stock markets between January 1995 and December 2013 from the SDC/Platinum Global New Issues database. We exclude from the sample real estate investment trusts (REIT), closed-end funds, unit IPOs and unit investment trusts, rights issues, spin-offs, equity carve-outs, financial firms (with SIC codes between 6000 and 6999), foreign firms, leveraged buy-out firms (LBO), shelf-registrations, withdrawn IPOs, and IPOs with an offer price lower than five dollars. Accounting data are from Compustat and stock price data from CRSP. We obtain firm age data from Jay Ritter's website as well as the analyst coverage data (covering the period 1995–2009). We search for articles related to each IPO in the U.S. newspaper collections, provided by Factiva database, which includes the vast majority of U.S. newspapers, using the firm name as the key word and allowing for common variations.[3] The news search range spans from the filing date to the first-day of trading. This search generates a dataset of 27,309 articles (from 474 different outlets) covering 2814 IPOs.[4,5] For each article we also run a search in order to identify the journalist(s) who authored the article itself. Due to the lack of reported authorship and some dropout caused by the automatized recognition procedure, we obtain authorship for 8829 articles written by 3065 authors.

Finally, S-1 filings (and amended S-1/A when S-1 is missing) are obtained from EDGAR. Using the CIK (Central Index Key) and the Company name as a search criterion we are able to match 2475 S-1 forms out of the 2814 IPOs which comprise our sample. As for the news samples, we process these documents in order to infer the embedded sentiment, excluding particles which are not meaningful, such as ASCII- encoded segments (i.e. pdf's, jpg's), HTML, and XBRL (Loughran and McDonald 2013).

3.2. Textual analysis

Textual analysis for both articles and S-1 forms is performed as in Loughran and McDonald (2011). This methodology, widely used and tested in the literature (Tetlock, 2011; Dougal et al., 2012; Garcia, 2013), is based on searching inside a financial document for a list of words that are likely to be associated with some sentiment attributes (positiveness, negativeness, and uncertainty). The frequency of these particular words within each document allows the tone used by the writer to be inferred. We first employ a "bags of words" approach, but keeping track of the order in which words appear, in order to account for negations.[6] We then parse documents into particles and we exclude terms which are not meaningful (like encoding parts that are not actual words). In analyzing the newspaper articles we also apply a regular expressions based script to correctly identify and separate for each piece of news some important data like title, author(s), date of publication, and body of the text.

From the sample of 27,309 articles, we then aggregate the information in order to obtain IPO-level measures of media coverage and sentiment. We estimate the IPO coverage by summing the total number of articles (N. Articles) and the total number of words used in the articles related to each IPO (N. Words). We compute the tone metrics as the average of the frequency of each sentiment attribute across the news reporting information of a specific IPO. For instance, Westell Technologies is a company that went public on December 1996. For this IPO we collect three articles showing 1.42%, 1.10%, and 0.83% of positive words (relative to the overall number of words) respectively. We compute the positive tone for the IPO of Westell Technologies (1.12%) averaging the tones detected in the three different newspaper articles. Consistently, we aggregate at the IPO-level the other sentiment attributes, i.e. negativeness (negative sentiment), uncertainty (uncertainty sentiment), and level of confidence and certainty in the way in which the news is written (modal weak and modal strong).[7] In the appendix we report three examples of articles with high positive and the same number of piece of news with pronounced negative tone.[8]

[2] This conjecture is in line with previous literature which only considers national newspapers, which are more influential and reputable, to measure the effects of media reporting on financial outcomes (among others, Fang and Peress, 2009).

[3] First, we search for the complete company name and then we allow for common variations and abbreviations like Inc., Co., Corp., Intl., Lmt., Limited, Group.

[4] One hundred eighty five IPOs (roughly 6% of the total observations) are dropped from the sample, as they received no newspaper coverage. The excluded IPOs are generally smaller companies. The average (median) proceeds for these 185 IPOs not covered by the media is 75.6 (41.4) million vs. 101.9 (60.5) for the 2814 issuing companies covered by the media.

[5] We limit our analysis to the printed version of the newspapers. We therefore exclude business wire and online news.

[6] We consider each article as formed by a collection of terms that, at least in the first stage, are not ordered or related to each other. Textual analysis is performed just considering the frequency with which each word appears in the text. We then also consider the order when we allow for negations, since we are interested in understanding to which word the negations effectively refer. In this way, given a list of negation words, we are able to count how many times a positive word is negated, and we drop these cases from the total occurrences of positive words. As in Loughran and McDonald (2011), we consider an extra list of negation words, like "not" or "nobody" and we count the frequency they appear before positive words. We finally consider the positive counts excluding the cases in which positive words are negated in a range of 3 words.

[7] For robustness, we also aggregate sentiment measure at the IPO level by computing the median (instead of the mean) and the weighed (by the length of the articles) mean but results remain unaltered.

[8] To save space we only report the most informative and tonal section of the article.

Table 1
Coverage summary statistics. Panel A shows newspaper coverage summary statistics. The panel shows the number of articles associated with the IPOs for each newspaper considered in this study. For the sake of space the table reports the ten most active outlets. For each newspaper the table indicates the average daily circulation (as June 2013), the overall number of articles, and the number of IPOs covered (both in absolute and in relative terms). Panel B reports information on the distribution of articles, number of IPOs covered, total number of articles, and average positive and negative tone for the ten most productive journalists. Data on newspaper circulation are from "Top Media Outlets: Newspapers, Blogs, Consumer Magazines, Broadcasters, Websites & Social Networks", BurrelsLuce report, (June 2013).

PANEL A: Coverage by newspaper

Newspaper	Avg. Daily Circulation (as June 2013)	Articles N.	Articles %	IPOs Covered N.	IPOs Covered %
The Wall Street Journal	2,378,827	5,968	22%	2,276	81%
The New York Times	1,865,318	3,951	14%	2,071	74%
The Orange County Register	356,165	1,043	4%	687	24%
Austin American-Statesman	129,519	975	4%	514	18%
USA Today	1,674,306	918	3%	625	22%
Investor's Business Daily	157,161	854	3%	347	12%
The Washington Post	474,767	757	3%	317	11%
The Salt Lake Tribune	104,023	725	3%	607	22%
The Boston Globe	245,572	714	3%	360	13%
Buffalo News	145,386	634	2%	509	18%
Other Newspaper		*10,729*	*39%*	*1,655*	*59%*
TOTAL		*27,309*	*100%*	2,814	*100%*

PANEL B: Top contributing authors

Author	Newspaper	Author Positive Tone	Author Negative Tone	N. Articles	N. IPOs
Lynn Cowan	The Wall Street Journal	0.66%	0.85%	400	271
Raymond Hennessey	The Wall Street Journal	0.69%	0.90%	388	242
Matt Krantz	USA Today	0.74%	0.86%	162	150
Dunstan Prial	The Wall Street Journal	0.70%	0.99%	159	126
Lori Hawkins	Austin American-Statesman	0.48%	0.74%	87	32
Beth Healy	The Boston Globe	0.57%	0.49%	79	64
Jack Willoughby	Barron's	0.64%	1.01%	73	59
Scott Reeves	Barron's	0.72%	0.69%	63	51
Kirk Ladendorf	Austin American-Statesman	0.64%	0.66%	61	27
Thomas N. Cochran	Barron's	0.95%	0.52%	56	53
Other Authors	*3055 Authors and 464 Newspapers*			7,301	1,433
TOTAL				27,309	2,814

3.3. Data summary statistics

Our sample comprises 2814 IPOs and 27,309 articles published in U.S. newspapers. Table 1 summarizes the detailed distribution of articles among newspapers for the ten top contributing sources along with the cumulative figures for the 454 remaining outlets (panel A), as well as the same information for the top ten contributing authors (panel B).

Interestingly, only the *Wall Street Journal* (WSJ) and the *New York Times* (NYT) provide an extensive IPO coverage, reporting information roughly for eighty and seventy-five percent of the new issues in the period between 1995 and 2013, respectively. Instead, the remaining newspapers solely cover a minor fraction of the IPOs. The *Orange County Register*, *USA Today* (third newspaper by circulation), and *The Salt Lake Tribune* follow approximately one fourth of the IPOs, while *The Washington Post*, fourth largest newspaper outlet, covers less than one tenth of the initial public offerings. This disproportion between the number of articles and the percentage of IPOs covered suggests different editorial styles among newspapers, where some of them offer a coverage which is relatively distributed among new issues while others produce more concentrated information production for a subset (likely to be larger or more glamorous) of IPOs. Table 1 (panel A) also shows that (a) the first ten outlets produce approximately 60% of the overall number of detected articles, and (b) the remaining sources report, as a whole, information on 59% of IPOs. We interpret this evidence as a reassurance about the representativeness of the media coverage among the IPOs in our sample, having noted that news is not heavily unbalanced towards specific media outlets.

Table 1 (panel B) shows the ten most prolific journalists covering U.S. IPOs in the period 1995–2013. Consistent with the information provided above, the two most active reporters work for the WSJ, which overall accounts for three out of the ten listed authors. Not surprisingly, the top contributor is Lynn Cowan, who has written the weekly IPO Outlook column for the Wall Street Journal for several years. Three other journalists are from Barron's, which was not listed among the top contributing sources.[9] Interestingly, within the most active

[9] This result may suggest that Barron's has fewer but more specialized journalists covering IPOs.

Table 2
IPO summary statistics. This table reports the summary statistics for the sample of 2814 U.S. IPOs in the period 1995–2013. Panel A provides the statistics for the IPO variables: First-day Return is the difference between the first-day closing price and the offer price, divided by the offer price, Price Revision is the ratio between the offer price and the filing price range (minus 1), Proceeds is the total amount of IPO proceeds, VC dummy is a dummy assuming a value equal to 1 if the IPO is backed by a venture capitalist, Reputation is the Megginson and Weiss underwriter reputation measure (underwriters' IPO market share), Firm Age is the firm age at the IPO date, Analyst Dummy describes the presence of analysts following the IPO, Lockup Dummy is equal to 1 if there is a lockup period, IPO Price Above Midpoint is the percentage of IPOs in the same month of each IPO priced over the midpoint of their original price range. Panel B reports the variable related to media coverage and mandatory disclosure by the firm (S-1 forms). Number of Articles is the number of newspaper articles per IPO, Number of Words is the total numbers of words in all the articles about an IPO, Positive Words, Negative Words, Uncertainty Words, Modal Weak Words, and Modal Strong Words are all averages of the tones of all the articles about each IPO, S-1 Number of Words, and S-1 Negative Words are instead the tonal variable of all S-1 files related to each IPO. All the tonal variables are a percentage of tonal words of the total number of words used in the related texts.

Variable	Obs	Mean	Median	St. Dev.	Min	Max
Panel A: IPO characteristics						
First day returns	2814	0.27	0.11	0.55	−0.43	6.98
Price revision	2814	0.01	0.00	0.13	−0.37	0.33
Proceeds (USD million)	2814	101.85	60.53	124.19	4.50	933.80
VC dummy	2814	0.48	0.00	0.50	0.00	1.00
Reputation	2814	0.06	0.05	0.06	0.00	0.34
Firm age	2814	14.92	8.00	20.87	0.00	165.00
Analyst dummy	2393	0.23	0.00	0.42	0.00	1.00
Lockup dummy	2814	0.79	1.00	0.41	0.00	1.00
IPOs price above midpoint	2814	46.92	48	21.16	0.00	100.00
Panel B: coverage and tones						
Number of articles	2814	10	5	22	1.00	782.00
Number of words	2814	6939	3727	15,475	21.00	507,387
Positive words (% point)	2814	0.28	0.25	0.23	0.00	2.44
Negative words (% point)	2814	0.41	0.33	0.40	0.00	3.92
Uncertainty words (% point)	2814	0.27	0.24	0.21	0.00	1.82
Modal weak words (% point)	2814	0.15	0.12	0.14	0.00	1.19
Modal strong words (% point)	2814	0.29	0.25	0.26	0.00	2.48
S-1 number of words	2475	52,432	39,395	42,879	392	837,209
S-1 negative words (% points)	2475	1.28	1.28	0.33	0.48	2.88

IPO journalists we observe a wide variability in terms of percentage of covered IPOs. While the top four authors cover an important proportion of new issues (from 5 to 10% of the detected articles), the remaining journalists show a significantly lower activity. For each journalist the Table likewise reports the average positive and negative tone Interestingly, we observe wide heterogeneity across different reporters suggesting some kind of idiosyncratic tone. For instance, Thomas Cochran (reporter of Barron's) displays a larger-than-average positive tone (0.95%) and lower-than-average negative tone (0.52%). To the other end, Jack Willoughby (still from Barron's) shows a 0.64% and 1.01% of positive and negative tone, respectively.

Table 2, Panel A presents the descriptive statistics at the IPO level. This panel reports the statistics for the dependent (*First-day Returns*) and control variables, while panel B reports those for coverage and sentiment, both at the article and at the S-1 level. In order to have the set of metrics at the IPO level, coverage measures account for the cumulative distribution of news per IPO, while sentiment metrics reflect the average across the articles associated to each offer. *First-day returns* is the percentage difference between first day of trade closing price and the offer price; Price revision is the ratio between the final offer price and the middle of the book-building price range (minus one). The former denotes an average (median) underpricing of 27 (11) percent, while the latter shows that the offer price has been on average set 1% above the mid-price (<1% in median). The third variable (Proceeds) proxies for the IPO size and shows that the average firm collects nearly $100 million through the offer. VC dummy shows that approximately 48% of the IPOs in our sample have received financing from venture capitalists. The Reputation measure is computed as in Megginson and Weiss (1991) and accounts for the market share of the leading underwriter among all IPOs in the four years before the IPO date. The remaining variables indicate that the average firm's age (Age at IPO) when it goes public is 15 years (8 years in median), roughly 23% of our IPO firms are analyst-followed (Analyst Dummy), and 79% of IPO are accompanied with a lockup agreement.

Panel B lists the variables obtained from textual analysis, regarding both newspaper articles and S-1 forms. The first two variables relate to the magnitude of the coverage. Although the aim of this paper is not to test the effect of media coverage on IPO underpricing (as in Liu et al., 2014a and Da et al., 2011), we want to show the effect of the article tone over and above the mere result of the IPO newspaper coverage, whose effect we control for in all our analyses. Unlike Liu et al. (2014a and 2014b) and Da et al. (2011), who solely proxy media coverage with the number of hits (Number of Articles), we also consider the overall number of words used in the news (Number of Words). Although these two metrics are potentially highly correlated, we do believe that the size of the articles may produce incremental explanatory power over the simple consideration of the number of news pieces.[10] The average (median) IPO is followed by 10 (5) articles, while the most covered IPO (i.e. Facebook Inc.) has obtained

[10] The underlying idea is that what drives the investor attention is not merely the presence of a news piece but also the space that the article occupies on the newspaper page. The reason for this is threefold: a more extensive area in the newspaper page may increase (a) the reader's attention; (b) the investor's perception of the IPO's relevance (and the after-market performance) (c) the amount of reported information.

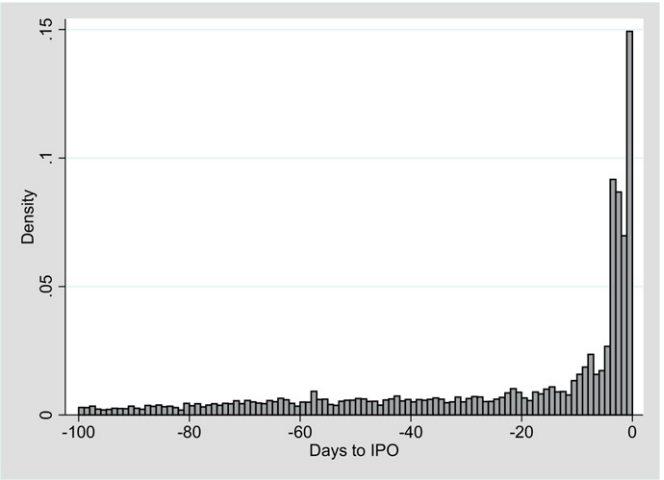

Fig. 1. IPO coverage time distribution. This graph reports the time distribution of news relative to the IPO date (set as day 0). The time interval of the considered sample spans from one year before the filing date to the first day of trading.

Table 3
Newspaper sentiment and IPO underpricing. This table shows the results for a set of ordinary least squares regressions where the dependent variable is the First-day Return and the independent variables are the sentiment proxies as well as the standard controls and year and industry fixed effects. First-day Return is the difference between the first-day closing price and the offer price, divided by the offer price, Price Revision is the ratio between the offer price and the filing price range (minus 1), Proceeds is the log of the total amount of IPO proceeds, VC dummy is a dummy assuming a value equal to 1 if the IPO is backed by a venture capitalist, Reputation is the Megginson and Weiss underwriter reputation measure (underwriters' IPO market share), Firm Age is the (log) firm age at the IPO date, Lockup Dummy is equal to 1 if there is a lockup period, IPO Price Above Midpoint is the percentage of IPOs in the same month of each IPO priced over the midpoint of their original price range. Positive, Negative, Uncertainty, Modal Weak, and Modal Strong are all averages of the tones of all the articles about each IPO. Number of Articles is the log of the number of newspaper articles per IPO.

	(1)	(2)	(3)	(4)	(5)
	First-day returns	First-day returns	First-day returns	First-day returns	First-day returns
Positive	10.91**				
	(2.44)				
Negative		0.536			
		(0.20)			
Uncertainty			5.827		
			(1.22)		
Modal weak				−0.749	
				(−0.11)	
Modal strong					3.491
					(0.92)
Number of articles	0.00444	0.0130	0.00944	0.0144	0.0111
	(0.33)	(0.95)	(0.71)	(1.09)	(0.84)
Price revision	1.043***	1.043***	1.044***	1.043***	1.042***
	(13.68)	(13.67)	(13.69)	(13.67)	(13.65)
Reputation	0.603***	0.606***	0.609***	0.605***	0.610***
	(3.41)	(3.42)	(3.44)	(3.41)	(3.44)
Proceeds	0.0170	0.0176	0.0166	0.0178	0.0167
	(1.29)	(1.34)	(1.26)	(1.36)	(1.27)
Tech dummy	0.0579**	0.0589**	0.0597**	0.0587**	0.0592**
	(2.11)	(2.14)	(2.18)	(2.14)	(2.16)
VC dummy	0.0977***	0.0974***	0.0972***	0.0973***	0.0981***
	(4.82)	(4.80)	(4.79)	(4.79)	(4.83)
Lockup dummy	−0.102***	−0.106***	−0.104***	−0.107***	−0.105***
	(−4.05)	(−4.22)	(−4.14)	(−4.24)	(−4.17)
Firm age	−0.0342***	−0.0349***	−0.0348***	−0.0350***	−0.0350***
	(−3.33)	(−3.40)	(−3.39)	(−3.41)	(−3.41)
IPOs price above midpoint	0.00229***	0.00234***	0.00236***	0.00233***	0.00234***
	(4.53)	(4.62)	(4.67)	(4.60)	(4.62)
Constant	0.173	0.195	0.190	0.195	0.191
	(0.38)	(0.42)	(0.41)	(0.42)	(0.41)
Observations	2814	2814	2814	2814	2814
Adjusted R-squared	0.329	0.327	0.328	0.327	0.327

t statistics in parentheses.
* $p < 0.10$.
** $p < 0.05$.
*** $p < 0.01$.

over 782 news items. In terms of the alternative metric, the median IPO is covered with roughly 4000 words, while on average the same measure is almost the double. The skewness in media coverage is not a surprise, given the disproportional attention that media providers usually dedicate to larger and more glamorous issues.

Panel B likewise reports the sentiment variables both for the news and the S-1 filings associated with our sample of U.S. IPOs. Unfortunately, we witness a sample reduction for the sentiment variables extracted from the S-1 filings as in 339 cases (out of 2814) we have not been able to trace the S-1 form.

To conclude the descriptive observation of the data, Fig. 1 displays the time-path of article distribution in the 100 calendar days prior to the IPO date (set by convention at zero). As expected, the amount of articles monotonically increases up to the IPO date, when we observe an important rise, consistent with the visibility that the IPO receives around the first day of trading. More specifically, we observe a significant increase in the coverage starting from the fourth to last day before the IPO date, when the number of news items is approximately twice as high as in the immediately preceding days. The upsurge in newspaper attention in the window [-4,-1] is economically motivated, as the retail offering period usually ends in this time span and underwriters–through the bookbuilding–set the offer price. The peak in newspaper attention is then reached on the IPO date when we observe approximately 1.5% of the overall articles published in the time between the filing and the IPO date.

4. Results

The scope of this section is firstly to shed some light on the impact of media sentiment on the level of underpricing. After having shown that a positive tone is indeed associated with this dimension, we attempt to provide an answer to three main questions: (a) is the timing of the news disclosure or (b) the newspaper's reputation (or its diffusion) relevant to the observed underpricing? (c) does media sentiment produce an impact over and beyond the tone embedded in the IPO filings?

4.1. Media tones and IPO underpricing

Based on the hypothesis that the tone of the news may contribute to shaping retail investor beliefs, we postulate that first-day returns should be larger when associated with benevolent media coverage (positive sentiment).

Table 3 shows ordinary least-squares linear regression models using first-day returns (i.e. the underpricing) as a dependent variable. Looking at the sentiment indicators, model (1) evidences a strong and significant positive relation between positive sentiment and underpricing.[11] Also, the economic magnitude of this effect is important as one standard deviation in the positive sentiment increases the underpricing by 2.5%. This result provides some grounds for the conjecture that a benevolent treatment from the media increases the investors' interest towards the offer and in turn the demand for shares and the first-day returns.[12] The positive association between the well-disposed media coverage and the first-day returns holds after controlling for year and industry effects, as well as for a number of variables commonly used to explain the underpricing: log of proceeds, offer price revision, tech dummy, venture capital backed dummy, reputation of the leading underwriter, log of age of the IPO firm, average returns in the month of the IPO, and percentage of IPOs above the midpoint in the considered month. The sign and the statistical significance of the control variables appear to be in line with previous studies.[13] Importantly, the significance of the positive tone holds after controlling for media coverage (as measured by the number of articles–as in Liu et al. (2014a) and Da et al. (2011)–and the number of total words employed in the news), which instead exhibits no apparent relationship with the first day returns.[14]

In contrast to the positive sentiment, media negative tone appears not to be associated with the price behavior on the first day of trading. This result seems to propound the idea that (retail) investors are not influenced by less complaisant newspaper coverage, while they are highly attentive to potential positive signals. This result is in line with Barber and Odean (2008) who find that individual investors are net buyers of attention-grabbing news. They argue that investors are inclined to only purchase stocks that have caught their attention but they are less sensitive to negative information because they tend to only sell stocks they already own. We argue that this tendency should be even stronger in the context of an IPO. Due to the large skewness of the IPO first-day return distribution, in which we observe extremely large positive returns (but not the opposite), retail investors may be

[11] As a potential concern, one might argue that part of this effect could be driven by the news disclosed during the IPO date (after the stock market opens). In fact, a successful IPO (as measured by the opening price) is more likely to attract the interest of the media which then go on to report it in a more positive way. However, as we only include the printed version of the newspapers, our results are not affected by any information that concerns the first-day price performance. Furthermore, for the sake of robustness, we also drop any news reported on the IPO date and our findings remain unaltered.

[12] A legitimate concern is that the newspaper article tone might be endogenous if both journalist sentiment and the first-day returns are driven by some omitted (and likely unobservable) factors. We attempt to address this concern proposing an instrumental variable approach based on the idiosyncratic journalist tone. We proceed as follows: first, we compute the average tone for each journalist across all his articles other than the given IPO (our instrument); second, we regress the article tone of the given IPO against the instrument (as well as the control variables); finally, we use the positive instrumented tone in the second stage regression where we regress the first-day returns vs. standard controls. The F-statistic for the Cragg Donald weak identification test abundantly surpasses the Stock and Yogo (2005) threshold, providing some grounds for the validity of the chosen instrument. More important, results from the second stage regression confirm both the statistical significance and the economic importance of the relationship between newspaper positive tone and first-day IPO returns.

[13] Due to a lack of data, we experience a modest dropout in our regression when we control for the effect of analysts. For the sake of space we do not report these regressions, although their results confirm previous findings.

[14] This result is in contrast with Liu et al. (2014a) who find a significant relationship between underpricing and newspaper coverage. However, unlike Liu et al. (2014a) who only collect the news released in the last 30 days before the IPO, we take into account a larger time span (from the filing date).

more on the lookout for potential highly underpriced shares, paying more (less) attention to those offers which are positively (negatively) treated by newspapers.

The documented evidence is apparently in sharp divergence with Loughran and McDonald (2013), who show how a negative sentiment in the S-1 filings is associated with larger underpricing. We argue that these two results do not conflict as the information conveyed through these two channels (SEC compulsory filings and media) hit different investor segments. While it is plausible that only professional investors have the needed skills and the interest to analyze the information contained in the legal SEC forms, retail investors are likely to rely largely on the press and on the way in which the information is presented.

As for the degree of negativeness, the other tones considered also show no significant association to the IPO underpricing. Table 3 reports the results of the models where the first-day returns are regressed against the level of news Uncertainty, Modal Weak and Modal Strong but none of these tones appear to produce an impact on the behavior of the first-day stock price.

4.2. Time-varying effectiveness of media disclosure

Previous results refer to the sentiment of the articles reported in a wide window-period around the IPO (from one year before the filing to the IPO trade date). However, it is a legitimate concern that the timing of the news may also play a relevant role. More specifically, it is plausible to assume that media sentiment impacts more as news is released close to the IPO date, when investor attention is likely to be at its highest.

In order to test this conjecture, we analyze the effect of media tones in five non-overlapping time periods: the IPO date, 3 to 1 days before the IPO date (as a proxy of the book-building period), one and two weeks before the book-building phase and the two weeks before that.[15] In doing so, we analyze the effect of tone in news reported up to one month before the IPO date. Table 4 displays the effects of positive tone on the observed level of underpricing for the five sub-periods. The positive tone keeps its signs, magnitude and significance, but only for the first two (out of five) periods considered. This result confirms the idea that favorable media coverage increases the level of underpricing, but only if coupled with investor attention.

In fact, unlike the evidence presented in the previous Section, *Number of Articles* is positively associated to the first-day returns, but only in the IPO date. We consider this result as a further corroboration of the investor attention hypothesis (Merton (1987), Liu et al. (2014b)) and a confirmation of our conjecture that positive newspaper tone influences retail investors when their attention is peaked. Around the IPO date, newspapers grant large space to the stock offer and this effect leads to a visibility shock for the issuing firm, a greater retail investor attention to the IPO offer and in turn a larger demand for share. On the IPO date, one standard deviation increase in the amount of media coverage produces a 0.03% rise in the underpricing. However, the effect of the tone goes over and beyond the mere coverage effect, as it is statistically more significant and economically more meaningful (one standard deviation increase in the positive tone has an impact of 5.11% on the IPO underpricing).[16]

Two main caveats may be in place. First, in order to measure the effect of newspaper tone across different sub-periods we necessarily end up with an unbalanced set of sub-samples. For instance, period 1 comprises 1120 IPOs, period 2 1960 IPOs and so on. The uneven sample time distribution is the effect of the newspaper coverage, that is not continuous and uniform for every IPO. Some issuing firms may be covered particularly in the proximity of the IPO, while others might likewise receive media attention during the weeks before. As a result, the number of newspaper covered IPOs for each sub-period necessarily differs and it may be argued that the documented tone effect might not be driven by the timing of the release but rather by other (perhaps, unobservable) characteristics that explain the time-variation of media coverage, posing a potential problem of selection bias.

Second, if, as the time of the first trading day approaches, newspapers use more pronounced tones, the documented relationship might not be due to the effect of the attention, but rather to the augmented emphasis put by the media on the way they report the information about the IPO.

As regards the former, in order to enhance the degree of comparability among sub-samples, we operate two robustness checks: (a) restrict the analysis to the IPOs with media coverage on the first trading day (1118 observations), computing the effect of media tone for each of the previous four time-periods; (b) replace the tone missing values (for IPOs with no news in a given sub-period) with the average of positive tone in the same sub-period across all the covered IPOs and run the set of regressions reported in Table 4 (with 2814 observations). The results (not shown for the sake of space) confirm the previous indications. Positive tones remain significant up to the book-building period but their impact seems to vanish in the earlier weeks.[17]

The second caveat concerns the time-variation of the media tones. We posit, in accordance with Liu et al. (2014a), that media tones produce sizeable effects only if coupled with investor attention that is generated by a larger coverage that takes place in the final phase of the IPO process. As a potential counter-argument, newspapers may change the tone of their news as the IPO date approaches, accentuating the emphasis in the reported news. Should this supposition be confirmed, the significance of media tones around the IPO date may be driven by a stronger tone rather than the joint effect of investor attention. In order to dissipate any doubt we compare the positive tone in the proximity of the IPO date (from −3 to 0) to the same tone measured in the period before.

Articles far from the IPO date provide on average (median) a more positive coverage: 0.47% compared to 0.35% (0.39% compared to 0.07%) of positive words. All these differences are statistically significant at the 1% level. Similar evidence is documented when we employ a propensity score matching method in order to take into account differences in sample compositions.[18] This

[15] We isolate the effect of each time-period by including, for the computation of the sentiment measures, the articles exclusively released in the days comprised in the time-window.

[16] We also attempt to address the endogeneity concern using the instrumental approach as described in footnote 16. However, results are unaltered.

[17] For robustness, we also restrict our analysis to the sub-sample of IPOs with news in the (−1;-3) period with no appreciable differences.

[18] We match the samples for size, industry, and year and then we apply the nearest-neighbor method, as in Smith and Todd (2001).

Table 4
Sentiment and distance from the IPO. This table reports the effect of positive tone as delivered at different times relative to the first day of trade: the IPO date (Period 1, day 0), the bookbuilding phase, usually taking place in the three days before the IPO date (Period 2, from −1 to −3), the week before the bookbuilding (Period 3, from −4 to −10), the week before Period 3 (Period 4, from −11 to −17) and the two weeks before Period 4 (Period 5, from −18 to −24). Regressions include the set of control variables used in previous tables (not reported for the sake of space).

	Period 1	Period 2	Period 3	Period 4	Period 5
	IPO date	3 to 1 days	10 to 4 days	17 to 11 days	24 to 18 days
Positive	14.46***	14.04***	−0.564	−0.377	−0.662
	(2.67)	(3.30)	(−0.13)	(−0.06)	(−0.09)
Number of articles	0.0847*	0.0432	0.0436	−0.0649	0.0309
	(1.77)	(1.56)	(1.61)	(−1.24)	(0.51)
Control variables	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Industries fixed effects	Yes	Yes	Yes	Yes	Yes
Observation	1120	1960	1866	703	560
Adjusted R2	0.366	0.365	0.337	0.340	0.327

t statistics in parentheses.
* $p < 0.10$.
** $p < 0.05$.
*** $p < 0.01$.

evidence contradicts the idea that the tone-effect concentrated around the final IPO phase is the result of a different (and stronger) tone and provides some grounds for the hypothesis of investor attention.

4.3. Newspaper circulation and reputation

Newspapers exhibit great variation in terms of journalistic style, circulation across the country and reputation. All these characteristics impact in some way on the type of audience as well as on the reliability of the reported news. Consistent with this fact, we believe that different media outlets have a diverse capability of influencing market investors. Everything else being constant, a more wide-spread circulation increases the geographical area of potential influence; a deeper focus on economic and financial news, along with newspaper reputation are likely to affect the readers' social group and these factors in turn explain the degree of market participation and therefore the probability that a certain coverage or sentiment is associated with the IPO underpricing.

For instance, Van Rooij et al. (2011) show how financial literacy affects the likelihood of investing in stocks. Under the (legitimate) assumption that more financially literate groups are more likely to belong to the audience of more reputable newspapers, we can put forward the hypothesis that wide-spread national media outlets are more effective in influencing stock market retail investors. In order to test this conjecture, as in Messner and South (2011), we categorize the newspapers into two types: National Newspapers and Local Newspapers. National Newspapers are those whose diffusion is spread all around the United States, namely the Wall Street Journal, The New York Times, USA Today, and The Washington Post. All the others are here considered as local newspapers. Several papers have focused on the market features of US newspapers in terms of geographical segmentation. For

Table 5
Newspaper reputation and circulation. This table shows the results for a set of ordinary least squares regressions to assess the effect of positive tone on First-day Returns conditional on the newspaper circulation. The table separates the effect of the four newspapers with national circulation (i.e. USA Today, The Wall Street Journal, The New York Times, and The Washington Post) from the remaining sources. Regressions include the set of control variables used in previous tables (not reported for the sake of space).

	(1)	(2)	(3)
	First-day returns	First-day returns	First-day returns
Positive (national newspapers)	13.34***		13.96***
	(3.07)		(2.63)
N. of articles (national N.)	0.0331*		0.037*
	(1.88)		(1.78)
Positive (local newspapers)		0.20	1.443
		(0.05)	(0.38)
N. of articles (local N.)		−0.0042	
		(−0.28)	
Control variables	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Industries fixed effects	Yes	Yes	Yes
Observation	2576	2340	2102
Adjusted R2	0.327	0.324	0.322

t statistics in parentheses.
* $p < 0.10$.
** $p < 0.05$.
*** $p < 0.01$.

instance, George and Waldfogel (2006) analyze the success of the process of the New York Times becoming a nationally diffused newspaper and the role of technology in that process.

Table 5 reports the effects of positive tone on the IPO underpricing, restricting the analysis to National Newspapers (Model 1), Local Newspapers (Model 2) and including in the same regressions the tones computed in both groups. The findings provide support for the idea that only the tones used by more reputable and widespread newspapers are effective in influencing potential investors, leading to larger first-day returns. While the statistical significance of the coefficient National Newspapers is very large, we document that the tone from Local Newspapers does not exhibit a value (statistically significant) different from zero.[19] It has to be said, however, that we cannot rule out whether the effect of national vs. local newspaper is driven by a larger geographical diffusion–that in turn increases the potential audience and the number of retail investors participating in the stock market–or by the different type of reader that has a different likelihood of investing in IPO stocks.

As with the previous concern, it could be argued that these findings are mainly driven by the characterization of the tones between the groups, rather than the diffusion or the prestige of the newspaper. Although probably counter-intuitive, National Newspapers may report information with more enthusiastic or extreme tones than media outlets with a more confined circulation. In these cases, news reported by National Newspapers would exhibit tones with higher positiveness and the statistical significance presented in Table 5 may be the effect of the more pronounced characterization of the tones rather than being explainable as a result of the higher capacity to influence the readership. However, results contradict this concern, as National Newspapers show less positive tones than Local Newspapers.[20] This finding is also in line with Gurun and Butler (2012), who show that local newspapers use fewer negative words when they report about a local company, as they fear a drop in local media advertising expenditures.

4.4. IPO filings and media tones

This last sub-Section aims at dispelling the suspicion that the tones of the articles published by the media may be influenced by the sentiment embedded in the legal documents that issuing firms are required to fill in (S-1 forms) before the IPO. Should this supposition be verified, the observed association between newspaper tones and underpricing would be a spurious effect derived from the relationship documented in Loughran and McDonald (2013). We provide two motivations for which this concern is unjustified. First, Loughran and McDonald (2013) find that negative S-1 sentiment increases underpricing, while we document that the newspaper positive (and not negative) tones are positively associated with first-day returns. This difference suggests that media and S-1 sentiments are not positively correlated measures and supports the idea that journalists are not influenced by the sentiment embedded in the SEC filings.

Second, for the sake of completeness, we collect the S-1 forms (as in Loughran and McDonald (2013)) to verify that newspaper sentiment produces an effect over and above what compulsory filings can offer. Table 6 (Model 1) confirms our predictions as the newspaper article positive sentiment maintains its positive and significant effect after controlling for S-1 sentiment. Although we experience a non-negligible dropout, the results are in line with previously documented findings.[21] The coefficient of positive media sentiment is strongly significant and its magnitude even larger than that shown earlier; the coefficient of S-1 negative tone is positively associated with first-day returns as in Loughran and McDonald (2013).

It may seem puzzling that two different characterizations of sentiment (positive and negative) are positively associated with the underpricing when two information channels (SEC filings and newspapers) are taken into consideration. We interpret this outcome as a potential confirmation of our conjecture of investor segments. We argue that investors who have knowledge of the existence of Form S-1 filings differ from those who rely on the media to collect and process IPO information. The legal and technical information embedded in compulsory filings requires high skills that only professional investors possess; on the contrary, retail investors greatly rely on second-hand and simplified information reported in the newspapers. Given the different audience and type of signals that these two investor groups are more attentive to, we believe that our findings and those in Loughran and McDonald (2013) do not conflict but rather provide an even clearer understanding of the effect of information sentiment on IPO underpricing.

For robustness Table 6 likewise reports the results of the analyses presented in the earlier Sections, controlling for the S-1 negative tone. Model 2 and model 3 provide some robustness on the findings concerning the tones detected in the news reported close to the IPO date (from 0 to −3) and on National newspapers, respectively. As for previous robustness checks, the results evidence that the effects of news timing and newspaper reputation and circulation are confirmed once the tone embedded in the IPO filings is taken into consideration. Loughran and McDonald (2013) likewise document that first-day returns are positively associated with *Uncertain* and *Weak Modal* tones. For completeness, we run model 1 to model 3 substituting *S-1 Negative Tone* with the other two S-1 tones. Results (unreported) show that the newspaper positive tone maintains the sign and the statistical significance for all the specifications considered.[22]

[19] Results hold after using the author idiosyncratic tone as an instrument in the two-stage regression approach.

[20] Local newspapers display on average (median) a more positive coverage, 0.52% vs. 0.30% (0.40% vs. 0.10%), than National newspapers and both these differences are statistically significant at the 1% level. The same result has been obtained applying a propensity score matching method in order to take into account differences in sample compositions (matching for size, industry, and year and applying the nearest-neighbor method.

[21] The regression shows a lower sample size due to the drop out caused by the merger of our sample with the number of companies for which we find information on S-1.

[22] We also control for the effect of S-1 tone by taking the difference between tones embedded in the newspapers' articles and the S-1 tones, as a proxy for unanticipated IPO tone. However, all the shown findings remain fully confirmed (results available upon request).

Table 6
Newspaper articles and S-1 form informative contents. This table shows the results for a set of ordinary least squares regression results after controlling for S-1 file textual content, as in Loughran McDonald (2013). The dependent variable is the First-day Return and the independent variables are the positive sentiment detected in the newspaper articles and the S-1 form negative tone, as well as the standard controls (as in previous tables) and year and industry fixed effects (not reported for the sake of space). Results refer to the whole sample (Model 1), news disclosed in the four days around the IPO date (Model 2) and news reported by U.S. National newspapers (Model 3), i.e. The Wall Street Journal, the New York Times, USA Today, and The Washington Post.

	(1)	(2)	(3)
	First-day returns	First-day returns	First-day returns
Positive	10.29**		
	(2.06)		
Number of articles	0.00122		
	(0.08)		
Positive (close to IPO)		19.03***	
		(4.07)	
N. articles (close to IPO)		0.0351	
		(1.40)	
Positive (national N.)			12.59***
			(2.64)
N. articles (national N.)			0.0320*
			(1.65)
S-1 negative tone	10.34***	8.291**	9.526***
	(3.25)	(2.22)	(2.81)
Constant	Yes	Yes	Yes
Control variables	Yes	Yes	Yes
Year and industries fixed effects	Yes	Yes	Yes
Observations	2475	1969	2269
Adjusted R-squared	0.334	0.346	0.332

t statistics in parentheses.
* $p < 0.10$.
** $p < 0.05$.
*** $p < 0.01$.

5. Conclusions

In the IPO process a large amount of private information is gradually released to the public. During the offer some investors (i.e., professional) have priority access and the needed skills to process a large amount of technical information; some others (i.e., retail investors) instead, greatly rely on the second-hand information that newspapers report. We argue that the way in which the media presents the information can influence the retail investor's belief and then cause an impact on the investor's appetite for the IPO shares. More specifically, we believe that a well-presented IPO can, everything else remaining constant, make retail investors more inclined to subscribe the offer or to demand for shares on the first trading day, pushing up the stock price on the IPO date. If newspapers contribute to shaping investor beliefs, it is also plausible that the timing of the news coverage and the outlet reporting the information are likewise important. Specifically, we postulate that the tone is more effective (on the observed level of underpricing) if a reputable (or geographically dispersed) newspaper covers the IPO or if the same tone is used in the proximity of the IPO date, when the (retail) investor's attention is likely to be at its greatest (Liu et al. (2014b)).

In this paper we analyze 2814 U.S. IPOs in the period 1995–2013 and use textual analysis (as in Loughran and McDonald (2011)) to compute the sentiment (tone) from almost thirty thousand articles (from approximately five hundred newspapers). We document that positive newspaper tones are indeed positively associated with first-day returns. This effect is highly significant and economically meaningful, as one standard deviation in the tone is associated with a roughly 2.5% increase in the level of underpricing.

We also show that the timing of the coverage and newspaper reputation are important. Positive tones used far in advance of the IPO date are not associated with first-day returns, while we observe a strong significance of the same sentiment in the four days around the IPO date (from 0 to −3) when the coverage (number of articles) is also at its highest. We interpret this outcome as a confirmation that media tones are important but only if coupled with investor attention. Second, we bi-partition tones from National and reputable newspapers and from Local newspapers. We find that only National and reputable newspapers are associated with the level of underpricing, offering some grounds for the hypothesis that not all media are equally important in shaping retail investor beliefs.

Finally, we also control whether the association between newspaper tones and underpricing holds when we take into consideration the sentiment embedded in the compulsory SEC filings. In fact, Loughran and McDonald (2013) document a positive association between negative S-1 form sentiment and first-day returns. However, we show that the economic significance of newspaper (positive) sentiment becomes even stronger after having controlled for the SEC filing tones. We interpret this result as support for the information segmentation hypothesis, according to which the media are able to produce a sizable impact only on retail (non-professional) investors.

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Appendix A. Sample of news articles

Positive # 1

GM Is Rosy in Its Pitch For IPO

By Sharon Terlep and Randall Smith

5 November 2010 - The Wall Street Journal

General Motors Co., in an online pitch to potential investors in its initial public offering this month, gives bullish projections on the car maker's profit and promotes its shares as "a **great** investment **opportunity**." GM tells investors the company can generate $11 billion to $13 billion in annual pretax profit and profit margins of 7% to 8% as the North American auto market recovers, according to a video in the presentation by Chief Financial Officer Chris Liddell that was available Thursday on a website used by underwriters to distribute IPO information. Mr. Liddell says GM should be **able** to hit those targets as the industry moves up from the trough of 2009. When the car market is at its **strongest**, he says, GM will be capable of delivering pretax annual profit of $17 billion to $19 billion, with profit margins of 9% to 10%. By comparison, Ford Motor Co. reported $7 billion in pretax profit in the first three quarters of 2010. "I know a **great** investment **opportunity** and the new GM is just that," Chief Executive Officer Dan Akerson says in his own video address included in the presentation. The presentation gives a glimpse of the "road show" GM executives are embarking on this week to promote the IPO ahead of plans to become a publicly traded company starting Nov. 18. Mr. Liddell, in his 10-minute presentation, says GM boasts a balance sheet cleaned up by last year's U.S.-funded bankruptcy that affords more money for new products, along with changed business practices. "Our plan is that we will use that higher reinvestment to create even **better** vehicles, which will drive the virtuous cycle of **greater** quality and higher **profitability**," Mr. Liddell says, standing in front of a red Cadillac CTS. "This is fundamentally different than old GM." He also makes the case that GM has a **strong** position in both North America, a highly **profitable** part of the global auto market, and the large emerging-market countries of Brazil, Russia, India and China, where car sales are growing rapidly. Global rivals Ford, Toyota Motor Corp. and Volkswagen AG are **strong** in one of those key battlegrounds each, but none is tops in both. "We clearly have the **best** of both worlds," Mr. Liddell says in the video […].

Positive # 2

PayPal and Other Post-Bubble Signs of Life on the Internet

By Adam Cohen

February 2002 - The New York Times

PayPal has all the trappings of a classic dot-com bubble story. The company, based in Palo Alto, Calif., was conceived in 1998 by Peter Thiel, a **smooth**-talking hedge fund operator, and Max Levchin, a Russian-immigrant computer geek. It started out with the dubious business model of helping people "beam" money from one Palm Pilot to another. When the market for beamed money proved elusive, it switched to **enabling** people to e-mail each other cash. Mr. Thiel and Mr. Levchin, who declared that their little start-up would **revolutionize** commerce, persuaded venture capitalists to pour in more than $225 million.

Unlike many such dot-com escapades, this little start-up has survived – and thrived. PayPal has been **enthusiastically** adopted by the online community. In a single four-month period in 2000, registered users shot up from 10,000 to one million. The company now has over 13 million users, and annual revenues, generated by taking a small percentage of each transaction, of more than $100 million. PayPal isn't a sure thing. It's still not in the black, and it's had trouble with fraud. But it so dominates the fast-growing online payments business that Salomon Smith Barney is expected to take it public tomorrow in one of the most eagerly anticipated Internet I.P.O.'s in nearly two years.

[…] But companies that take **advantage** of the unique **efficiencies** of the Internet show more promise than ever. PayPal caught on because it did just that. It allows users to send money from their credit cards or bank accounts to other people, who can receive the funds, by wire transfer or check, starting with a visit to PayPal's Web site. The **great** majority of those first million users were eBay buyers and sellers who were miffed that after having conducted a sale online, they had to make the payment by sending a check through regular mail. PayPal made the payment as **easy** as the auction.

[…] When tulip mania dies down, all that remains are pretty flowers. When bubbles burst, nothing is left but soapy residue. But the Internet revolution, for all its speculative excesses, really is changing the world. We are beginning to see quiet signs that **despite** all the naysaying, dot-coms will be back, **better** than ever.

Positive # 3

Prospectors seek gold on Internet

By Beppi Crosariol

30 July 1995 - Denver Post

Analysts say Spyglass' IPO may yet pale against that of Netscape Communications Corp., expected next month. Netscape is arguably the most widely anticipated Internet stock offering to date. It makes a competing browser called Netscape Navigator, also based on the freely available Mosaic. Co-founded by former Silicon Graphics Inc. Chairman Jim Clark, the Mountain View, Calif.-

based company plans to issue 3.5 million shares at an estimated price of $13 apiece. “Netscape is just going to be a high flier,” says David Menlow, president of the IPO Financial Network Corp. in Springfield, N.J., whose firm specializes in predicting the premium new shares will fetch over their IPO price as soon as they hit the trading floor. Menlow predicts Netscape will open trading at least $5 above its estimated offering price range of $13 a share, his **highest** rating. Menlow says the money-losing company is **attractive** especially because of its high-profile **alliances**. In April, it raised an estimated $17 million by selling an 11% stake to several partners, including Adobe Corp., Hearst Corp., Knight Ridder and Times Mirror Co. Says Menlow: “Netscape is right in the middle of the trough.” […].

Negative # 1

Deals & Deal Makers: Hesitance Persists in IPO Market As Agere Postpones Its Deal Again

By Kate Kelly and Dennis K. Berman

22 March 2001 - The Wall Street Journal

For the IPO market, the bear continues to roar. Despite a decent showing by the software maker Verisity Ltd., which experienced a 14% price pop in Nasdaq trading yesterday, other companies that had intended to go public remain shy or **unwilling** to offer themselves to investors. Case in point: Agere Systems Inc., the optical-networking unit of Lucent Technologies Inc., Murray Hill, N.J., which said yesterday that after two **postponements** and a price **cut** that its $6.5 billion public offering won't be completed until next week at the earliest. Underwriters have struggled to complete the Agere deal, which if completed would be the second-largest IPO in the U.S. after AT&T Wireless Group's $10.6 billion offering last year. Investors have **balked** at paying even the reduced valuations suggested by the company's underwriters led by Morgan Stanley Dean Witter & Co. The Agere IPO was originally scheduled for Tuesday, but yesterday it was **postponed** for the third time until next week at the earliest. Although underwriters are still talking about a price range of $12 to $14, for the last week they have been informally discussing a lower price of $8 to $10 a share with prospective investors. At the CeBit technology conference in Hanover, Germany, Lucent Vice Chairman Ben Verwaayen told Bloomberg News that the company would decide “either way” about the IPO next week, raising the possibility that the deal may be **canceled**. Company spokeswoman Kathleen Fitzgerald said such a conclusion is speculative. “There's no new news here,” Ms. Fitzgerald said. “Of course we look at the market closely as we proceed with the IPO process. […]” “This is a very **bad** time to be doing this deal, said Sanford Bernstein analyst Paul Sagawa.” “The market sentiment for optical stocks is quite **poor**, and the liquidity issues at Lucent are pushing them to get this done.” Despite all the **bad** IPO news, investors saw one small upside: the $30 million offering of Verisity, a Mountain View, Calif. maker of software for chip makers. Priced at a relatively unambitious $7 per share, the company's price popped to $8.38 in initial trading, ending the day at $8 per share.

Negative # 2

TheStreet.com Steers for IPO Fast Lane

By Robert McGough and Terzah Ewing

10 May 1999 - The Wall Street Journal

[…] A regulatory filing notes that TheStreet.com had added 5500 subscribers in the fourth quarter – or >17% of the total at the end of 1998 – who got their subscriptions by trading in airline miles. These subscribers don't pay cash. Indeed, TheStreet.com pays a third-party service for them. The filing notes that such subscribers are much less likely to sign up for a new subscription once they have to start paying cash. (Though the practice hurts the company's already **negative** cash flow, some magazines do this as well.) What's clear is that profits have eluded TheStreet.com. **Losses** have grown from $1.7 million in the period from its June 1996 inception through the end of 1996, to $5.8 million in 1997 and $16.4 million last year. During the first three months of 1999, the company had a **loss** of $7.2 million, on net revenue of less than $2 million. The **losses** have come as the company doubled its editorial staff. The site's editorial content has won fans. Midtown Research, a research boutique, said in a report that TheStreet.com's “**critical** and real-time reporting stands out from the fare offered in the morning's Wall Street Journal or New York Times.” But Midtown Research also **cautioned** in its report: “The company appears to have underinvested in noneditorial parts of its business – the CEO only joined last October, and the CFO is brand new.” (The chief executive is Kevin English, 46 years old, who was previously general manager of the Nexis Enterprise Group, a division of Lexis-Nexis.) A spokesman for Dow Jones said the company has >580,000 subscribers to real-time news through its newswires and The Wall Street Journal Interactive Edition, and the newspaper itself has the largest paid circulation in the U.S. Until lately, at least, **worrying** about cash and earnings hasn't been a way to make money in Internet stocks. And TheStreet.com's Mr. Cramer has chided the news media for **worrying** about such things in his spirited, frequent columns in TheStreet.com. TheStreet.com has a couple of bigshouldered new investors […].

Negative # 3

Deals & Deal Makers: Loudcloud's IPO Is Priced Below Its Original Range

By Suzanne McGee and Raymond Hennessey

9 March 2001 - The Wall Street Journal

For the IPO market, a lot is hanging on the fate of Loudcloud Inc. A total of 25 million shares in the fledgling Internet-infrastructure and launched by Netscape co-founder Marc Andreessen were offered to public market investors for only $6 each **late** yesterday, down from original terms of as much as $12 a share **late** last year. […] Last night's pricing values the company at $439.9 million, down from the $1.15 billion valuation originally predicted by underwriters Goldman Sachs Group and Morgan Stanley Dean Witter & Co. this past fall, and below the $727.7 million valuation placed on the company in a private financing last summer. The offering is being watched closely; even venture capitalists and underwriters who had nothing to do with the deal are praying fervently for its success. “This is what we call a ‘Hail Mary’ deal,” says Richard Kramlich, general partner at New Enterprise Associates, a Menlo Park, Calif., venture capitalist, referring to a last-ditch football play. “You throw it up in the

air, and hope for the best." Mr. Kramlich and others hope that if Loudcloud fares well in the market, the IPO could help reopen the public markets to a large number of cash-strapped technology companies eager to launch their much-**delayed** IPO plans. Loudcloud's offering yesterday was expected to be one of four IPOs to hit the market, a number that was routine during the IPO market's heady days in 1999 and early 2000, but hasn't been seen since this past October. As of **late** yesterday afternoon, one of those three additional deals had been priced: Encore Acquisition, a Fort Worth, Texas, energy **concern**, sold 7.15 million shares at $14 each, the bottom end of the pricing range at which the IPO was marketed by Goldman Sachs and Credit Suisse First Boston. […] Market participants say the path ahead will be full of **obstacles** for all these new companies – even for Loudcloud, which has blue-chip backing from Mr. Andreessen and venture-capital firms such as Integral Capital Management and Benchmark Capital, which also financed eBay Inc. Some potential investors say part of the **problem** is that Loudcloud, which helps companies manage Web sites, closely resembles the Internet companies of old and evokes unhappy memories among money managers. Loudcloud reported a net **loss** of $107.6 million for the nine months ended Oct. 31, 2000, and **warned** in its prospectus that it expects to increase its operating expenses, and will "continue to incur significant operating **losses** and **negative** cash flow for the foreseeable future." Even at the revised price range, some investors found the deal to be pricey […].

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