Venture Capital Backing, Investor Attention, and Initial Public Offerings

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Abstract

We hypothesize that VC-backing garners greater "investor attention" (Merton (1987)) for IPOs, allowing IPO underwriters to perform two information-related roles more efficiently during the book-building and road-show process: information dissemination, where the lead underwriter disseminates noisy information about various aspects of the IPO firm to institutional investors; and information extraction, where the lead underwriter extracts information useful in pricing the IPO firm equity from institutional investors. Using pre-IPO media coverage as a proxy, we show empirically that VC-backed firm IPOs indeed obtain greater investor attention, causally yielding them more favorable IPO characteristics such as higher IPO and secondary market valuations.

Keywords: Initial Public Offerings; Investor Attention; Venture Capital

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1 Introduction

It is by now well established that venture capitalists add product market value to the private firms that they invest in, either by helping them to improve firm efficiency (Chemmanur, Krishnan, and Nandy (2011)) or through monitoring (see, e.g., Gompers (1995) or Lerner (1995)). However, practitioners also talk about venture capitalists helping to create value for the firm in the financial market at the time the firm goes public. The channels through which such value is created, however, are less well-understood. The objective of this paper is to explore a new channel through which VCs may create value in the IPO market for the private firms that they invest in over and above any value they have created for these firms in the product market. We propose a new channel through which VCs may create value at the time of IPO for a firm that they have invested in, namely, by attracting greater investor attention to the firm's IPO. Using proxies for investor attention, we first test whether VC-backed firm IPOs are indeed associated with greater investor attention relative to non-VC-backed firm IPOs. We then develop testable predictions regarding the implications of this ability of VC-backing to attract greater investor attention to a firm going public for various specific characteristics (e.g., firm valuation at IPO) of VC-backed versus non-VC-backed firm IPOs and empirically test these predictions.

An important hypothesis that has significant currency in the existing literature regarding financial market value-creation by VCs for their portfolio firms is the venture capital (VC) "certification hypothesis": see, e.g., Megginson and Weiss (1991). This hypothesis postulates that venture capitalists are able to "certify" the value of a firm backed by them to the financial market, thus reducing the information asymmetry faced by the firm in the IPO market. The argument here is that this reduces information asymmetry, and in turn, leads to a lower extent of underpricing for the IPOs of VC-backed firms relative to that for the IPOs of non-VC-backed firms. The certification hypothesis, however, has been called into some question by the evidence from the 1990s and later, which shows that VC-backed IPOs were, in fact, more (not less) underpriced than non-VC-backed firm IPOs (see, e.g., Lee and Wahal (2004)). However, while the notion that VC-backing reduces underpricing has been contradicted by the empirical evidence, it is nevertheless possible that, given the empirical evidence that VCs select higher quality firms to invest in and add product market value to them (see, e.g., Chemmanur, Krishnan, and Nandy (2011)), investors may infer that a firm going public

is of higher quality (intrinsic value) from the fact that it is VC-backed. The investor attention channel that we propose in this paper and the above "weak form" of the certification hypothesis are not mutually exclusive: we control for this certification effect in our empirical analysis.[1]

Precisely how may VC-backing affect the IPO characteristics of a firm when it goes public through the investor attention channel? To address this question, we start by assuming that for institutional investors to participate in a firm's IPO, they not only need to receive information about various aspects of that firm from an investment bank, but also to pay attention to or "recognize" this information. This last assumption is in the spirit of Merton's (1987) investor recognition or attention model, which assumes that an investor will incorporate a security into his portfolio only if he pays attention to (or acquires information about) that security. While Merton (1987) posits several possible sources of his "attention" or "recognition" cost, he views this cost mainly as arising from the cost of investors becoming aware of (or familiar with) a firm: in his setting, investors consider investing only in the stock of firms with which they have a certain level of familiarity. In a similar vein, we can think of institutional and other investors considering for investment only the stock of IPO firms that they have become familiar with by incurring a cost.[2]

We now make the additional assumption that the above attention cost for investors is lower for VC-backed IPOs compared to that for non-VC-backed IPOs. This may be because VCs are repeat players in the IPO market, so that institutional investors may have had repeated prior interactions with the VCs backing a given IPO firm. For example, some institutional investors may have previously invested in IPOs backed by one or more of the VCs backing the current IPO firm, and had a good experience from the point of view of their investment paying off a high return. Alternatively, they may have heard about other institutions having made such successful prior investments in IPOs backed by one or more of the VCs backing the current IPO firm. In the

[1]We use the term "weak form" of the certification hypothesis to capture the notion that IPO market investors may infer that the firm is of higher quality from the fact that it is VC-backed (with implications for firm valuation and other IPO characteristics). This is in contrast to the stronger implications of the original certification hypothesis such as the reduction in information asymmetry facing a VC-backed firm or lower underpricing for VC-backed firms (compared to non-VC-backed firms), which can be thought of as arising from a "strong form" of the certification hypothesis. In order to establish that the investor attention channel of VC value creation in the financial market that we propose in this paper has effects on the IPO characteristics of VC-backed firms over and above any certification effects of VC-backing, we control for potential differences in intrinsic quality between VC-backed and non-VC-backed firms in a variety of ways (discussed in the main text).

[2]The Merton (1987) model has been extended by Van Nieuwerburgh and Veldkamp (2009), who assume that such attention/information acquisition has a cost. See also the theoretical IPO model of Liu, Lu, Sherman, and Zhang (2016) who also make such an assumption.

context of the Merton (1987) model, the above assumption implies that investors' cost of paying attention to VC-backed IPO firms will, on average, be lower compared to that for paying attention to non-VC-backed IPO firms. This, in turn, implies that more institutions are likely to pay attention to a particular IPO if that IPO is VC-backed relative to the situation where it is not VC-backed.[3]

The notion that VC-backed IPO firms may attract greater attention from institutional investors has important implications for the IPO pricing process, and in particular, for the book-building and road-show process in IPOs. The practitioner literature points to the two-way information flow occurring during the IPO road-show and book-building process between IPO underwriters and institutions: while underwriters collect information from institutions about their demand schedules for the IPO firm's shares during this process (information extraction), they also address institutions' questions and concerns about the future strategy and performance of the IPO firm (information dissemination). We can therefore think of two ways in which the greater investor attention that may be generated by the VC-backing of IPO firms may affect the characteristics of VC-backed versus non-VC-backed IPOs. First, such greater investor attention may affect the ability of a lead IPO underwriter to disseminate information about the IPO firm to institutional investors. Second, such greater investor attention may affect a lead IPO underwriter's ability to extract information from institutions about their demand for the IPO firm's equity.

We first discuss how VC-backing and the greater investor attention it draws to a firm's IPO affects information dissemination. An important strand in the theoretical literature on IPOs has argued that the role of an underwriter in an IPO is that of a producer of noisy information about the firm it takes public and a transmitter of that information to potential investors in its IPO: see, e.g., Booth and Smith (1986) or Chemmanur and Fulghieri (1994). However, unlike this literature, which has argued that a lead IPO underwriter transmits information to investors about the IPO using its reputation as a certification mechanism, we postulate here that the lead underwriter transmits noisy information about the IPO firm to potential IPO investors either directly, or through the other investment banks in the IPO syndicate.[4] As we discussed earlier, we have assumed that,

[3]By a similar argument, we expect institutions' attention cost to be lower for high-reputation VC-backed IPOs relative to that for low-reputation VC-backed IPOs. This, in turn, implies that institutions are more likely to pay attention to an IPO if it is high-reputation VC-backed rather than low-reputation VC-backed.

[4]Unlike their role in the certification literature, the role of lead IPO underwriters that we postulate here is essentially that of "marketing" IPOs to institutional investors making use of their investment banking syndicate and the ongoing relationships individual investment banks in the IPO syndicate may have with various institutional investors. See also a related paper by Gao and Ritter (2010), who analyze the effects of marketing efforts by

for institutional investors to participate in a firm's IPO, they not only need to receive information about various aspects of that firm from the IPO underwriter, but also to pay attention to or "recognize" this information in the spirit of Merton's (1987) investor recognition model. This has an important implication for information dissemination. The implication is that, since, on average, a greater number of institutions will pay attention to an IPO if it is VC-backed, the dissemination of information about the IPO firm from the underwriter to institutions will be more efficient if the IPO is VC-backed. We will refer to this hypothesis as the "information dissemination through investor attention" hypothesis.

We now turn to the effect of VC-backing on information extraction. The theoretical book-building literature that originated with Benveniste and Spindt (1989) has modeled an IPO underwriter as concerned with extracting truthful information from institutional investors who have private information about their own valuation of the IPO firm (and therefore their demand schedule for the firm's shares), and using the IPO share allocation process to design an incentive compatible mechanism to extract this information. In the above setting, we again introduce our assumption that institutions' cost of paying attention to an IPO is lower for VC-backed than for non-VC-backed firm IPOs, in which case institutional investors are more likely to pay attention to the IPO of a VC-backed firm rather than that of a non-VC-backed firm. Since a lead IPO underwriter has to first attract the attention of institutional investors to the firm whose IPO they are underwriting before they can extract information from them about their valuation of the firm's equity, this also implies that a lead IPO underwriter will be able to extract information from institutions more efficiently in the case of VC-backed IPOs relative to the case of non-VC-backed IPOs. We will refer to this hypothesis as the "information extraction through investor attention" hypothesis.[5]

In summary, we have argued above that an important effect of the VC-backing of IPOs is to induce a larger number of institutions to pay attention to IPO firms, thus making it easier for the lead underwriter to disseminate information about the firm to institutions and to extract information from them about their demand for the IPO firm's equity. As we discuss in detail

underwriters in seasoned equity offerings.

[5]Some of our discussion above of the effect of VC-backing on information dissemination and information extraction by IPO underwriters is parallel to the arguments made by Bajo, Chemmanur, Simonyan, and Tehranian (2016). Similar to our paper, they also focus on the ability of a lead underwriter to disseminate information to institutions and to extract information from them. Unlike our paper, however, the focus of that paper is on the effect of the centrality of lead IPO underwriters in their investment banking networks on their ability to efficiently disseminate information about IPO firms they take public to institutional investors and to extract information from them.

in Section 3, this has implications for various IPO characteristics such as the absolute value of IPO offer price revisions; IPO and immediate secondary market valuations of the firm; IPO initial returns; and participation by institutional investors and financial analysts in IPOs or its immediate secondary market (the former by holding IPO firms' equity and the latter by providing analyst coverage). We test these implications in our empirical analysis.

Before empirically analyzing the relation between VC-backing, investor attention, and various specific IPO characteristics, we first analyze whether VC-backed IPOs are indeed able to garner greater investor attention than non-VC-backed IPOs. In conducting this analysis, we make use of a proxy for investor attention developed by Liu, Sherman, and Zhang (2014), namely, pre-IPO media coverage received by the firm going public. Liu, Sherman, and Zhang (2014) argue that, since media sources compete to attract readers and advertising revenues, editors expect their reporters to cover those firms which have already received investor attention or are expected to receive such attention in the future. Consequently, the pre-IPO media coverage of firms going public serves as a good proxy for the degree of attention investors pay to such firms. We therefore make use of this proxy to test the notion that VC-backed IPOs are associated with greater investor attention.

We then move on to test the relation between VC-backing, investor attention, and various specific IPO characteristics. One difficulty with conducting such an analysis is that differences in various IPO characteristics between VC-backed and non-VC-backed firms may be driven by considerations other than differences in investor attention. For example, VC-backed and non-VC-backed firms may differ in terms of their intrinsic value (quality) pre-IPO. Such differences in intrinsic value may arise, for example, from VCs investing in higher quality firms to begin with (screening) or by VCs adding greater product market value to these firms pre-IPO (value addition or monitoring). Consequently, in our empirical analysis, we explicitly allow for the fact that differences in the IPO characteristics of VC-backed and non-VC-backed firms may be due to differences in their intrinsic quality (and the resulting valuation differences as inferred by investors: i.e., the certification effect) as well as their differences in investor attention (as proxied by media coverage) across the two kinds of IPOs. As we discuss below, we accomplish this in three different ways.

First, in our OLS analysis, we choose not to rely purely on comparisons of IPO characteristics between VC-backed versus non-VC-backed firms to test our hypotheses. Instead, we use interaction

tests to split up the effect of VC-backing on various IPO characteristics (e.g., IPO valuation) into three components. The first component we identify is the direct effect of VC-backing, as captured by the coefficient of a VC-backing dummy, on IPO valuation. This component can be interpreted as coming partly from the higher intrinsic value of VC-backed firms (as inferred by the financial market).[6] The second component, whose effect is captured by the coefficient of our high (above median) investor attention dummy, can be interpreted as a "pure" investor attention effect: i.e., the direct effect of receiving higher investor attention on the IPO valuation of any firm (though, under our theory, we expect VC-backed firms to be more likely to receive higher investor attention than non-VC backed firms). The third component, whose effect is captured by the coefficient of the interaction term between VC-backing and the high investor attention dummy, can be interpreted as the incremental effect of higher investor attention on the valuation of VC-backed firms relative to that of non-VC-backed firms. Thus, we use our interaction tests to analyze whether there is an incremental effect of higher investor attention on various IPO characteristics of VC-backed firms even after controlling for the effect of possible differences in quality (intrinsic value) between VC- and non-VC-backed firms going public.

Second, we conduct a dynamic analysis of the difference in valuation between VC- and non-VC-backed firms, analyzing how firm valuation changes over the period of one, two, and three years after IPO for the two types of firms. Since we expect investor attention to dissipate (fade) to some extent after the IPO over time, we expect the differences in market valuation between VC and non-VC-backed firms (generated by the higher investor attention received by VC-backed firms) to become correspondingly smaller as time passes after the IPO. Further, if we assume that investor attention will decline to a greater extent (with the passage of time) for firms that received a higher level of such attention at the time of IPO (and assuming that the effect of investor attention is stronger on the valuation of VC-backed than that of non-VC-backed firms), we expect to find in our interaction test that the valuation of VC-backed firms that received higher (above median) investor attention at IPO declines to a greater extent post-IPO with the passage of time.[7]

[6]Thus, a positive and significant coefficient of the VC-backing dummy in the regression of IPO valuation would indicate that VC-backed firms are valued higher on average than non-VC-backed firms at IPO: this could be partially due to VC-backed firms having higher intrinsic value than non-VC-backed firms, and partially due to VC-backed firms receiving greater investor attention than non-VC-backed firms. A similar interpretation of the VC-backing dummy holds in our regressions of other IPO characteristics as well.

[7]Using similar arguments, and under similar assumptions about the effect of investor attention fading over time (and assuming that the effect of investor attention is stronger on valuation of high-reputation VC-backed firms than

Third, we control for the fact that VC-backing and investor attention (as well as favorable IPO characteristics) may be endogenous. In other words, it is possible that firms with certain intrinsic characteristics are more likely to receive VC backing as well as to receive greater investor attention, so that the greater investor attention and favorable IPO characteristics that we document for VC-backed firms may be due to these underlying intrinsic firm characteristics rather than due to VC-backing itself. We control for this endogeneity by instrumenting for VC-backing. Similar to the methodology of Samila and Sorenson (2011), the instrument we use for VC-backing is the product of the number of limited partners (who invest in VC funds) in the state where the IPO firm is headquartered and the average investment returns of college endowment funds for the ten years preceding the firm's IPO. Our instrument is motivated by the following three well-documented facts: First, the LPs of VC funds generally adopt an investing strategy that has a fixed optimal allocation ratio to distribute their investment over different asset classes, which includes equity, fixed income, and alternative assets (such as venture capital, private equity, and hedge funds). When university endowments earn higher returns, they are likely to shift more of their assets into venture capital to maintain the above optimal ratio. Second, these LPs exhibit a "home bias" when investing in venture capital, i.e., they are likely to invest in VC funds headquartered close to them. Third, VC funds also have a "home bias": i.e., they have a strong tendency to invest in entrepreneurial (private) firms close to them so that it is easier for them to monitor and advise these firms (see, e.g., Tian (2011)). The above three facts collectively imply that higher endowment returns earned by LPs likely lead to more venture capital investments in firms in the same state as the LPs in the next few years, so that we expect our instrument to be positively related to the probability of VC-backing of a sample firm. We confirm that this is indeed the case empirically in the first stage of our IV analysis. The exclusion restriction for this instrument for VC-backing is also likely to be satisfied, since this instrument is likely to be unrelated to the underlying firm characteristics of the IPO firms in our sample.

The results of our analysis of the relation between VC-backing and investor attention can be summarized as follows. First, we find from our baseline regression analysis that VC-backed IPOs are associated with a greater amount of investor attention as proxied by pre-IPO media coverage.

that of low-reputation VC-backed firms), we expect the valuation of high-reputation VC-backed firms receiving higher (above median) investor attention to decline to a greater extent as time passes post-IPO.

Second, high-reputation VC-backed IPOs receive greater investor attention than low-reputation VC-backed IPOs. Third, the second-stage regressions of our IV analysis with investor attention as the dependent variable show that VC-backed IPOs are associated with a greater amount of investor attention (as proxied by pre-IPO media coverage), and that this relation is causal.

We now discuss the results of our analysis of the relation between VC-backing, investor attention, and IPO characteristics. First, VC-backed IPOs are associated with larger absolute values of IPO offer price revisions. Further, our interaction tests reveal that, even after controlling for the direct effect of VC-backing, there is an incremental positive effect of higher (above median) investor attention received by VC-backed firms on the absolute value of IPO offer price revisions. Second, VC-backed IPOs are associated with greater IPO and secondary market valuations, and greater IPO initial returns. Further, our interaction tests reveal that, even after controlling for the direct effect of VC-backing, there is an incremental positive effect of higher (above median) investor attention received by VC-backed firms on IPO and secondary market valuations as well as on IPO initial returns.

The above results show two things. First, VC-backed firms have more favorable IPO characteristics, namely IPO and secondary market valuations and IPO initial returns, than non-VC-backed firms. Second, the fact that the coefficient of the interaction terms between higher investor attention and VC-backing is positive and significant in each of our OLS regression analyses of the above three IPO variables is consistent with the notion that the productivity of investor attention (in generating IPO and secondary market valuations and IPO initial returns) is greater for VC-backed than for non-VC-backed firm IPOs. This indicates that, even if part of the higher valuations (and higher IPO initial returns) of VC-backed over non-VC-backed IPO firms is due to differences in intrinsic firm quality, investor attention plays a significant role in generating higher values of these variables in VC-backed over non-VC-backed firm IPOs.

The results of our analysis of comparing the IPO characteristics of high- versus low-reputation VC-backed firms are broadly consistent with the above results. First, while we find that the coefficient of the VC-reputation dummy is not significantly different across high- versus low-reputation VC-backed IPOs in our regressions of IPO and secondary market valuations, it is significantly different in our initial return regression. Second, in our interaction tests comparing the IPO and secondary market valuations as well as the initial returns of high- versus low-reputation VC-backed

IPOs, we find that high-reputation VC-backed firm IPOs receiving higher (above median) investor attention have higher IPO and secondary market valuations as well as IPO initial returns, compared to low-reputation VC-backed IPOs receiving higher (above median) investor attention, even after controlling for the direct effect of high- and low-reputation VC-backing. The fact that the coefficient of the interaction term between high-reputation VC-backing and higher investor attention is significantly greater than that of the interaction term between low-reputation VC-backing and higher investor attention in our analysis of the above IPO variables suggests that the productivity of investor attention in generating higher values of these IPO variables is greater for high-reputation VC-backed IPO firms.

The results of our analysis of the relation between VC-backing and participation by important financial market players in a firm's IPOs is also broadly supportive of the investor attention channel. First, VC-backed IPOs have a greater number of institutional investors holding the firms' equity and have greater analyst coverage post-IPO. Further, our interaction tests reveal that, even after controlling for the direct effect of VC-backing, there is an incremental positive effect of higher (above median) investor attention received by VC-backed firms on institutional investor participation and analyst coverage.

The results of our analysis of the dynamics of IPO firm valuation over time is also supportive of the investor attention channel. We find that the secondary market valuation of VC-backed IPO firms fall to a greater extent from the first trading day post-IPO through the three years following the IPO date. Further, our interaction tests reveal that, even after controlling for the direct effect of VC-backing, VC-backed firms that received higher (above median) investor attention have a greater fall in valuation as time passes after IPO.[8] These two results, taken together, suggest that the higher market valuation of VC-backed firms that we document at IPO is at least partially due to the greater investor attention received at IPO by such firms, as evidenced by their valuation falling to a greater extent as investor attention dissipates with the passage of time after IPO.

[8]Similarly, our interaction test comparing high- and low-reputation VC-backed IPOs reveal that, even after controlling for the direct effect of venture capital reputation, high-reputation VC-backed IPO firms receiving higher (above median) investor attention have a greater fall in valuation over the three years after IPO compared to low-reputation VC-backed IPO firms receiving similar levels of (above median) investor attention. This is consistent with our earlier results showing that the productivity of high-reputation VC-backing in generating immediate post-IPO secondary market firm valuations is higher than that of low-reputation VC-backing. Clearly, given the earlier result, one would expect the fall in valuation as investor attention fades over time to be greater for high-reputation VC-backed IPOs as well.

We now discuss the results of our IV analysis of the relation between VC-backing and various IPO characteristics. As mentioned earlier, we use our IV analysis to control for the possible differences in intrinsic quality between VC-backed and non-VC-backed firm IPOs, using the instrument for VC-backing discussed earlier. Our second-stage regressions with various IPO characteristics as dependent variables show that the positive relations between VC-backing and various IPO characteristics (the absolute value of offer price revisions, IPO and secondary market valuations, IPO initial returns, participation by institutional investors, and financial analyst coverage) that we document in our OLS analysis are causal.

The rest of this paper is organized as follows. Section 2 discusses how our paper is related to the existing literature and describes its contribution relative to this literature. Section 3 discusses the underlying theory and develops testable hypotheses. Section 4 describes our data and variables. Section 5 presents our analysis of the relation between VC-backing and investor attention. Section 6 presents our analysis of the relation between VC-backing, investor attention, and various IPO characteristics. Section 7 concludes.

2 Relation to the Existing Literature and Contribution

Our paper is most closely related to two different strands in the IPO literature. The first strand is the literature on the effects of VC-backing on IPO characteristics and its implications for the intermediation role played by VCs in the financial market. As we discussed earlier, an important early paper in this literature is Megginson and Weiss (1991), who document that VC-backing is associated with lower IPO underpricing (initial returns), which they attribute to the ability of VCs to certify firm value to the financial market. Another early paper is Barry, Muscarella, Peavy, and Vetsuypens (1990), who also document lower IPO underpricing for VC-backed IPOs, though this paper attributes this lower extent of underpricing to the intensive monitoring services provided by VCs and find that VC equity ownership, the length of board service, and the number of VCs invested in the pre-IPO firm are negatively related to IPO underpricing.[9] However, Lee and Wahal (2004) document that, controlling for the endogeneity in the receipt of VC funding, IPOs of VC-backed firms were, in fact, more underpriced on average than those of non-VC-backed firms between 1980

[9]See also Li and Masulis (2007), and Krishnan Ivanov, Masulis, and Singh (2011) for similar arguments based on VC certification.

and 2000.[10] They cite their evidence as providing partial support for the grandstanding hypothesis of Gompers (1996), whereby younger VCs take the firms they have invested in public at an earlier age even at the expense of incurring a greater extent of underpricing, since this enables such VCs to establish a reputation for successful exits, thereby enhancing their future fund-raising abilities.[11]

An important recent paper that gives a new rationale for why some IPOs are more underpriced than others is Liu and Ritter (2011). They argue that, while the underwriting industry is in general competitive, a small number of underwriters have market power and are able to provide greater coverage by "star analysts." This, in turn, generates the prediction that issuers who are less focused on maximizing IPO proceeds and more desirous of coverage by star analysts will have IPOs characterized by greater underpricing. They also attribute the greater underpricing of VC-backed IPOs to the "analyst lust" of VCs. Unlike Liu and Ritter (2011), in our setting, VC-backed IPOs receive greater analyst coverage endogenously as a consequence of the greater investor attention garnered by VC-backed firm IPOs. Further, while our empirical results documenting a positive relation between VC-backing and underpricing (IPO initial returns) are consistent with that of Liu and Ritter (2011), underpricing is only one among the many IPO characteristics we study in our empirical analysis: the focus of our paper is on establishing the ability of VC-backing to generate greater investor attention as a channel for value creation by venture capitalists in IPOs.

In summary, while related to the above literature analyzing the effect of VC-backing on various IPO characteristics, this paper contributes uniquely to this literature by establishing a new channel through which VC-backing creates value at IPO for the entrepreneurial firms they that invest in. It is also worth pointing out that the investor attention channel of value creation by VCs in the financial market that we propose and analyze in this paper may coexist with other channels that have been proposed in the existing literature, such as VC certification of firms and intensive monitoring of firm management by VCs pre- and post-IPO. In fact, by controlling for the direct effect of VC-backing, we are able to account for the differences in intrinsic value between VC- and

[10] Megginson and Weiss (1991) analyze VC- and non-VC-backed IPOs between 1983 and 1987, while Barry, Muscarella, Peavy, and Vetsuypens (1990) analyze such IPOs between 1978 and 1987.

[11] A number of other papers document somewhat similar results. Bradley and Jordan (2002) show that, once they control for industry effects and underwriter quality, there is no significant difference in underpricing between VC- and non-VC-backed IPOs during the period 1990-1999. Brav and Gompers (2003) find that underpricing is more severe among VC-backed firms during the 1990s. Hamao, Packer, and Ritter (2000) do a similar comparison for Japanese VC-backed and non-VC-backed firm IPOs during the 1990s and find that underpricing is more severe for VC-backed firm IPOs. See also Chemmanur and Loutskina (2004), who note that IPO underpricing may not be the most appropriate measure to evaluate the role of VC-backing in IPOs.

non-VC-backed firm IPOs (and therefore the VC certification and monitoring effects documented in the existing literature) even in our baseline analysis of various IPO characteristics.

The second strand in the IPO literature to which our paper is related is the broader theoretical and empirical literature on IPOs: see Ritter and Welch (2002) for a review. Apart from the IPO papers discussed earlier, our paper is related to several other papers in this literature. In an important paper, Liu, Sherman, and Zhang (2014) show that pre-IPO media coverage is positively related to the long-term equity value, liquidity, analyst coverage, and institutional investor ownership of the equity of firms going public. Another related paper is by Bajo, Chemmanur, Simonyan, and Tehranian (2016) who show that lead underwriters located more centrally in the networks of investment banks induced by their prior underwriting activity are able to generate more favorable IPO characteristics for the firms they take public, by attracting greater investor attention, and thereby disseminating information more efficiently to institutions and by better extracting information from them.[12,13] While our result that the extent of investor attention received by a firm is positively related to its IPO characteristics such as IPO valuation and initial returns is consistent with those in the above two papers, ours is the first paper in the literature that analyzes the relation between VC-backing and investor attention. Ours is also the first paper in the literature to propose investor attention as a channel through which VCs create value in the IPO market for the firms that they invest in, and the first to empirically analyze how VC-backing affects IPO characteristics through the investor attention channel.

Our paper is also distantly related to the literature on the selection of private firms to invest in by venture capitalists as well as that on value addition by VCs (in the product market) subsequent to their investment in these firms (but pre-IPO). Some papers have documented that venture capitalists may invest in higher quality private firms to begin with: see, e.g., Sørenson (2007), who makes use of an "assortive" matching model to show that more experienced VCs invest in better firms. A number of other papers have shown that VCs add value to the private firms in which they

[12]The broader empirical literature studying the information flows in IPOs (e.g., Hanley (1993)) and the more recent studies on the efficiency of the IPO process in general (e.g., Lowry and Schwert (2004)) are also related to our paper.

[13]There are also several information-driven theoretical models of IPO underpricing indirectly related to this paper (see, e.g., Chemmanur (1993); Allen and Faulhaber (1989); Sherman (1992); Welch (1989); and Welch (1992)). Further, to the extent that our study is related to information flows around a firm's IPO, it is also indirectly related to models of going public versus remaining private decision driven by the desire of firm insiders to avoid revealing private information (e.g., Bhattacharya and Ritter (1983)) or by considerations of minimizing duplication in information production by outsiders (e.g., Chemmanur and Fulghieri (1999)).

invest in a variety of ways: for example, by playing a role in the monitoring and management of these companies (Gorman and Sahlman (1989), Sahlman (1990), and Gompers and Lerner (1999)), by professionalizing firm management (Hellman and Puri (2002)), and improving firm efficiency (Chemmanur, Krishnan, and Nandy (2011)). Given this value addition, it is possible that, on average, VC-backed firms differ from non-VC-backed firms in a variety of ways including having a higher intrinsic value. However, our analysis goes through even if this is the case, since, in our empirical analysis, we explicitly take into account the fact that VC-backed firms may differ in intrinsic value (quality) from non-VC-backed firms. In contrast to the above literature, the focus of this paper is to show that, for a firm with a given intrinsic value at the time of IPO, VC-backing creates additional value in the IPO market by garnering enhanced investor attention to the firm's IPO, yielding higher IPO and secondary market valuations and other favorable IPO characteristics.

3 Theory and Hypothesis Development

In the introductory section of this paper, we introduced the notion that VC-backing may attract greater investor attention to an IPO firm, and discussed two ways in which this may affect the IPO characteristics of VC-backed versus non-VC-backed firms. First, the greater investor attention brought about by VC-backing may make information dissemination about the IPO firm by the IPO underwriter to institutional investors more effective. Second, such enhanced investor attention may allow the IPO underwriter to credibly extract information from institutional investors more efficiently about their valuation of the IPO firm. We refer to these two ways in which VC-backing may affect IPO characteristics as the "information dissemination through investor attention hypothesis" and the "information extraction through investor attention hypothesis," respectively.[14] In this section, we develop testable implications for the relationship between the VC-backing of firms going public and various characteristics of the IPOs of these firms based on these two broad

[14]We would like to emphasize that the two roles of the lead IPO underwriter during IPO road-shows and the book-building process that we discussed in the introduction are not mutually exclusive, though, in some contexts, one or the other role may dominate. Indeed, the practitioner literature on IPOs points to the two-way information flow occurring during IPO road-shows and the book-building process between IPO underwriters and institutions: while, on the one hand, underwriters collect information about the demand schedule of institutional investors for the IPO firm's shares, they also address institutional investors' questions and concerns about the future strategy and performance of the firm going public, thus disseminating information about the IPO firm to them. It is therefore not our objective to empirically distinguish between the information dissemination and information extraction roles of the lead IPO underwriter during IPO road-shows and the book-building process.

hypotheses.

3.1 Relation between VC-Backing and Investor Attention

We argued earlier that VC-backed IPOs may receive greater investor attention and are thereby able to obtain more favorable IPO characteristics (such as higher IPO and immediate secondary market valuations, greater institutional investor participation, and financial analyst coverage). If indeed an important mechanism through which the IPOs of VC-backed firms obtain more favorable IPO characteristics is by attracting a larger number of institutions to pay attention to these firms, then we would expect proxies for investor attention to be greater for VC-backed relative to non-VC-backed IPOs. We follow Liu, Sherman, and Zhang (2014) and use the pre-IPO media coverage received by a firm going public as a proxy for investor attention paid to that firm (see Section 4.1 for a detailed discussion of our two proxies and why they are appropriate proxies). Thus, we expect greater pre-IPO media coverage for the IPOs of VC-backed firms compared to those of non-VC-backed firms (**H1**). Further, if indeed VC-backed IPOs receive greater investor attention relative to non-VC-backed IPOs, due to VCs being repeat players in the IPO market, we would expect this effect to be stronger in the case of high-reputation VCs than in the case of low-reputation VCs. This is because high-reputation VCs may have taken more higher intrinsic value firms public in the past and therefore may have had even more favorable prior interactions with institutional investors than low-reputation VCs (as well as having a better track record in terms of the post-IPO performance of firms they have taken public). This is the next hypothesis (**H2**) that we test here.

In the following subsections, we develop testable hypotheses regarding the effect of the higher investor attention that will be garnered by a VC-backed firm (as we postulated) on various IPO characteristics of such firms.

3.2 VC-Backing, Investor Attention, and the IPO Pricing Process: Initial Offer Price Range, the IPO Offer Price, and the Secondary Market Price

We now discuss the specific relation that we have in mind between the VC-backing of an IPO firm, the greater investor attention that VC-backing generates, and its effect on the IPO pricing process. In particular, we characterize the setting of the initial IPO offer price range by the lead IPO underwriter and the firm, offer price revision during the book-building process leading to the

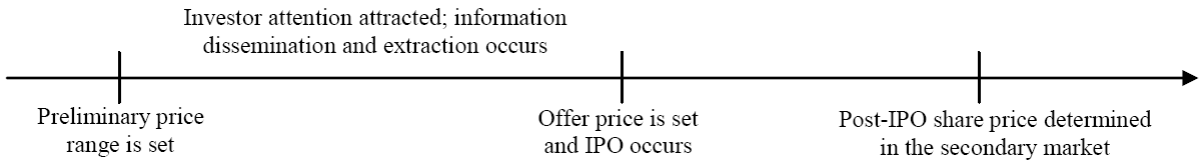

Figure 1: Timeline of the IPO Pricing Process

determination of the final IPO offer price, and the subsequent determination of the post-IPO share price in the immediate post-IPO secondary market. The timing of various events that we postulate (as depicted in Figure 1) is the following. First, the firm and its lead underwriter agree on the initial range of offer prices (sometimes referred to as the "preliminary offer price range" or "initial filing range") within which they expect to set the final offer price. Second, the lead underwriter attempts to attract the attention of various institutions to the firm whose IPO it is underwriting. We assume here, as discussed earlier, that institutions' cost of paying attention to an IPO firm is lower for VC-backed firms than for non-VC-backed firms. Third, the lead underwriter disseminates information about the characteristics of the IPO firm to the institutions whose attention it has been able to attract to the firm's IPO. Finally, the lead underwriter extracts information from the above institutions about their demand schedule for the IPO firm's equity.[15] The final offer price is set by the lead IPO underwriter as a result of the above information dissemination and extraction process; this may also affect the immediate post-IPO share price of the firm as well.

Consider first the determination of the initial IPO offer price range by the lead underwriter. To the best of our knowledge, there has been no formal theoretical model in the existing literature regarding the process by which an underwriter and issuer choose this initial offer price range; our objective here is not to develop such a model. Rather, the process we describe below is meant only to capture the trade-offs facing a lead underwriter when setting this initial offer price range. We make two important assumptions here about the process of setting the initial offer price range. First, while the lead underwriter is aware of its expected ability to attract investor attention to a particular IPO and the noisy information about the IPO firm that it wishes to convey to these investors, it will have residual uncertainty about the precise amount of attention it will be able to

[15]While, for concreteness, we have specified the timing of information extraction as occurring after information dissemination, our testable predictions remain qualitatively unchanged even if there is some overlap between the timing of information dissemination and information extraction by the lead underwriter.

attract from institutions to the IPO and therefore about the amount of information it will be able to convey to these institutions about the firm going public.[16] This means that the lead underwriter will choose the initial IPO offer price range based on the expected value of the investor attention that it will be able to attract to the IPO and the expected value of the effect of its information dissemination on the firm's final IPO offer price, with the precise value of these variables being realized only subsequently (during the book-building process). Second, we assume that, while the lead underwriter is free to set the final offer price anywhere within the initial offer price range (and if necessary above or below this range), it is costly for the lead underwriter to set the offer price significantly above or below the midpoint of this range: for simplicity, we assume that this cost is increasing in the distance of the final offer price from the midpoint of the initial IPO offer price range.[17]

The above two assumptions imply that the cost-benefit trade-off driving a lead underwriter's choice of the initial IPO offer price range is as follows. If a lead underwriter sets the midpoint of the initial IPO offer price range significantly below the expected final IPO offer price, it will have to incur the cost of revising the price upward in the event the demand from institutions for the IPO firm's shares is strong (in order to maximize IPO proceeds). If, however, the lead underwriter sets the midpoint of the initial IPO offer price range significantly above the expected final IPO offer price, it will have to incur the cost of revising the price downward in the event the demand from institutions for the IPO firm's shares is weak (to ensure that all the shares offered in the IPO are sold out, and the firm is able to raise the amount of financing it needs). The above trade-off implies that a lead underwriter will set the midpoint of the initial IPO offer price range equal to its expectation of the final IPO offer price.[18]

[16]This uncertainty may arise for various reasons. For example, there may be other important (and unforeseen) events occurring at the time of a given IPO that may affect the stock market and the economy as a whole, which can affect the attention that institutions pay to the IPO: see, e.g., Liu, Sherman, and Zhang (2014) who discuss the possibility of other contemporaneous news events affecting the investor attention (and media coverage) achieved by a particular firm's IPO.

[17]Such a cost may arise, for example, from underwriters losing reputation with institutions: the latter may have devoted considerable resources to evaluating the IPO firm based on the initial offer price range set by the underwriter, and some of these resources may be wasted if the final offer price is set significantly away from the initial offer price. See, e.g., Bajo, Chemmanur, Simonyan, and Tehranian (2016) for a more detailed discussion.

[18]The empirical and anecdotal evidence is somewhat consistent with the process of setting the initial IPO offer price (filing) range that we postulate here. While there is no consensus in the literature on this point, some of the empirical studies on IPOs have used the midpoint of the initial IPO offer price range as an unbiased predictor of the ultimate IPO offer price: see, e.g., Hanley (1993), Loughran and Ritter (2002), and Bradley and Jordan (2002). However, Lowry and Schwert (2004) document that the midpoint of the initial IPO offer price range is not always an unbiased predictor of the final IPO offer price: in their sample, the final IPO offer price is set about 1.4% below the

After the initial offer price range is chosen and the information about the IPO firm is disseminated to the institutions who pay attention to it, the lead underwriter extracts information from these institutions about their demand for the IPO firm's shares. The offer price will be revised upward or downward from the midpoint of the initial offer price range depending on the above information extracted by the lead underwriter from institutions. Since the lead IPO underwriter of a VC-backed firm will be able to attract attention from a larger number of institutions for the firm it is taking public (relative to the situation in the case of a non-VC-backed firm), it will be able to more efficiently extract information useful for valuing a VC-backed IPO firm's shares from institutions. If this is the case, we would expect a positive relationship between VC-backing and the absolute value of the IPO offer price revision under the information extraction hypothesis (**H3A**), since a greater amount of information will be extracted from institutions in this case.[19] Further, assuming that the effect of investor attention is stronger in the case of VC-backed IPOs than in the case of non-VC-backed IPOs, the information extraction hypothesis implies that, VC-backed firms receiving higher (above median) investor attention will be associated with a larger absolute value of IPO offer price revision, even after controlling for the direct effect of VC-backing.[20]

A lead IPO underwriter of a VC-backed firm may also be in a position to disseminate information more efficiently about the firm to institutions, given institutions' lower cost of paying attention to VC-backed firms. Since the lead underwriter knows the expected value of the effect of its information dissemination on the final IPO offer price, the expected effect of this more efficient information dissemination will already be incorporated into the midpoint of the initial IPO filing range (recall that, as we discussed above, the underwriter sets the midpoint of the initial IPO offer price range equal to its expectation of the final IPO offer price). However, since lead underwriters will be able to disseminate information more efficiently (and accurately) to institutions in the case of VC-backed firms, the realization of information dissemination during the book-building process will be closer to the midpoint of the initial IPO offer price range for VC-backed firm IPOs compared to

midpoint of the initial IPO offer price range, on average.

[19]The above implication assumes that the information that a lead underwriter uses in setting the initial IPO offer price range is obtained from the process of writing the initial IPO prospectus, and the process of gathering more information from institutional investors begins only after that (during the book-building process).

[20]For all IPO characteristics, we empirically analyze whether the incremental effect of higher investor attention received by VC-backed compared to non-VC-backed firms (after controlling for the direct effect of VC-backing) making use of interaction tests. Thus, we expect the coefficient of the interaction between VC-backing and higher investor attention to be positive or negative according as this incremental effect of investor attention is greater or smaller in VC-backed firms.

non-VC-backed firm IPOs. This implies that we would expect a negative relationship between VC-backing and the absolute value of the IPO offer price revision under the information dissemination hypothesis (**H3B**). Further, assuming that the effect of investor attention is stronger in the case of VC-backed IPOs than in the case of non-VC-backed IPOs, the information dissemination hypothesis implies that, VC-backed firms receiving higher (above median) investor attention will be associated with a smaller absolute value of IPO offer price revision, even after controlling for the direct effect of VC-backing.

We now turn to the relationship between VC-backing and immediate post-IPO secondary market valuation (we discuss the various valuation measures we use in Section 4.3). As we discussed earlier, underwriters may be able to induce more institutions to pay attention to the information they are disseminating about VC-backed IPO firms that they take public, since institutions will have a smaller cost of paying attention to the IPOs of VC-backed firms compared to the situation where they take a non-VC-backed firm public. Assuming that a given fraction of institutions paying attention to an IPO firm choose to invest in its equity, this means that the market clearing price for the shares of a VC-backed IPO firm will be greater than the market clearing price of a non-VC-backed firm (of the same intrinsic value). Further, since the expected secondary market IPO firm value will equal this the market-clearing price, this implies that VC-backed IPO firms will be associated with higher immediate post-IPO secondary market valuations than similar non-VC-backed firms (**H4**).[21] Further, assuming that the effect of investor attention is stronger in the case of VC-backed IPOs than in the case of non-VC-backed IPOs, we would expect VC-backed firms receiving higher (above median) investor attention to be associated with higher immediate post-IPO secondary market valuations even after controlling for the direct effect of VC-backing.[22]

Next, we discuss the relationship between VC-backing and firm valuation at the IPO offer price. This relationship depends on the process of setting the offer price in IPOs. While there is

[21]The immediate secondary market as well as IPO valuations of VC-backed firms may be greater compared to those of non-VC-backed firms driven by considerations other than differences in investor attention. For example, VC-backed and non-VC-backed firms may differ in terms of their intrinsic value pre-IPO. Such differences in intrinsic value may arise, for example, from VCs investing to higher quality firms to begin with (screening) or by VCs creating greater product market value for these firms pre-IPO (monitoring). Given this possibility, we chose not to focus on simple comparisons between VC-backed versus non-VC-backed firms to test our hypotheses. Rather, we also focus on the interaction tests between VC-backing and proxies for investor attention in our empirical analyses of IPO and secondary market valuations.

[22]A higher after-market price may also arise from considerations of information extraction, since more complete knowledge and more accurate valuation of an IPO firm's shares means less risk for investors, and hence a smaller risk premium (assuming that investors are risk-averse on average).

no consensus in the theoretical and empirical literature on precisely how the IPO offer price is set, this price-setting process can be broadly thought of as the following. During the book-building and road-show, the lead underwriter may convey information about the IPO firm to institutions (this, in turn, may affect their valuation of the firm). The lead underwriter may then extract information from institutional investors about their valuation of the IPO firm. Toward the end of the book-building and road-show process, once the lead underwriter establishes the highest uniform price at which it can sell all the shares offered in the IPO (i.e., the market-clearing price, which is also the underwriter's expectation of the first day secondary market closing price), the underwriter may apply a "discount" to this price, thus establishing the actual IPO offer price (typically on the evening before the IPO). The theoretical literature has made various arguments regarding the main driving force behind this discount. A prominent reason for this discount that has been advanced by Benveniste and Spindt (1989) is that this discount ensures that institutional investors have the incentive to reveal their true demand for the firm's equity (i.e., it ensures that their incentive compatibility or truth-telling conditions will hold). Since VC-backing may induce a larger number of institutions to pay attention to the IPO of a given firm (so that a larger number of institutions may participate in the book-building process of that IPO), the Benveniste and Spindt (1989) argument predicts that only a smaller discount to the market-clearing price will be required for the IPOs of VC-backed firms to ensure truth-telling by institutions. This, in turn, implies that the relationship between VC-backing and firm valuation at the IPO offer price will be unambiguously positive (**H5A**). Further, assuming that the effect of investor attention is stronger in the case of VC-backed IPOs than in the case of non-VC-backed IPOs, we would expect VC-backed firms receiving higher (above median) investor attention to be associated with higher valuations at the offer price even after controlling for the direct effect of VC-backing.

On the other hand, if the discount from the expected after-market price is used to compensate institutional investors for their opportunity cost of paying attention to a particular IPO (as argued by Liu, Lu, Sherman, and Zhang (2016)) in addition to ensuring truthful revelation of information by these investors (as in Benveniste and Spindt (1989)), then lead underwriter may apply a higher discount to the expected first day secondary market closing price for VC-backed IPOs.[23] If this is

[23]To better understand why lead underwriters may apply a larger discount to the expected secondary market price to arrive at the IPO offer price, note, as we argued earlier, that such IPOs will attract greater investor attention. In equilibrium, such underwriters need to compensate these institutional investors for their opportunity cost of paying

indeed the case, the predicted relationship between VC-backing and the IPO offer price becomes ambiguous (**H5B**). This is because the greater after-market price associated with the IPO of a VC-backed firm (that we postulated earlier) may be overcome by a larger discount, so that the relationship between VC-backing and firm valuation at the IPO offer price may even turn negative.

Finally, we turn to the relationship between VC-backing and IPO initial returns (underpricing). Given our discussion above regarding the potentially ambiguous relationship between VC-backing and the discount applied by the underwriter to the market-clearing (expected after-market) price to arrive at the IPO offer price, we are agnostic about the relationship between VC-backing and IPO initial returns.[24] Following our discussion above, if the above discount is driven primarily by the need to extract truthful information from institutions (as argued by Benveniste and Spindt (1989)), then we would expect this relationship between VC-backing and the discount to be negative (**H6A**), since lead underwriters will apply a smaller discount to the expected after-market price to arrive at the IPO offer price in the case of VC-backed firms. If, however, this relationship is driven also by considerations of compensating institutions for their opportunity cost of paying attention to the IPO firm (as argued by Liu, Lu, Sherman, and Zhang (2016)), then we would expect the relationship between VC-backing and IPO initial returns to be positive (**H6B**). We are agnostic of about the sign of coefficient on the interaction between VC-backing and investor attention, since it may be positive or negative depending on whether it is **H6A** or **H6B** that holds.

3.3 The Effect of VC Reputation on the Relation between Investor Attention and IPO Characteristics

Analogous to our analysis of the relation between VC-backing, investor attention, and IPO characteristics, we also conduct an analysis of the relation between VC reputation, investor attention, and three IPO variables: immediate secondary market valuation, IPO valuation, and IPO initial returns. As we argued earlier, we expect institutions' cost of paying attention to information dis-

attention to these IPOs (as argued by Liu, Lu, Sherman, and Zhang (2016)). In the above setting, if institutions' *aggregate* cost of paying attention to VC-backed IPOs is greater (taking into account the smaller cost per investor for paying attention to a VC-backed IPO but the greater attention paid to these IPOs by institutions collectively), then the "money left on the table" (the dollar amount of the IPO discount multiplied by the number of shares sold) has to be greater for VC-backed IPO firms.

[24] Clearly, the greater the discount applied by the lead underwriter to the first day expected secondary market closing price of an IPO (assumed here to be the same as the market-clearing price) to arrive at the IPO offer price, the greater the initial return will be.

seminated by lead IPO underwriters about firms backed by higher reputation VCs to be lower than those backed by lower reputation VCs. Therefore, by arguments similar to that we have made above in the context of VC-backing (when developing our hypothesis **H4**), high-reputation VC-backed IPOs will be associated with higher immediate secondary market valuations compared to those backed by low-reputation VCs. Further, assuming that the effect of investor attention on secondary market valuation is stronger in the case of high-reputation VC-backed firm IPOs compared to that of low-reputation VC-backed firm IPOs, we would expect such IPOs receiving high (above median) investor attention to have higher secondary market valuations compared to low-reputation VC-backed IPOs receiving high (above median) investor attention, even after controlling for the direct effect of high- and low-reputation VC-backing.[25]

We also conduct an analysis comparing IPO valuations of high- and low-reputation VC-backed IPOs. By arguments similar to that we have made earlier (when developing hypotheses **H5A** and **H5B**), high-reputation VC-backed IPOs may have greater or lesser valuations compared to those of low-reputation VC-backed IPOs (depending on whether higher secondary market valuations for the former IPOs are overcome by the larger discounts applied by underwriters in setting the IPO offer price). Further, if considerations of information extraction dominate and assuming that the effect of investor attention is stronger in the case of high-reputation VC-backed firm IPOs compared to that of low-reputation VC-backed firm IPOs, we would expect that high-reputation VC-backed firm IPOs receiving higher (above median) investor attention will have higher valuations at the IPO offer price compared to low-reputation VC-backed IPOs receiving higher (above median) investor attention, even after controlling for the direct effect of high- and low-reputation VC-backing.

Finally, we conduct an analysis comparing the initial returns of high- and low-reputation VC-backed IPOs. By an argument similar to that we made in developing hypotheses **H6A** and **H6B**, we would expect high-reputation VC-backed IPOs to have a greater or smaller intial returns than that for low-reputation VC-backed IPOs, depending upon whether or not information extraction considerations dominate that of compensating institutions for paying greater investor attention to

[25]There is significant empirical evidence that high-reputation venture capitalists take higher quality firms public compared to low-reputation venture capitalists. This means that the nature of information disseminated to institutional investors by lead underwriters of high-reputation VC-backed IPO firms about the firms going public (or that of the information extracted by lead IPO underwriters from institutions about these firms) may be fundamentally different from the information disseminated (or extracted) by lead underwriters of low-reputation VC-backed IPO firms. This in turn, may lead to differential effects of investor attention on the immediate post-IPO secondary market as well as IPO valuations of firms backed by high- and low-reputation VCs.

the former category of IPOs. Further, assuming that the effect of investor attention is stronger in the case of high-reputation VC-backed firm IPOs compared to that of low-reputation VC-backed firm IPOs, and depending on whether it is **H6A** or **H6B** that holds, we would expect high-reputation VC-backed firm IPOs receiving higher (above median) investor attention to have lower or higher IPO initial returns compared to low-reputation VC-backed IPOs receiving higher (above median) investor attention, even after controlling for the direct effect of high- and low-reputation VC-backing.

3.4 VC-Backing, Investor Attention, and the Participation of Financial Market Players in IPOs

We have argued so far that the lead IPO underwriters may be able to induce a larger number of institutions to pay attention to the IPOs of VC-backed firms. This implies that participation by institutional investors (i.e., institutional investor investments in the equity of the IPO firm) will be greater for such IPOs (**H7**). Further, the grater amount of investor attention (as proxied by pre-IPO media coverage) received by a VC-backed firm IPO, the greater the institutional investor investment in the equity of that IPO firm even after controlling for the direct effect of VC-backing.

Given that financial analysts are either engaged in conveying information about the IPO firm to institutions (sell-side analysts affiliated with investment banks in the IPO underwriting syndicate) or in acquiring information on behalf of institutions (buy-side analysts affiliated with various institutions) we would also expect greater analyst coverage to be received by VC-backed firm IPOs (**H8**). Further, the greater the amount of investor attention (as proxied by pre-IPO media coverage) received by a VC-backed firm IPO, the greater analyst coverage received by that IPO firm even after controlling for the direct effect of VC-backing.

3.5 The Dynamics of the Secondary Market Valuation of IPO Firm Equity

We argued in Section 3.2 that VC-backed IPO firms may receive greater valuations in the immediate post-IPO secondary market due to, among other reasons, the greater amount of investor attention they receive around their IPO. We now explore the dynamic changes in the valuations of VC-backed and non-VC-backed IPO firms over time. To develop testable hypotheses for our dynamic analysis of VC valuation, we make two assumptions. First, we assume that investor attention fades

significantly as time passes after the IPO. Second, we assume that investor attention will decline to the greatest extent (with the passage of time) for firms that received the highest level of such attention at the time of IPO. Under these two assumptions, we get two testable implications. First, the valuation of VC-backed IPO firms will fall to a greater extent than that of non-VC-backed firms, assuming that a significant portion of their immediate secondary market value is due to the greater investor attention they received around the IPO (**H9**).[26] Second, we expect the valuation of VC-backed firms receiving the greatest investor attention at IPO to decline to the greatest extent post-IPO (corresponding to the greater decline in investor attention received by these firms over time) (**H10**). By a similar argument, in our analysis comparing the dynamics the secondary market valuations of high- and low-VC-backed IPOs, we expect that the valuation of high-reputation VC-backed firms receiving high investor (above median) attention at the IPO to decline to a greater extent than that of low-reputation VC-backed firms receiving high investor attention.

4 Data and Sample Selection

The data used in this study came from multiple sources. We obtain the list of initial public offerings in the US from 1980 to 2009 from the SDC/Platinum Global New Issues database. In line with the IPO literature, we exclude equity offerings of financial institutions (SIC codes between 6000 and 6999) and regulated utilities (SIC codes between 4900 and 4999), unit offerings, closed-end funds, real estate investment trusts (REITs), American Depositary Receipts (ADRs), rights issues, spin-offs, equity carve-outs, leverage buyouts, tracking stocks, issues with offer price less than $5, issues with incomplete information on offer price and the number of shares filed in an IPO, and duplicates. The IPO firm should issue common shares (with share code headers of 10 and 11 in CRSP). We further require that the issuing firm must be present on the Compustat annual industrial database for the fiscal year prior to the offering and at least for one year after the offering, as well as on the CRSP database within sixty days of the issue date. Though the SDC/Platinum Global New Issues database provides the venture flag which can be used to identify venture-backed IPOs, we cross check this by merging our list of IPOs with the VentureXpert database. We drop IPO firms that are

[26] As we discussed earlier, VC-backed and non-VC-backed IPO firms may also differ in intrinsic value, driven by product market considerations associated with VC-backing. The implications we are deriving in this subsection assumes that the drivers of higher valuation in VC-backed firms other than the greater investor attention received by a VC-backed firm IPO, remain constant as time passes after IPO.

classified as VC-backed in the SDC/Platinum Global New Issues database but as non-VC-backed in VentureXpert or vice versa from our sample.

We end up with 4105 IPOs that satisfy these criteria, out of which 1876 are VC-backed IPOs and 2229 are non-VC-backed IPOs. The median offer price of the IPO firms in our sample is $12.00, median sales are $43.0 million, median EBITDA is $4.65 million, and median net income is $1.58 million. These characteristics of our IPO sample are comparable to those in other studies (see, e.g., Loughran and Ritter (2004)). Information on IPO underwriters as well as various IPO characteristics is taken from the SDC/Platinum Global New Issues database. The data for constructing the VC reputation measure came from VentureXpert. Information on institutional investors was obtained from Thomson Reuters Institutional Holdings (13F) Database. Analyst coverage data came from Institutional Brokers Estimate System (I/B/E/S). Accounting data came from Compustat and stock price data came from CRSP. Table 1 provides the summary statistics of our sample.

4.1 Proxies for Investor Attention

In order to assess the degree of attention that investors pay to IPO firms, we make use of two measures of pre-IPO media coverage of firms going public following Liu, Sherman, and Zhang (2014), who use media coverage as a proxy for investor attention. Liu, Sherman, and Zhang (2014) argue that media sources compete to attract readers and advertising revenues and, consequently, editors expect their reporters to cover the firms which have already received investor attention or are expected to receive such attention in the future. Even though media coverage does not contain any new "hard" information about the IPO firm (such "hard" information must be disclosed in the IPO prospectus), the fact that the firm receives coverage indicates that reporters and/or their sources expect the firm to attract investor attention. According to Liu, Sherman, and Zhang (2014), when choosing a firm to cover, reporters use not only their own judgment but also talk to Wall Street professionals, so that media coverage of IPO firms will be more than mere noise. While media coverage may include some firms due to short-term demand from retail investors who are driven by sentiment, it will also include firms that sophisticated investors care about. Given the above, the pre-IPO media coverage of firms going public is a good proxy for the degree of attention investors pay to such firms.

We construct two measures of pre-IPO media coverage of firms going public by searching all

U.S. English language media sources in Factiva for news articles as well as the headlines of articles covering IPO firms in our sample. Our first measure is *Headlines*, which is the number of article headlines that have mentioned the IPO firm in the two months prior to the IPO date: this measure has been used by Bajo, Chemmanur, Simonyan, and Tehranian (2016). Our second measure is *Articles*, which is the number of articles that have mentioned the IPO firm in the two months prior to the IPO date (used by both Liu, Sherman, and Zhang (2014) and Bajo, Chemmanur, Simonyan, and Tehranian (2016)). As shown in Table 1, a typical firm in our sample is covered by 2 headlines and 10 articles in the two months prior to its IPO. Since the distribution of *Headlines* and *Articles* are right skewed, we use the natural log of one plus the actual number of headlines and that of articles (*Ln(Headlines)* and *Ln(Articles)*) in our regressions. We also construct two dummy variables, *High Headlines* and *High Articles*, to indicate that the number of headlines and that of articles covering the IPO firm are above the sample median, respectively.

4.2 Measures for VC Reputation

In this section, we describe how we construct our reputation measure for the lead VC investors that invested in VC-backed IPO firms. To determine lead VC investors, we merge our list of VC-backed IPOs with the VC investment level data from VentureXpert. Following Nahata (2008), we define the lead VC as the VC firm that participated in the first round and made the largest total investment in the company across all rounds. If the identities of investors in the first round are not available, we use the same logic to identify the lead VC firm based on investors' information in the second round. We require the lead VCs to have participated in the first or second rounds since the lead VCs usually originate the deal and are among the first venture investors in startups.

In each year, we define VC reputation using the market share of the amount of funds raised by the VC up to the current year since 1975, following the methodology of Megginson and Weiss (1991) and Chemmanur, Krishnan, and Nandy (2011).[27] This measure effectively captures reputation since reputation is primarily built on past success: VCs are usually able to raise greater follow-on funds from their limited partners only if the performance of their funds has been successful in the past. For each VC-backed IPO in our sample, we then calculate the average reputation of their lead VC

[27] In untabulated tests, we use an alternative measure for VC reputation. We define VC reputation using the market share of the amount of investment made by a VC up to the current year since 1975 and obtain qualitatively similar results.

investor(s). *High-Rep-VC-Backing* is a dummy variable equal to 1 if the average market share of funds raised by their lead VC investors is above the 75th percentile of the sample and 0 otherwise; while *Low-Rep-VC-Backing* is a dummy variable equal to 1 if the average market share of funds raised is equal to or below the 75th percentile of the sample and 0 otherwise.

4.3 Measures for Valuation

We measure the valuation of firms at IPO and in the secondary market using a comparable firm approach based on a non-IPO industry peer with comparable Sales and EBITDA profit margin (EBITDA/Sales): see, e.g., Kim and Ritter (1999) and Purnanandam and Swaminathan (2004). To pick an industry peer firm for an IPO firm in our sample, we first consider all firms in the Compustat that were active and present on CRSP for at least three years at the end of the fiscal year preceding the IPO. We then eliminate firms that are REITs, closed-end funds, ADRs, not ordinary common shares, and firms with stock prices less than $5 at the report date. We separate the remaining population of Compustat firms into 48 industry groups based on the industry classification introduced by Fama and French (1997). For each year, we divide each industry portfolio into three portfolios based on sales, and then separate each sales portfolio into three portfolios based on EBITDA profit margin (EBITDA/Sales). This procedure gives us nine portfolios for each industry-year.[28] Each IPO firm is then placed into an appropriate year-industry-Sales-EBITDA margin portfolio based on an IPO firm's sales and EBITDA in the year prior to IPO. Within the portfolio, we find a matching firm that is closest in sales to the IPO firm being valued. We are able to find matching firms for 3100 IPO firms (1442 VC-backed and 1658 non-VC-backed IPO firms) in our baseline sample. We then estimate the relative valuation of the IPO firms to their matching firm based on their price multiples.

We measure the relative valuation of an IPO firm at offer (RVO) using the following formula:

$$RVO = \frac{\dfrac{\text{Offer Price} \times \text{IPO firm shares outstanding}}{\text{IPO firm prior fiscal year sales}}}{\dfrac{\text{Matching firm market price} \times \text{Matching firm shares outstanding}}{\text{Matching firm prior fiscal year sales}}}, \tag{1}$$

[28] We insist, however, that at least three firms should be in each portfolio. If the number of firms in the industry does not allow us to form 9 portfolios, we limit the separation to two portfolios based on Sales with further separation into two portfolios based on EBITDA profit margin.

In the above, the *Offer Price* of the IPO firm is collected from the SDC database. *IPO firm shares outstanding* refers to the shares outstanding of the IPO firm at the first secondary market trading day as recorded in CRSP. *Matching firm market price* is the stock price and *matching firm shares outstanding* is the number of shares outstanding of the matching firm at the close of the day closest to the IPO offer date.

We measure the relative valuation of an IPO firm in the secondary market using the following formula:

$$RVS_t = \frac{\dfrac{\text{Secondary Market Price} \times \text{IPO firm shares outstanding}}{\text{IPO firm prior fiscal year sales}}}{\dfrac{\text{Matching firm market price} \times \text{Matching firm shares outstanding}}{\text{Matching firm prior fiscal year sales}}}, \tag{2}$$

In the above, the relative valuation in the secondary market in the t-th year after IPO as shown in formula (2), RVS_t, is computed in a similar way: we substitute the IPO offer price and the number of shares outstanding of the IPO firm in formula (1) by the secondary market price in the t-year after IPO and the number of shares outstanding observed on that date in CRSP. Here t equals 0, 1, 2, and 3, and year 0 means at the close of the first trading day in the secondary market. Due to their right skewed distribution, we use the natural log of the above two measures (*Ln(RVO)* and *Ln(RVS$_t$)*) as the dependent variables in our regressions.[29]

In addition to the above relative valuation measures, we use industry-adjusted Tobin's Q as alternative measures for IPO and secondary market valuations. Tobin's Q is defined as the ratio of a firm's market value of assets over its book value of assets, where the market value of assets is equal to the book value of assets minus the book value of equity plus the product of the number of shares outstanding multiplied by the relevant share price. We measure Tobin's Q at IPO using the IPO offer price as the share price in the above definition, while we measure Tobin's Q in the secondary market using the closing price on the first trading day. The number of shares outstanding for IPO firms is measured as of the first trading day in the secondary market. In untabulated analyses, we obtain quantitatively and qualitatively similar results using these alternative firm valuation measures.

[29] Although our main measures of IPO and secondary market valuations are computed based on Price-to-Sales multiple, we also compute valuation measures based on price-to-EBITDA and price-to-earnings multiples.

4.4 The Participation of Financial Market Players

We obtain the institutional investor data from the Thomson Reuters Institutional Holdings (13F) Database, as reported on Form 13F filed with the SEC. All investment companies and professional money managers with assets over $100 million under management are required to report the 13F filings on a quarterly basis. The number of institutional investors (*N_Inst*) is defined as the number of institutions that hold the stocks of the IPO firm at the end of the first fiscal year after IPO. We obtain analyst coverage data from Institutional Brokers Estimate System (I/B/E/S). The analyst coverage measure we use, *N_An*, is defined as the number of analysts providing earnings forecasts at the end of the first fiscal year after IPO. As reported in Table 1, the medians of *N_Inst* and *N_An* are 20 and 3, respectively, suggesting that 20 institutional investors invested in the equity of a typical IPO firm in our sample and three financial analysts provided earnings forecast for a typical IPO firm.

Since the distribution *N_Inst* and *N_An* are right skewed, we use take logs of these two values and use the logged number of institutional investors and that of financial analysts (*Ln(N_Inst)* and *Ln(N_An)*) in our regressions in later sections.

4.5 Control Variables

In our regressions in the later sections, our dependent variables include various IPO characteristics as well as investor attention (as proxied by pre-IPO media coverage). Following the existing literature, our control variables include the Carter-Manaster rank of the lead underwriter (*CM Rank*), the natural log of the firm's pre-IPO assets (*Ln(Asset)*), and the fraction of firm equity sold in the IPO (*Fraction Sold*). We obtain the values of pre-IPO assets and the fraction of equity sold in an IPO from the SDC database, or Compustat if the SDC data item is not available. The Carter-Manaster rank of lead underwriter reputation is collected from Jay Ritter's website (http://site.warrington.ufl.edu/ritter/ipo-data/). In addition to the above control variables, we also include industry fixed effects based on Fama French 48 industry classifications, IPO year fixed effects, and stock exchange (in which the IPO firm is listed) fixed effects to control for differences among IPO characteristics across different industries, time periods, and listing exchanges in all regressions unless otherwise specified.

5 Analysis of the Relation between VC-Backing and Investor Attention

5.1 Baseline Analysis of the Relation between VC-Backing and Investor Attention

In this section, we directly test whether VC-backed firms receive greater investor attention (as proxied by pre-IPO media coverage) compared to non-VC-backed firms (**H1**), and whether this effect is stronger for IPO firms backed by high-reputation VCs (**H2**). To test the former hypothesis, we thereby regress our media coverage variables as described in Section 4.1, on *VC-Backing*, a dummy variable equal to 1 if the IPO is VC-backed and 0 otherwise. To test the latter hypothesis, we regress our media coverage variables on *High-Rep-VC-Backing* and *Low-Rep-VC-Backing*, dummy variables indicating IPO firms backed by high-and low-reputation VCs, respectively, and test whether the differences between the coefficients on these two variables are statistically different from zero. Our control variables include underwriter reputation (*CM Rank*), pre-IPO assets (*Ln(Asset)*), and the fraction of firm equity sold in the IPO (*Fraction Sold*). We include IPO year dummies, industry dummies based on Fama French 48 industry classifications, and dummies for stock exchange in which the IPO firm is listed to control for the time-invariant, industry-specific, and stock exchange-specific characteristics that might affect the media coverage received by an IPO firm, in all regressions (unless otherwise specified). Standard errors are clustered at the industry level for all regressions in this paper.

We report the effect of VC-backing on investor attention as measured by pre-IPO media coverage in Panel A of Table 2 and the differential effects of high-reputation and low-reputation VC-backing in Panel B. As shown in Panel A, the coefficients of *VC-Backing* are positive and statistically significant at the 1% level in all specifications. Further, the economic magnitude of the effect of VC-backing is significant: for example, Columns (1) and (2) indicate that VC-backing is associated with an increase of 14.1% in the number of headlines covering the IPO firm and an increase of 14.9% in the number of articles. As for control variables, we find that IPO firms underwritten by higher-ranked underwriters and firms that have larger pre-IPO assets are associated with greater pre-IPO media coverage. Collectively, these findings support our hypothesis **H1**. In Panel B,

we find that the coefficients of *High-Rep-VC-Backing* are significantly positive at the 1% level in all specifications and are significantly larger than those of *Low-Rep-VC-Backing* as suggested by tests of differences on the coefficients of these two variables shown in the bottom row of Panel B. This provides strong evidence supporting our conjecture that the effect of VC-backing on investor attention is stronger for high-reputation VC-backed IPOs than for low-reputation VC-backed IPOs. These empirical findings are consistent with our hypothesis **H2**.

5.2 Instrumental Variable Analysis of the Relation between VC-Backing and Investor Attention

VC-backing and investor attention may be endogenous for the following reason: unobservable firm characteristics (such as firm intrinsic value or firm quality) may affect VC-backing as well as investor attention, so that the greater investor attention we document above for VC-backed firms may be due to the underlying firm characteristics rather than due to VC-backing itself. In order to address the above endogeneity concern, we use an instrumental variable (IV) analysis. In our IV analysis, we instrument for *VC-Backing* using a plausibly exogenous shock to the supply of venture capital.

In doing the above, we broadly follow the methodology of Samila and Sorenson (2011), who use a similar instrument to study the effect of venture capital in fostering innovation and the creation of new firms. Similar to Samila and Sorenson (2011), our instrument is motivated by the following facts. First, institutional investors who are limited partners (LPs) of the VC funds generally adopt an investing strategy that has a fixed optimal asset allocation ratio to distribute their investment over asset classes. For example, they may invest 60% in equity, 30% in fixed income, and 10% in alternative assets (such as venture capital, private equity, and hedge funds). The managers of these LPs regularly rebalance their portfolio to maintain allocation close to the fixed optimal ratio. When the endowments they manage earn higher returns, they are likely to shift assets to venture capital to maintain their asset allocations. Second, these LPs exhibit a "home bias" when investing in venture capital, i.e., they tend to invest in venture capital funds headquartered close to them, we would expect a highly positive correlation between the lagged endowment returns earned by LPs and investments in VC funds whose headquarters are geographically close the LPs.[30] Finally, it has

[30] As Samila and Sorenson (2010 and 2011) argue, the assumption of "home bias" is likely to hold for a number of reasons: institutional investors might feel more comfortable investing near home, and they might have had prior interactions with the managers of local funds.

been well documented that VC funds have a strong tendency to invest locally (see, e.g., Sorenson and Stuart (2001)). Venture capitalists rely on social networks to find investments and must travel to their portfolio companies to monitor and advise them. Therefore, VCs tend to prefer to invest in firms that are close to them. Collectively, the above facts imply that higher endowment returns earned by LPs are likely to lead to more venture capital investments in firms in the same states as the LPs in the next few years.

Therefore, we construct our instrument for *VC-Backing*, namely, *LP Returns*, by multiplying the national average returns to college and university endowments (an important class of LPs) by the number of all LPs in each state that had invested in any venture capital fund at least ten years earlier. Specifically, *LP Returns* for firms headquartered in state s in year t is constructed using the following formula:

$$LP\ Returns_{s,t} = \sum_{j=t-10}^{t-1} Endowment\ Returns_j \times Ln(1 + LP_{s,j}), \tag{3}$$

where *Endowment Returns*$_j$ is the returns to college and university endowments in year j. We obtained the average annual returns data for college and university endowments, from the website of the National Association of College and University Business Officers.[31] $Ln(1 + LP_{s,j})$ is the log of the number of LPs located in state s who had invested in any venture capital fund at least ten years prior to year j: this data is collected from the SDC Platinum database. The ten-year lag is meant to remove any endogeneity that might result from LPs initiating investment in venture capital in response to a change in local economic conditions. The product of the two provides an estimate of the investment gains that LPs in a given state experience and hence of the amount of funds available for investments in VC funds. As shown in (3), we then summed up ten years of inflows into VC funds prior to the IPO year to create our instrument for the VC-Backing of an IPO firm.[32]

We report our 2SLS results for the effect of VC-backing on investor attention (as proxied by pre-IPO media coverage) in Table 3. Since our endogenous variable is binary, we use a probit model in the first stage and regress *VC-Backing* on our instrument *LP Returns* controlling for the

[31] See more details at http:www.nacubo.org.

[32] In untabulated results, we also construct our instrument by summing up the inflows of investment into VC funds from five years prior to ten years prior. The results are qualitatively similar.

same set of control variables and fixed effects as described in earlier sections, following Wooldridge (2010). In the second stage, we use the predicted probability of VC-backing from the first stage as an instrument. We report the first-stage result in Column (1) of Table 3. Consistent with our earlier conjecture, we find that the coefficient of *LP Returns* is significantly positive, suggesting that higher endowment returns earned by LPs lead to greater chances of VCs backing private firms in the same state in the next few years. In Column (1), we also report the Kleibergen-Paap *rk* Wald statistic (Kleibergen and Paap (2006)), which directly tests whether our instrument predicts a sufficient amount of the variance in the endogenous variable to identify our equations. Stock and Yogo (2005) report a critical value of 16.38 for the IV estimates to have no more than 10% of the bias of the OLS estimates for LIML estimation with one instrument and one endogenous variable and ours is 29.93, which is significantly larger than the critical value.

Columns (2)-(3) report the second-stage results of the effect of *VC-Backing* on pre-IPO media coverage variables. In each specification, the coefficient of *VC-Backing* is significantly positive and gets even larger compared to the OLS regression estimates as in Table 2, suggesting that the positive relationship between VC-backing and investor attention around a firm's IPO that we documented in our baseline analysis is causal.

6 Analysis of the Relation between VC-Backing, Investor Attention, and IPO Characteristics

6.1 VC-Backing, Investor Attention, and Price Revision

In this section, we study the relationship between VC-backing, investor attention (as proxied by pre-IPO media coverage), and the IPO offer price revision, which corresponds to our hypotheses **H3A** and **H3B**. We run the following regression:

$$Ln(PR) = \alpha + \beta\, VC\text{-}Backing + \gamma Z + year\ FE + industry\ FE + stock\ exchange\ FE + \epsilon, \quad (4)$$

where the dependent variable, *Ln(PR)*, is the natural log of one plus the absolute value of difference between the IPO offer price and the midpoint of the original filing range.

We present our empirical results for the above test in Table 4. Columns (1) reports the regression

result of *Ln(PR)* on the dummy variable for VC-backing. We find that the coefficient of *VC-Backing* is positive and significant at the 1% level. The economic magnitude is significant as well: VC-backing is associated with 0.014 increase in the *Ln(PR)*, which is equivalent to 14% of the median *Ln(PR)*. These findings suggest a positive relationship between VC-backing and the absolute value of the IPO offer price revision, which is consistent with the information extraction hypothesis **H3A**. Columns (2) and (3) present regression results of the IPO offer price revision on the two media coverage variables, *Ln(Headlines)* and *Ln(Articles)*, respectively. The coefficients on *Ln(Headlines)* and *Ln(Articles)* are positive and significant at the 1% level, suggesting that greater investor attention is associated with a greater absolute value of IPO offer price revision.[33]

As we argued in earlier sections, under the information extraction hypothesis, we would expect VC-backed IPO firms receiving a higher level of investor attention to be associated with a larger absolute value of IPO offer price revision, even after controlling for the direct effect of VC-backing. To test this conjecture, we include the interaction of *VC-Backing* and a dummy variable for greater investor attention (namely, *High Headlines*) and test the following model:

$$\begin{aligned} Ln(PR) =& \alpha + \beta\, \textit{VC-Backing} + \lambda \textit{High Headlines} + \theta\, \textit{VC-Backing} \times \textit{High Headlines} \\ &+ \gamma Z + \textit{year FE} + \textit{industry FE} + \textit{stock exchange FE} + \epsilon. \end{aligned} \tag{5}$$

Columns (4) and (5) of Table 4 report the results for these interaction tests. We find that the coefficients of the interaction terms, *VC-Backing*×*High Headlines* and *VC-Backing*×*High Articles*, are significantly positive. Consistent with the information extraction hypothesis, these findings suggest that VC-backed firms that have attracted greater investor attention around their IPOs are likely to have even larger price revisions.

[33] When we report our regression results of the relation between investor attention and price revision, we tabulate only the results for the continuous versions of these variables: i.e., *Ln(Headlines)* in Column (2) and *Ln(Articles)* in Column (3). In untabulated results, we find that similar results hold when we measure investor attention using dummified versions of these variables: i.e., *High Headlines* and *High Articles*. We take a similar approach in reporting the results of our analysis of all other IPO characteristics, such as secondary market and IPO valuations and IPO initial returns: i.e., we report regression results using only the continuous versions of our two investor attention variables, though these results hold for the dummified versions of these variables as well.

6.2 VC-Backing, Investor Attention, and Secondary Market Valuation

In this section, we analyze the effect of VC-backing on the post-IPO immediate secondary market valuations of IPO firms and the channel through which this may happen, corresponding to our hypothesis **H4**. We begin our analysis with a univariate comparison of median firm valuations in the immediate secondary market between VC-backed and non-VC-backed firms. Though our main measures of secondary market valuation (and IPO market valuation as well) are computed based on the price-to-sales multiple, we also compute valuation measures based on price-to-EBITDA and price-to-earnings multiples, compare their medians between VC-backed and non-VC-backed subsamples, and find that these results are consistent with our results using measures based on the price-to-sales multiple. We present these univariate analysis results in Table 5.

Our univariate results in Panels A-C of Table 5 show that the VC-backed firms have significantly higher valuation in the post-IPO immediate secondary market compared with non-VC-backed firms. The differences in the median valuations between VC-backed and non-VC-backed firms are significant both statistically (all at the 1% level) and economically. A consistent pattern is observable across different decades, suggesting that our results are not driven by a particular period of time.[34]

We then move on to assess the relationship between VC-backing and secondary market firm valuations by running multivariate regressions. We adopt the same regression models as (4)-(5) in Section 6.1 but use *Ln(*RVS_0*)*, our measure of secondary market valuation of an IPO firm relative to an industry peer, as the dependent variable.

Our results for the above multivariate regressions are reported in Table 6. Column (1) shows that the coefficient of VC-backing is positive and statistically significant at the 1% level. In terms of economic magnitude, VC-backing is associated with a 36.9% increase in RVS_0. Columns (2) and (3) present the effect of our investor attention proxies, *Ln(Headlines)* and *Ln(Articles)*, respectively. We find that our investor attention proxies by themselves have a significantly positive effect on the post-IPO immediate secondary market valuations, which is consistent with the theoretical prediction of Merton (1987) and the empirical findings of Liu, Sherman, and Zhang (2014). With regard to control variables, we find IPO firms with more reputable underwriters and a smaller

[34] In untabulated results, we compare the median valuation of VC-backed and non-VC-backed IPO firms on a yearly basis and find that VC-backed firms have consistently higher valuations than non-VC-backed firms. These results are not reported to conserve space and are available from the authors upon request.

fraction of firm equity sold to the public have higher valuations, which is consistent with the existing IPO literature. Columns (4) and (5) summarize the results for the interaction tests. We find that in both specifications, the coefficients of the interaction terms (*VC-Backing*×*High Headlines* and *VC-Backing*×*High Articles*) are significantly positive, suggesting that there is an incremental positive effect of greater investor attention received by VC-backed firms on immediate post-IPO secondary market valuations, even after controlling for the direct effect of VC-backing. Collectively, our empirical results provide strong evidence consistent with our hypothesis **H4**.

6.3 VC-Backing, Investor Attention, and IPO Market Valuation

We now turn to the study of the relationship between VC-backing and IPO market valuations, which corresponds to our hypotheses **H5A** and **H5B**. As in the prior section, we begin our analysis with a univariate comparison of the median IPO market valuations between VC-backed and non-VC-backed firms using valuation measures based on price-to-sales, price-to-EBITDA, and price-to-earnings multiples. We present these results in Panels D-F of Table 5. We find that the median IPO market valuations are significantly higher for VC-backed firms than for non-VC-backed firms. The differences of median IPO valuations between VC-backed and non-VC-backed IPO firms are significant statistically (mostly at the 1% level) as well as economically. A similar pattern remains persistent across different decades.

We then conduct multivariate regressions to test the relation between VC-backing, investor attention, and IPO market valuations. We adopt the same regression models as in Section 6.2, but use the IPO market valuation measure, *Ln(RVO)*, as the dependent variable. We report the results for these tests in Table 7. Column (1) shows that the coefficient of *VC-Backing* is positive and significant both statistically and economically: *VC-Backing* is associated with a 32.5% increase in *RVO*. In Columns (4) and (5), we report the results for our interaction tests. We find that the coefficients on *VC-Backing*×*High Headlines* is positive and significant at the 1% level, while the coefficient on *VC-Backing*×*High Articles* is positive but insignificant. These results provide evidence for the conjecture that VC-backed firms receiving higher investor attention are associated with higher valuations at the offer price even after controlling for the direct effect of VC-backing. In general, the above findings lend support for our hypothesis **H5A**.

6.4 VC-Backing, Investor Attention, and IPO Initial Returns

We now move on to the study of the relationship between VC-backing and IPO initial returns, as captured by our hypotheses **H6A** and **H6B**. To assess the effect of VC-backing on IPO initial returns, we regress *Initial Ret*, which is defined as the percentage change from the offer price to the first-day closing price in the secondary market, on the VC-backing dummy, investor attention measures as proxied by pre-IPO media coverage, and the interaction of the VC-backing dummy and dummies for greater media courage, namely, *High Headlines* and *High Articles*.

We present the results of the above tests in Table 8. Our results show that VC-backing has a significantly positive effect on IPO initial returns as presented in Column (1). The economic magnitude is significant as well: on average, VC-backing is associated with a 4.5% increase in IPO initial returns, which is equivalent to 22.6% of the sample mean. Columns (2) and (3) show that both media coverage variables, *Ln(Headlines)* and *Ln(Articles)*, are significantly and positively related to the initial returns, suggesting that firms that have attracted more investor attentions have higher initial returns. Columns (4) and (5) present the regression results using *VC-Backing* $\times$ *High Headlines* and *VC-Backing* $\times$ *High Articles* as the main explanatory variables, respectively. We find that the coefficient of each of these interaction terms is positive and significant at the 1% level, while the coefficient of *VC-Backing* becomes insignificant. These findings suggest that there is an incremental positive effect of greater investor attention on IPO initial returns, even after controlling for the direct effect of VC-backing. Collectively, these findings support our hypothesis **H6B**.

6.5 VC Reputation, Investor Attention, and IPO Characteristics

We now turn to the study of the relationship between the reputation of lead VC investors backing an IPO firm, investor attention, and various IPO characteristics such as the secondary market and IPO firm valuations, and IPO initial returns. We test the following model:

$$\begin{aligned} Dep\ Var = \alpha &+ \theta_1 \textit{High-Rep-VC-Backing} \times \textit{High Headlines} + \theta_2 \textit{Low-Rep-VC-Backing} \times \textit{High Headlines} \\ &+ \beta_1 \textit{High-Rep-VC-Backing} + \beta_2 \textit{Low-Rep-VC-Backing} + \lambda \textit{High Headlines} \\ &+ \gamma Z + \textit{year FE} + \textit{industry FE} + \textit{stock exchange FE} + \epsilon. \end{aligned} \tag{6}$$

We interact the two dummy variables for high-reputation and low-reputation VC-backing with *High Headlines* (or *High Articles*) and use these interactions terms as the main explanatory variables in our regressions. Following our discussion in 3.3, we expect θ_1 to be significantly positive and larger than θ_2.

We report our regression results for the relationship between VC reputation, investor attention, and IPO characteristics in Table 9. Column (1), (4), and (7) report regression results that use *High-Rep-VC-Backing* and *Low-Rep-VC-Backing* as the main explanatory variables. We find that the effect of high-reputation VC-backing on IPO initial returns is significantly larger than that of low-reputation VC-backing. The rest of Table 9 report the results for our interaction tests. As shown in Columns (2), (5), and (8), the coefficients of *High-Rep-VC-Backing*×*High Headlines* are significantly positive and significantly larger than those of *Low-Rep-VC-Backing*×*High Headlines* in the regressions for immediate post-IPO secondary market valuation, IPO valuation, and initial returns. Our regressions using the interaction terms between reputation variables and *High Articles* (as in Column (3), (6), and (9)) provide qualitative consistent but weaker results. In general, our findings suggest that high-reputation VC-backed IPO firms receiving greater investor attention have higher valuations in the secondary and IPO markets as well as higher initial returns compared to low-reputation VC-backed IPO firms receiving greater investor attention. Thus the results reported in this section provide additional support for our hypotheses **H4**, **H5A**, and **H6B**.

6.6 VC-Backing, Investor Attention, and Financial Market Player Participation

In this section, we study how VC-backing affects the participation of financial market players (institutional investors and financial analysts) in the IPO and in the immediate post-IPO secondary market using multivariate regression analyses. Our dependent variables are the natural log of the number of institutional investors holding the stock of the IPO firm (*Ln(N_Inst)*) and the natural log of the number of analysts following the IPO firm (*Ln(N_An)*) at the end of the first fiscal year after IPO.

Table 10 reports our findings on the participation of institutional investors in the IPO. Column (1) reports the effect of VC-backing on the number of institutional investors holding the stock of the IPO firm. We find VC-backing is positively associated with the number of institutional investors. In terms of economic magnitude, VC-backing is associated with a 21.2% increase in the

number of institutional investors. Columns (2) and (3) report the effect of our investor attention proxies, *Headlines* and *Articles*, on the number of institutional investors, respectively. We find that the coefficient of each of these proxies is positive and significant, consistent with Merton's (1987) attention model as well as with Liu, Sherman, and Zhang (2014)'s empirical findings. In Columns (4) and (5), we report the results for our interaction tests. We find the coefficient of *VC-Backing* × *High Headlines* is positive and significant at the 10% level, while that of *VC-Backing* × *High Articles* is positive but insignificant. This provides evidence for our conjecture that there is an incremental positive effect of higher investor attention received by VC-backed firms on institutional investor participation, even after controlling for the direct effect of VC-backing. As for control variables, pre-IPO firm size and underwriter rank are positively related to the number of institutional investors holding the equity of the firm, while the fraction of equity sold in the IPO is negatively related to the number of institutional investors. These empirical findings are consistent with our hypothesis **H7**.

In Table 11, we turn to study the relationship between VC-backing, investor attention, and the number of analysts following the IPO firm. We find that VC-backing remains positively and significantly related to analyst coverage as shown in Column (1): VC-backing increases analyst coverage by 13.6%. In Columns (2) and (3), we find that each of our investor attention proxies is significantly and positively related to analyst coverage, indicating higher pre-IPO investor attention is likely to lead to greater analyst coverage immediately after IPO. In Columns (4) and (5), we find that the coefficient of *VC-Backing* × *High Headlines* is positive and significant at the 10% level, while that of *VC-Backing* × *High Articles* is positive but insignificant. This provides evidence consistent with our conjecture that there is an incremental positive effect of higher investor attention received by VC-backed firms on analyst coverage, even after controlling for the direct effect of VC-backing. Collectively, the above results are consistent with our hypothesis **H8**.

6.7 The Dynamics of Investor Attention and Secondary Market Valuation

In this section, we study the dynamics of IPO firms' secondary market valuations over time, from the close of the first trading day in the secondary market up to three years after IPO, corresponding to our hypotheses **H9** and **H10**. We first conduct a univariate analysis of the secondary market valuations over time for VC-backed and non-VC-backed subsamples. Table 12 reports the median

valuations in the secondary market at the close of the first trading day, as well as in one, two, and three years following the IPO date for VC-backed and non-VC-backed IPO firms. Panel A presents the results using our main valuation measures, which are computed based on the price-to-sales ratio. Panels B and C use alternative valuation measures that are computed based on the price-to-EBITDA and price-to-earnings ratio, respectively. The last two columns of all panels test the statistical differences in median valuations between VC-backed and non-VC-backed subsamples.

For all three panels, we find consistent results that VC-backed IPO firms have higher secondary market valuations compared to non-VC-backed firms at the close of the first trading day, as well as in one, two, and three years after IPO. The differences in medians between VC-backed and non-VC-backed subsamples are statistically significant, mostly at the 1% level. Within each panel, we find that the median valuations decrease over time for both VC-backed and non-VC-backed firms. Moreover, VC-backed firms tend to have a larger decrease in valuations over time compared to non-VC-backed firms. Further, the differences in median valuations between VC-backed and non-VC-backed IPO firms become smaller over time. This pattern is also depicted in Figure 2, in which we plot the medians of secondary market valuations over time for VC-backed and non-VC-backed subsamples. The upper panel uses the entire sample while the lower panel uses firms that have all three years of data available. Both panels show that the differences in medians between VC-backed and non-VC-backed firms tend to become smaller as time elapses subsequent to IPO.

We then move on to study the dynamics of secondary market valuations in a multivariate regression setting. Specifically, we test the following models:

$$Ln(RVS_t) = \alpha + \beta_1 Time\ Trend + \beta_2 Time\ Trend \times VC\text{-}Backing + Firm\ FE + \epsilon_{i,t}, \quad (7)$$

$$\begin{aligned} Ln(RVS_t) = \alpha &+ \beta_1 Time\ Trend + \beta_2 Time\ Trend \times VC\text{-}Backing \\ &+ \beta_3 Time\ Trend \times VC\text{-}Backing \times High\ Headlines \\ &+ \beta_4 Time\ Trend \times High\ Headlines + Firm\ FE + \epsilon_{i,t}. \end{aligned} \quad (8)$$

In the above regressions, *Ln(RVS$_t$)* is the IPO firm's valuation in the secondary market in the t-th year after IPO, where t equals 0, 1, 2, and 3, and year 0 means at the close of the first trading day in the secondary market. *Time Trend* is a linear time trend, defined as the number of years after IPO, which equals to 0, 1, 2, or 3. *VC-Backing* is a dummy variable indicating that a firm

is VC-backed. *High Headlines* (*High Articles*) is a dummy variable indicating that the number of headlines (articles) covering the IPO firm in the two months prior to the IPO date is above the sample median. We include the full expansion of the triple interaction of *Time Trend*, *VC-Backing*, and *High Headlines* (or *High Articles*) in regression (8).[35] In order to alleviate the concern that our regression results for the dynamics of secondary market valuations may be affected by intrinsic value or quality of the firm, we include firm fixed effects in the above regressions to control for firms' intrinsic value, which may be driven, for example, by VC-backed firms being of different quality than non-VC-backed firms. Standard errors are clustered at the industry level in the above regressions. The coefficients of our interest are β_2 and β_3.

We present our results for the above regressions in Panel A of Table 13. In Column (1), we regress our measure for secondary market valuation, *Ln(RVS)*$_t$, on time trend only and find that there is a significant and negative relationship between the two, justifying the inclusion of this variable in all the regressions reported in this table. In Column (2), we include the interaction term of *Time Trend* and *VC-Backing* as the main explanatory variable. We find that the coefficient on this interaction term, β_2, is negative and significant at the 1% level, which suggests that the valuation of VC-backed IPO firms will fall to a greater extent than that of non-VC-backed firms and is consistent with our hypothesis **H9**. In the last two columns, we further include the triple interaction term, *Time Trend*×*VC-Backing*×*High Headlines* (*High Articles*). The coefficients of *Time Trend* and of *Time Trend*×*VC-Backing* are significantly and negatively related to secondary market valuation. Further, the coefficient (β_3) of *Time Trend*×*VC-Backing*×*High Headlines* (*High Articles*) is negative in both Columns (4) and (5), with the one in Column (5) being statistically significant at the 10% level. This provides evidence that VC-backed firms receiving greater investor attention are likely to experience larger decreases in valuations over time in the secondary market. The above empirical findings are consistent with our hypothesis **H10**.

To study the impact of high-reputation versus low-reputation VC-backing on the dynamics of secondary market valuations, we interact *High-Rep-VC-Backing* and *Low-Rep-VC-Backing* with *Time Trend* and *High Headlines* (*High Articles*) and report the results for these interaction tests in Panel B of Table 13. In Column (1), our evidence suggests that both high-reputation and low-

[35] *VC-Backing*, *High Articles*, *High Headlines*, *VC-Backing*×*High Articles*, and *VC-Backing*×*High Headlines* are absorbed by the firm fixed effects in this specification.

reputation VC-backed IPO firms experience a fall in valuations as time passes, but there is no significant difference in the decreases in valuation between high-reputation and low-reputation VC-backed firms. In Column (2), we find that the coefficient of *Time Trend*×*High-Rep-VC-Backing*×*High Headlines* is negative and significant. Further, the coefficient of *Time Trend*×*High-Rep-VC-Backing*×*High Headlines* is larger in magnitude than that of *Time Trend*×*Low-Rep-VC-Backing*×*High Headlines*. In Column (3), we find qualitatively similar but weaker results using the interaction of time trend, VC reputation dummies, and the article variable. The above empirical results suggest that IPO firms backed by high-reputation lead VCs that have attracted higher investor attention are likely to experience larger decreases in valuation over time than IPO firms backed by low-reputation lead VCs that have attracted higher investor attention, consistent with the investor attention channel of VC value creation in the IPO market.

6.8 Instrumental Variable Analysis: VC-Backing, Investor Attention, and IPO Characteristics

Our OLS regression results show that VC-backed IPO firms are associated with higher absolute values of price revision, have higher IPO and secondary market valuations, and higher IPO initial returns. We also show that VC-backed IPO firms have greater participation by institutional investors and have greater post-IPO analyst coverage. However, as argued earlier in Section 5.2, VC-backing and IPO characteristics may be endogenous. In particular, unobservables (such as the intrinsic value of the firm going public) may affect VC backing as well as IPO characteristics, so that the favorable IPO characteristics that we documented earlier for VC-backed firms may be due to underlying firm characteristics rather than due to VC-backing itself. We therefore use the instrument (*LP Returns*) that we documented in Section 5.2 for VC-backing to conduct an instrumental variable analysis to account for the above endogeneity concern.

We report the second-stage results of our IV regression analysis for the effect of VC-backing on a variety of IPO characteristics (including IPO offer price revision, secondary market valuation, IPO market valuation, IPO initial returns, institutional investor participation, and financial analyst coverage) in Table 14. After controlling for the potential endogeneity of *VC-Backing* and IPO characteristics using our IV analysis, we continue to find a highly positive relationship between *VC-Backing* and each of the above dependent variables: the coefficient on *VC-backing* is positive

and significant at the 1% level for all of our second-stage regressions. These findings suggest that the relations between VC-backing and the above favorable IPO characteristics are causal.

We have established using the above IV analysis in this section that VC-backing causally affects IPO characteristics such as IPO and immediate secondary market valuations and IPO initial returns. We now turn to the channel through which this causal effect operates. As we showed using our OLS analysis of various IPO characteristics and our dynamic analysis of post-IPO secondary market valuations, we argue here that at least one channel through which this causal effect operates is through investor attention. In this context, we note that we have already established (using our IV analysis presented in Section 5.2) a positive causal relationship between VC-backing and investor attention. Further, Liu, Sherman, and Zhang (2014) has established (using an IV analysis where they use the number of special news reports aired on the three major US television networks (ABC, CBS, and NBC) as an instrumental variable for investor attention) that investor attention is positively and causally related to IPO characteristics such as the IPO firm's long-term stock value.[36] In untabulated results, we have conducted a similar IV analysis using the number of special news reports aired on the three major US television networks (ABC, CBS, and NBC) in the two months prior to IPO as an instrument for investor attention and find that investor attention is causally related to offer price revision, IPO and secondary market valuations, IPO initial returns, institutional investor participation, and post-IPO analyst coverage.[37] Taken together, these two results imply that at least one channel through which the causal effect of VC-backing on IPO characteristics operates is by enhancing the investor attention garnered by the IPOs of firms backed by them.

7 Conclusion

We propose and empirically analyze a new channel through which VCs may create incremental value at the time of IPO for the entrepreneurial firms that they invest in. We hypothesize that the IPOs of VC-backed firms garner greater "investor attention" (in the sense of Merton (1987)), allowing the

[36] Liu, Sherman, and Zhang (2014) argue that these special news reports were exogenous events that drew attention away from any IPO firms that were trying to attract a following and thus the number of these special news reports is a valid instrumental variable for investor attention as proxied by media coverage. See more details about the justification of this instrument in their paper.

[37] Given space constraints, we choose not to present these results here. These results are available from the authors upon request.

IPO underwriters of such firms to perform two information-related roles more efficiently during the IPO book-building and road-show process: information dissemination, where the lead underwriter disseminates noisy information about various aspects of the IPO firm to institutional investors; and information extraction, where the lead underwriter extracts information useful in pricing the IPO firm equity from institutional investors. Based on this investor attention channel, we develop testable implications for the IPO characteristics of VC-backed firms and empirically test these implications. Using a hand-collected dataset of pre-IPO media coverage as a proxy for investor attention, we first show that the IPOs of VC-backed firms indeed attract greater investor attention than those of non-VC backed firms. Further, while the IPOs of high- and low-reputation VC-backed firms attract greater investor attention than non-VC-backed firms, the IPOs of high-reputation VC-backed firms attract greater investor attention than those of low-reputation VC-backed firms. We find that VC-backed firms are associated with larger absolute values of IPO offer price revisions; greater IPO and after-market valuations; larger IPO initial returns; greater institutional investor equity holdings; and greater analyst coverage immediately post-IPO. Our dynamic analysis of IPO firm valuation in the three years post-IPO shows that the valuation of VC-backed firms falls to a greater extent than those of non-VC backed firms corresponding to investor attention fading with time, with the valuation of those VC-backed firms that received the greatest investor attention at IPO falling to the greatest extent. Our instrumental variable analysis shows that the positive relation we document between VC-backing, investor attention, and various IPO characteristics is causal.

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Table 1: Summary Statistics

This table reports the summary statistics for the sample of IPOs in the US from 1980 to 2009. We exclude equity offerings of financial institutions (SIC codes between 6000 and 6999) and regulated utilities (SIC codes between 4900 and 4999), unit offerings, closed-end funds, real estate investment trusts (REITs), American Depositary Receipts (ADRs), rights issues, spin-offs, equity carve-outs, leverage buyouts, tracking stocks, issues with offer price less than $5, issues with incomplete information on offer price and the number of shares filed in an IPO, and duplicates. The IPO firm should issue common shares (with share code headers of 10 and 11 in CRSP). We further require that the issuing firm must be present on the Compustat annual industrial database for the fiscal year prior to the offering and at least for one year after the offering, as well as on the CRSP database within sixty days of the issue date. *Headlines* is the number of headlines that have mentioned the IPO firm in the two months prior to the IPO date. *Articles* is the number of articles that have mentioned the IPO firm in the two months prior to the IPO date. *VC-Backing* is a dummy variable equal to 1 if the firm is venture capitalist backed and 0 otherwise. *RVO* is the valuation of an IPO firm at offer relative to an industry peer. RVS_0 is the valuation of the IPO firm at the close of the first trading day in the secondary market relative to an industry peer. *Initial Ret* is the percentage change from the offer price to the first-day closing price in the secondary market. *Price Revision* the absolute value of difference between the IPO offer price and the midpoint of original filing range. *N_Inst* is the number of institutions that hold the stocks of the firm at the end of the first fiscal year after IPO. *N_An* is the number of analysts providing earnings forecast at the end of the first fiscal year after IPO. *CM Rank* is the Carter-Manaster rank of the lead underwriter for the IPO firm. *Ln(Asset)* is the natural log of the firm's pre-IPO assets. *Fraction Sold* is the fraction of firm equity sold in the IPO.

Variables	N	Mean	Std. Dev	Min	25th	Median	75th	Max
Headlines	4105	4.891	10.229	0.000	0.000	2.000	5.000	272.000
Articles	4105	29.662	94.924	0.000	2.000	9.000	32.000	4369.000
VC-Backing	4105	0.457	0.498	0.000	0.000	0.000	1.000	1.000
RVO	3100	4.629	12.434	0.023	0.774	1.659	3.971	254.512
RVS_0	3100	6.273	19.189	0.026	0.838	1.911	4.773	342.800
Initial Ret	4070	0.199	0.428	-0.705	0.003	0.073	0.229	6.056
Price Revision	3964	0.160	0.176	0.000	0.048	0.105	0.227	2.100
N_Inst	3924	34.524	43.275	1.000	9.000	20.000	46.000	760.000
N_An	3502	4.302	3.561	1.000	2.000	3.000	6.000	43.000
CM Rank	3868	7.186	2.126	0.100	6.000	8.000	9.000	9.000
Ln(Asset)	4006	3.163	1.752	-3.912	2.080	3.077	4.138	11.823
Fraction Sold	4070	0.327	0.212	0.031	0.218	0.291	0.381	7.823

Table 2: VC-Backing and Investor Attention

Panel A reports the OLS regression results of the effect of VC-backing on investor attention around a firm's IPO (as proxied by pre-IPO media coverage); Panel B reports the OLS regression results of the effect of high- and low-reputation VC-backing on investor attention. *Ln(Headlines)* is the natural log of one plus the number of headlines that have mentioned the IPO firm in the two months prior to the IPO date. *Ln(Articles)* is the natural log of one plus the number of articles that have mentioned the IPO firm in the two months prior to the IPO date. *High Headlines* is a dummy variable equal to 1 if the number of headlines that have mentioned the IPO firm is above the sample median and 0 otherwise. *High Articles* is a dummy variable equal to 1 if the number of articles that have mentioned the IPO firm is above the sample median and 0 otherwise. *VC-Backing* is a dummy variable equal to 1 if the firm is venture capitalist backed and 0 otherwise. *High-Rep-VC-Backing* is a dummy variable equal to 1 if the average market share of funds raised by the IPO firm's lead VC investors is above the 75th percentile of the sample and 0 otherwise. *Low-Rep-VC-Backing* is dummy variable equal to 1 if the average market share of funds raised by the IPO firm's lead VC investors is equal to or below the 75th percentile of the sample and 0 otherwise. *CM Rank* is the Carter-Manaster rank of the lead underwriter for the IPO firm. *Ln(Asset)* is the natural log of the firm's pre-IPO assets. *Fraction Sold* is the fraction of firm equity sold in the IPO. Constant, industry fixed effects based on Fama French 48 industry classifications, IPO year fixed effects, and stock exchange fixed effects are included in all regressions. All standard errors are adjusted for clustering at the industry level and are reported in parentheses below the coefficient estimates. ***, **, and * represent statistical significance at the 1, 5, and 10 percent levels, respectively.

Panel A: The Effect of VC-Backing on Investor Attention (as Proxied by Media Coverage)

	(1)	(2)	(3)	(4)
VARIABLES	Ln(Headlines)	Ln(Articles)	High Headlines	High Articles
VC-Backing	0.141***	0.149***	0.054**	0.042*
	(0.037)	(0.041)	(0.023)	(0.022)
CM Rank	0.072***	0.108***	0.033***	0.028***
	(0.007)	(0.010)	(0.005)	(0.004)
Ln(Asset)	0.021*	0.071***	0.004	0.019***
	(0.011)	(0.013)	(0.005)	(0.005)
Fraction Sold	-0.114	-0.052	-0.030	-0.015
	(0.100)	(0.069)	(0.040)	(0.017)
Observations	3,696	3,696	3,696	3,696
Adjusted R-squared	0.409	0.664	0.318	0.542
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Exchange FE	Yes	Yes	Yes	Yes

Panel B: The Effect of VC Reputation on Investor Attention (as Proxied by Media Coverage)

	(1)	(2)	(3)	(4)
VARIABLES	Ln(Headlines)	Ln(Articles)	High Headlines	High Articles
High-Rep-VC-Backing	0.239***	0.246***	0.106***	0.093***
	(0.047)	(0.065)	(0.023)	(0.028)
Low-Rep-VC-Backing	0.112***	0.125***	0.041*	0.030
	(0.036)	(0.042)	(0.023)	(0.022)
CM Rank	0.071***	0.107***	0.032***	0.028***
	(0.007)	(0.010)	(0.005)	(0.004)
Ln(Asset)	0.020*	0.070***	0.003	0.018***
	(0.011)	(0.013)	(0.005)	(0.005)
Fraction Sold	-0.113	-0.051	-0.029	-0.014
	(0.100)	(0.068)	(0.040)	(0.017)
Observations	3,696	3,696	3,696	3,696
Adjusted R-squared	0.410	0.665	0.319	0.543
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Exchange FE	Yes	Yes	Yes	Yes
High-Rep VC- Backing – Low-Rep-VC-Backing	0.127***	0.121***	0.065***	0.063***

Table 3: Instrumental Variable Analysis of the Effect of VC-Backing on Investor Attention

This table reports the Instrumental Variable regression results of the effect of VC-backing on investor attention around a firm's IPO (as proxied by pre-IPO media coverage). Column (1) reports the first stage probit regression result, i.e., regressing *VC-Backing* on our instrument, *LP Returns*, which is defined in Section 5.2. Columns (2) and (3) report the second-stage results of the effect of VC-backing on media coverage. *VC-Backing* is a dummy variable equal to 1 if the firm is venture capitalist backed and 0 otherwise. *Ln(Headlines)* is the natural log of one plus the number of headlines that have mentioned the IPO firm in the two months prior to the IPO date. *Ln(Articles)* is the natural log of one plus the number of articles that have mentioned the IPO firm in the two months prior to the IPO date. *CM Rank* is the Carter-Manaster rank of the lead underwriter for the IPO firm. *Ln(Asset)* is the natural log of the firm's pre-IPO assets. *Fraction Sold* is the fraction of firm equity sold in the IPO. Constant, industry fixed effects based on Fama French 48 industry classifications, IPO year fixed effects, and stock exchange fixed effects are included in all regressions. All standard errors are adjusted for clustering at the industry level and are reported in parentheses below the coefficient estimates. ***, **, and * represent statistical significance at the 1, 5, and 10 percent levels, respectively.

	(1)	(2)	(3)
	1st Stage	2nd Stage	2nd Stage
VARIABLES	VC-Backing	Ln(Headlines)	Ln(Articles)
LP Returns	0.323***		
	(0.116)		
VC-Backing		0.644***	0.692***
		(0.154)	(0.108)
CM Rank	0.219***	0.044***	0.080***
	(0.020)	(0.014)	(0.010)
Ln(Asset)	-0.153***	0.046***	0.099***
	(0.027)	(0.012)	(0.014)
Fraction Sold	-0.543*	-0.014	0.060
	(0.313)	(0.079)	(0.069)
Observations	3,331	3,331	3,331
Pseudo R-squared	0.266		
Industry FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Exchange FE	Yes	Yes	Yes
Kleibergen-Paap rk Wald Stat	29.93		

Table 4: VC-Backing, Investor Attention, and Offer Price Revision

This table reports the relationship between VC-backing, investor attention around a firm's IPO (as proxied by pre-IPO media coverage), and the absolute value of the offer price revision. *Ln(PR)* is the natural log of one plus the absolute value of the percentage difference between the IPO offer price and the midpoint of original filing range. *VC-Backing* is a dummy variable equal to 1 if the firm is venture capitalist backed and 0 otherwise. *Ln(Headlines)* is the natural log of one plus the number of headlines that have mentioned the IPO firm in the two months prior to the IPO date. *Ln(Articles)* is the natural log of one plus the number of articles that have mentioned the IPO firm in the two months prior to the IPO date. *High Headlines* is a dummy variable equal to 1 if the number of headlines that have mentioned the IPO firm is above the sample median and 0 otherwise. *High Articles* is a dummy variable equal to 1 if the number of articles that have mentioned the IPO firm is above the sample median and 0 otherwise. *CM Rank* is the Carter-Manaster rank of the lead underwriter for the IPO firm. *Ln(Asset)* is the natural log of the firm's pre-IPO assets. *Fraction Sold* is the fraction of firm equity sold in the IPO. Constant, industry fixed effects based on Fama French 48 industry classifications, IPO year fixed effects, and stock exchange fixed effects are included in all regressions. All standard errors are adjusted for clustering at the industry level and are reported in parentheses below the coefficient estimates. ***, **, and * represent statistical significance at the 1, 5, and 10 percent levels, respectively.

	(1)	(2)	(3)	(4)	(5)
VARIABLES	Ln(PR)	Ln(PR)	Ln(PR)	Ln(PR)	Ln(PR)
VC-Backing	0.014**			0.004	0.005
	(0.006)			(0.006)	(0.006)
Ln(Headlines)		0.014***			
		(0.002)			
Ln(Articles)			0.017***		
			(0.003)		
VC-Backing × High Headlines				0.022***	
				(0.007)	
High Headlines				0.013**	
				(0.006)	
VC-Backing × High Articles					0.022**
					(0.010)
High Articles					0.020***
					(0.007)
CM Rank	0.011***	0.011***	0.010***	0.010***	0.010***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Ln(Asset)	-0.002	-0.003	-0.003*	-0.001	-0.004**
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Fraction Sold	-0.022	-0.022	-0.023	-0.020	-0.018
	(0.020)	(0.019)	(0.020)	(0.019)	(0.020)
Observations	3,591	3,591	3,591	3,591	3,591
Adjusted R-squared	0.102	0.107	0.112	0.109	0.104
Industry FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Exchange FE	Yes	Yes	Yes	Yes	Yes

Table 5: Univariate Comparisons of Secondary Market and IPO Valuations

This table reports the distribution of immediate secondary market and IPO valuations of our sample firms going public from 1980 to 2009. Panels A, B, and C present the medians of secondary market valuations at the close of the first trading day relative to an industry peer (RVS_0), which are computed based on market price-to-sales, market price-to-EBITDA, and market price-to-earnings multiple, respectively. Panels D, E, and F present the medians of IPO firm valuations relative to an industry peer (*RVO*), which are computed based on market price-to-sales, market price-to-EBITDA, and market price-to-earnings multiple, respectively. The industry peer is a comparable publicly traded firm generated by the comparable firm approach. ***, **, and * represent statistical significance at the 1, 5, and 10 percent levels, respectively, for the differences in medians of valuations between VC-backed and non-VC-backed firms.

	VC-Backed IPOs		Non-VC-Backed IPOs		Test of Differences	
Year	No. of Issues	Median	No. of Issues	Median	Difference	p-value
Panel A: RVS_0 Based on Price/Sales Multiple						
1980-1989	270	2.289	441	1.553	0.736***	0.003
1990-1999	845	2.748	968	1.534	1.214***	0.000
2000-2009	327	2.614	249	1.152	1.462***	0.000
Whole Sample	1442	2.625	1658	1.488	1.137***	0.000
Panel B: RVS_0 Based on Price/EBITDA Multiple						
1980-1989	209	1.783	393	1.347	0.436***	0.005
1990-1999	520	2.158	807	1.311	0.847***	0.000
2000-2009	130	2.099	212	0.947	1.152***	0.000
Whole Sample	859	2.022	1412	1.282	0.740***	0.000
Panel C: RVS_0 Based on Price/Earnings Multiple						
1980-1989	196	1.581	333	1.174	0.407***	0.001
1990-1999	398	1.725	611	1.354	0.371***	0.002
2000-2009	87	1.933	143	1.354	0.579**	0.041
Whole Sample	681	1.686	1087	1.267	0.419***	0.000
Panel D: RVO Based on Price/Sales Multiple						
1980-1989	270	2.182	441	1.398	0.783***	0.000
1990-1999	845	2.352	968	1.362	0.990***	0.000
2000-2009	327	2.294	249	1.041	1.253***	0.000
Whole Sample	1442	2.297	1658	1.345	0.952***	0.000
Panel E: RVO Based on Price/EBITDA Multiple						
1980-1989	209	1.649	393	1.232	0.417***	0.004
1990-1999	520	1.802	807	1.188	0.614***	0.000
2000-2009	130	1.697	212	0.877	0.820***	0.000
Whole Sample	859	1.761	1412	1.148	0.613***	0.000
Panel F: RVO Based on Price/Earnings Multiple						
1980-1989	196	1.455	333	1.091	0.364***	0.007
1990-1999	398	1.420	611	1.185	0.234***	0.006
2000-2009	87	1.465	143	1.179	0.286*	0.077
Whole Sample	681	1.436	1087	1.145	0.291***	0.000

Table 6: VC-Backing, Investor Attention, and Secondary Market Valuations

This table reports the relationship of VC-backing, investor attention around a firm's IPO (as proxied by pre-IPO media coverage), and the valuation of an IPO firm in the immediate post-IPO secondary market. *Ln(RVS_0)* is the natural log of the valuation of an IPO firm at the close of the first trading day in the secondary market relative to an industry peer. *VC-Backing* is a dummy variable equal to 1 if the firm is venture capitalist backed and 0 otherwise. *Ln(Headlines)* is the natural log of one plus the number of headlines that have mentioned the IPO firm in the two months prior to the IPO date. *Ln(Articles)* is the natural log of one plus the number of articles that have mentioned the IPO firm in the two months prior to the IPO date. *High Headlines* is a dummy variable equal to 1 if the number of headlines that have mentioned the IPO firm is above the sample median and 0 otherwise. *High Articles* is a dummy variable equal to 1 if the number of articles that have mentioned the IPO firm is above the sample median and 0 otherwise. *CM Rank* is the Carter-Manaster rank of the lead underwriter for the IPO firm. *Ln(Asset)* is the natural log of the firm's pre-IPO assets. *Fraction Sold* is the fraction of firm equity sold in the IPO. Constant, industry fixed effects based on Fama French 48 industry classifications, IPO year fixed effects, and stock exchange fixed effects are included in all regressions. All standard errors are adjusted for clustering at the industry level and are reported in parentheses below the coefficient estimates. ***, **, and * represent statistical significance at the 1, 5, and 10 percent levels, respectively.

	(1)	(2)	(3)	(4)	(5)
VARIABLES	Ln(RVS_0)	Ln(RVS_0)	Ln(RVS_0)	Ln(RVS_0)	Ln(RVS_0)
VC-Backing	0.369***			0.242***	0.309***
	(0.050)			(0.055)	(0.062)
Ln(Headlines)		0.115***			
		(0.031)			
Ln(Articles)			0.085***		
			(0.029)		
VC-Backing × High Headlines				0.285***	
				(0.090)	
High Headlines				0.043	
				(0.061)	
VC-Backing × High Articles					0.181**
					(0.078)
High Articles					0.099
					(0.079)
CM Rank	0.090***	0.109***	0.109***	0.084***	0.100***
	(0.017)	(0.018)	(0.018)	(0.017)	(0.015)
Ln(Asset)	-0.237***	-0.267***	-0.271***	-0.233***	-0.259***
	(0.038)	(0.038)	(0.038)	(0.038)	(0.030)
Fraction Sold	-1.212***	-1.266***	-1.274***	-1.196***	-1.230***
	(0.422)	(0.450)	(0.457)	(0.406)	(0.417)
Observations	2,890	2,890	2,890	2,890	2,890
Adjusted R-squared	0.223	0.214	0.213	0.228	0.221
Industry FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Exchange FE	Yes	Yes	Yes	Yes	Yes

Table 7: VC-Backing, Investor Attention, and IPO Valuations

This table reports the relationship of VC-backing, investor attention around a firm's IPO (as proxied by pre-IPO media coverage), and IPO valuation. *Ln(RVO)* is the natural log of the valuation of an IPO firm at offer relative to an industry peer. *VC-Backing* is a dummy variable equal to 1 if the firm is venture capitalist backed and 0 otherwise. *Ln(Headlines)* is the natural log of one plus the number of headlines that have mentioned the IPO firm in the two months prior to the IPO date. *Ln(Articles)* is the natural log of one plus the number of articles that have mentioned the IPO firm in the two months prior to the IPO date. *High Headlines* is a dummy variable equal to 1 if the number of headlines that have mentioned the IPO firm is above the sample median and 0 otherwise. *High Articles* is a dummy variable equal to 1 if the number of articles that have mentioned the IPO firm is above the sample median and 0 otherwise. *CM Rank* is the Carter-Manaster rank of the lead underwriter for the IPO firm. *Ln(Asset)* is the natural log of the firm's pre-IPO assets. *Fraction Sold* is the fraction of firm equity sold in the IPO. Constant, industry fixed effects based on Fama French 48 industry classifications, IPO year fixed effects, and stock exchange fixed effects are included in all regressions. All standard errors are adjusted for clustering at the industry level and are reported in parentheses below the coefficient estimates. ***, **, and * represent statistical significance at the 1, 5, and 10 percent levels, respectively.

	(1)	(2)	(3)	(4)	(5)
VARIABLES	Ln(RVO)	Ln(RVO)	Ln(RVO)	Ln(RVO)	Ln(RVO)
VC-Backing	0.325***			0.236***	0.307***
	(0.048)			(0.054)	(0.059)
Ln(Headlines)		0.095***			
		(0.028)			
Ln(Articles)			0.068**		
			(0.027)		
VC-Backing × High Headlines				0.194**	
				(0.084)	
High Headlines				0.070	
				(0.058)	
VC-Backing × High Articles					0.083
					(0.078)
High Articles					0.128
					(0.081)
CM Rank	0.089***	0.106***	0.106***	0.084***	0.100***
	(0.017)	(0.017)	(0.017)	(0.017)	(0.014)
Ln(Asset)	-0.251***	-0.277***	-0.280***	-0.249***	-0.271***
	(0.034)	(0.034)	(0.034)	(0.033)	(0.027)
Fraction Sold	-1.128***	-1.177***	-1.184***	-1.117***	-1.145***
	(0.380)	(0.404)	(0.410)	(0.367)	(0.379)
Observations	2,890	2,890	2,890	2,890	2,890
Adjusted R-squared	0.184	0.176	0.175	0.188	0.182
Industry FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Exchange FE	Yes	Yes	Yes	Yes	Yes

Table 8: VC-Backing, Investor Attention, and IPO Initial Returns

This table reports the relationship between VC-backing, investor attention around a firm's IPO (as proxied by pre-IPO media coverage), and IPO initial returns. *Initial Ret* is the percentage change from the offer price to the first-day closing price in the secondary market. *VC-Backing* is a dummy variable equal to 1 if the firm is venture capitalist backed and 0 otherwise. *Ln(Headlines)* is the natural log of one plus the number of headlines that have mentioned the IPO firm in the two months prior to the IPO date. *Ln(Articles)* is the natural log of one plus the number of articles that have mentioned the IPO firm in the two months prior to the IPO date. *High Headlines* is a dummy variable equal to 1 if the number of headlines that have mentioned the IPO firm is above the sample median and 0 otherwise. *High Articles* is a dummy variable equal to 1 if the number of articles that have mentioned the IPO firm is above the sample median and 0 otherwise. *CM Rank* is the Carter-Manaster rank of the lead underwriter for the IPO firm. *Ln(Asset)* is the natural log of the firm's pre-IPO assets. *Fraction Sold* is the fraction of firm equity sold in the IPO. Constant, industry fixed effects based on Fama French 48 industry classifications, IPO year fixed effects, and stock exchange fixed effects are included in all regressions. All standard errors are adjusted for clustering at the industry level and are reported in parentheses below the coefficient estimates. ***, **, and * represent statistical significance at the 1, 5, and 10 percent levels, respectively.

	(1)	(2)	(3)	(4)	(5)
VARIABLES	Initial Ret	Initial Ret	Initial Ret	Initial Ret	Initial Ret
VC-Backing	0.045***			-0.000	-0.014
	(0.010)			(0.011)	(0.013)
Ln(Headlines)		0.034***			
		(0.010)			
Ln(Articles)			0.031***		
			(0.009)		
VC-Backing × High Headlines				0.105***	
				(0.029)	
High Headlines				-0.023	
				(0.017)	
VC-Backing × High Articles					0.122***
					(0.037)
High Articles					-0.039*
					(0.021)
CM Rank	0.017**	0.017**	0.016**	0.015*	0.016**
	(0.008)	(0.007)	(0.007)	(0.008)	(0.008)
Ln(Asset)	-0.022***	-0.024***	-0.026***	-0.019***	-0.020***
	(0.004)	(0.004)	(0.005)	(0.004)	(0.004)
Fraction Sold	-0.166**	-0.170**	-0.172**	-0.161**	-0.157**
	(0.078)	(0.078)	(0.080)	(0.075)	(0.075)
Observations	3,696	3,696	3,696	3,696	3,696
Adjusted R-squared	0.233	0.235	0.235	0.237	0.238
Industry FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Exchange FE	Yes	Yes	Yes	Yes	Yes

Table 9: VC Reputation, Investor Attention, and IPO Characteristics

This table reports the relationship between VC reputation, investor attention, and IPO characteristics including secondary market and IPO valuations as well as IPO initial returns. *Ln(PR)* is the natural log of one plus the absolute value of the percentage difference between the IPO offer price and the midpoint of original filing range. *Ln(RVS_0)* is the natural log of the valuation of an IPO firm at the close of the first trading day in the secondary market relative to an industry peer. *Ln(RVO)* is the natural log of the valuation of an IPO firm at offer relative to an industry peer. *Initial Ret* is the percentage change from the offer price to the first-day closing price in the secondary market. *High-Rep-VC-Backing* is a dummy variable equal to 1 if the average market share of funds raised by the IPO firm's lead VC investors is above the 75th percentile of the sample and 0 otherwise. *Low-Rep-VC-Backing* is dummy variable equal to 1 if the average market share of funds raised by the IPO firm's lead VC investors is equal to or below the 75th percentile of the sample and 0 otherwise. *High Headlines* is a dummy variable equal to 1 if the number of headlines that have mentioned the IPO firm is above the sample median and 0 otherwise. *High Articles* is a dummy variable equal to 1 if the number of articles that have mentioned the IPO firm is above the sample median and 0 otherwise. *CM Rank* is the Carter-Manaster rank of the lead underwriter for the IPO firm. *Ln(Asset)* is the natural log of the firm's pre-IPO assets. *Fraction Sold* is the fraction of firm equity sold in the IPO. Constant, industry fixed effects based on Fama French 48 industry classifications, IPO year fixed effects, and stock exchange fixed effects are included in all regressions. All standard errors are adjusted for clustering at the industry level and are reported in parentheses below the coefficient estimates. ***, **, and * represent statistical significance at the 1, 5, and 10 percent levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
VARIABLES	Ln(RVS_0)	Ln(RVS_0)	Ln(RVS_0)	Ln(RVO)	Ln(RVO)	Ln(RVO)	Initial Ret	Initial Ret	Initial Ret
High-Rep-VC-Backing × High Headlines		0.478***			0.338***			0.197***	
		(0.087)			(0.088)			(0.052)	
Low-Rep-VC-Backing × High Headlines		0.229**			0.154			0.075***	
		(0.107)			(0.101)			(0.023)	
High-Rep-VC-Backing × High Articles			0.276**			0.140			0.210***
			(0.106)			(0.093)			(0.056)
Low-Rep-VC-Backing × High Articles			0.131			0.051			0.096***
			(0.091)			(0.092)			(0.033)
High-Rep-VC-Backing	0.371***	0.122	0.214**	0.314***	0.133	0.226**	0.069***	-0.030*	-0.044*
	(0.098)	(0.088)	(0.102)	(0.089)	(0.084)	(0.096)	(0.019)	(0.018)	(0.023)
Low-Rep-VC-Backing	0.367***	0.273***	0.303***	0.328***	0.263***	0.301***	0.037***	0.008	-0.006
	(0.051)	(0.060)	(0.060)	(0.049)	(0.061)	(0.057)	(0.008)	(0.010)	(0.014)
High Headline		0.042			0.069			-0.023	
		(0.060)			(0.057)			(0.016)	
High Article			0.092			0.119			-0.041*
			(0.079)			(0.080)			(0.021)
CM Rank	0.091***	0.084***	0.086***	0.089***	0.084***	0.086***	0.017**	0.015*	0.016**
	(0.017)	(0.018)	(0.017)	(0.017)	(0.017)	(0.017)	(0.008)	(0.008)	(0.008)
Ln(Assets)	-0.238***	-0.235***	-0.240***	-0.252***	-0.251***	-0.256***	-0.022***	-0.020***	-0.020***
	(0.038)	(0.038)	(0.038)	(0.033)	(0.033)	(0.033)	(0.004)	(0.004)	(0.004)
Fraction Sold	-1.213***	-1.193***	-1.199***	-1.130***	-1.115***	-1.122***	-0.166**	-0.159**	-0.155**
	(0.423)	(0.406)	(0.416)	(0.380)	(0.368)	(0.378)	(0.078)	(0.075)	(0.074)
Observations	2,890	2,890	2,890	2,890	2,890	2,890	3,696	3,696	3,696
Adjusted R-squared	0.223	0.229	0.225	0.184	0.188	0.185	0.234	0.238	0.239
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Exchange FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
High-Rep-VC-Backing – Low-Rep-VC-Backing	0.004			-0.014			0.032**		
High-Rep-VC-Backing × High Headlines – Low-Rep-VC-Backing × High Headlines		0.249**			0.184*			0.122***	
High-Rep-VC-Backing × High Articles – Low-Rep-VC-Backing × High Articles			0.145			0.089			0.114**

Table 10: VC-Backing, Investor Attention, and Institutional Investor Participation

This table reports the relationship between VC-backing, investor attention around a firm's IPO (as proxied by pre-IPO media coverage), and the number of institutional investors holding the IPO firm's equity. *Ln(N_Inst)* is the natural log of the number of institutional investors that hold the stocks of the firm at the end of the first fiscal year after IPO. *VC-Backing* is a dummy variable equal to 1 if the firm is venture capitalist backed and 0 otherwise. *Ln(Headlines)* is the natural log of one plus the number of headlines that have mentioned the IPO firm in the two months prior to the IPO date. *Ln(Articles)* is the natural log of one plus the number of articles that have mentioned the IPO firm in the two months prior to the IPO date. *High Headlines* is a dummy variable equal to 1 if the number of headlines that have mentioned the IPO firm is above the sample median and 0 otherwise. *High Articles* is a dummy variable equal to 1 if the number of articles that have mentioned the IPO firm is above the sample median and 0 otherwise. *CM Rank* is the Carter-Manaster rank of the lead underwriter for the IPO firm. *Ln(Asset)* is the natural log of the firm's pre-IPO assets. *Fraction Sold* is the fraction of firm equity sold in the IPO. Constant, industry fixed effects based on Fama French 48 industry classifications, IPO year fixed effects, and stock exchange fixed effects are included in all regressions. All standard errors are adjusted for clustering at the industry level and are reported in parentheses below the coefficient estimates. ***, **, and * represent statistical significance at the 1, 5, and 10 percent levels, respectively.

	(1)	(2)	(3)	(4)	(5)
VARIABLES	Ln(N_Inst)	Ln(N_Inst)	Ln(N_Inst)	Ln(N_Inst)	Ln(N_Inst)
VC-Backing	0.212***			0.174***	0.213***
	(0.034)			(0.037)	(0.037)
Ln(Headlines)		0.066***			
		(0.012)			
Ln(Articles)			0.075***		
			(0.015)		
VC-Backing × High Headlines				0.080*	
				(0.042)	
High Headlines				0.028	
				(0.049)	
VC-Backing × High Articles					-0.009
					(0.054)
High Articles					0.086*
					(0.048)
CM Rank	0.171***	0.180***	0.177***	0.168***	0.169***
	(0.013)	(0.015)	(0.016)	(0.013)	(0.013)
Ln(Asset)	0.177***	0.166***	0.162***	0.179***	0.175***
	(0.012)	(0.013)	(0.013)	(0.013)	(0.012)
Fraction Sold	-0.171**	-0.205**	-0.208**	-0.166**	-0.171**
	(0.076)	(0.090)	(0.092)	(0.073)	(0.074)
Observations	3,538	3,538	3,538	3,538	3,538
Adjusted R-squared	0.585	0.581	0.582	0.585	0.585
Industry FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Exchange FE	Yes	Yes	Yes	Yes	Yes

Table 11: VC-Backing, Investor Attention, and Financial Analyst Coverage

This table reports the relationship between VC-backing, investor attention around a firm's IPO (as proxied by pre-IPO media coverage), and the number of financial analysts that follow the firm after IPO. *Ln(N_An)* is the natural log of the number of analysts providing earnings forecast at the end of the first fiscal year after IPO. *VC-Backing* is a dummy variable equal to 1 if the firm is venture capitalist backed and 0 otherwise. *Ln(Headlines)* is the natural log of one plus the number of headlines that have mentioned the IPO firm in the two months prior to the IPO date. *Ln(Articles)* is the natural log of one plus the number of articles that have mentioned the IPO firm in the two months prior to IPO. *High Headlines* is a dummy variable equal to 1 if the number of headlines that have mentioned the IPO firm is above the sample median and 0 otherwise. *High Articles* is a dummy variable equal to 1 if the number of articles that have mentioned the IPO firm is above the sample median and 0 otherwise. *CM Rank* is the Carter-Manaster rank of the lead underwriter for the IPO firm. *Ln(Asset)* is the natural log of the firm's pre-IPO assets. *Fraction Sold* is the fraction of firm equity sold in the IPO. Constant, industry fixed effects based on Fama French 48 industry classifications, IPO year fixed effects, and stock exchange fixed effects are included in all regressions. All standard errors are adjusted for clustering at the industry level and are reported in parentheses below the coefficient estimates. ***, **, and * represent statistical significance at the 1, 5, and 10 percent levels, respectively.

	(1)	(2)	(3)	(4)	(5)
VARIABLES	Ln(N_An)	Ln(N_An)	Ln(N_An)	Ln(N_An)	Ln(N_An)
VC-Backing	0.136***			0.110***	0.110***
	(0.016)			(0.022)	(0.027)
Ln(Headlines)		0.034***			
		(0.007)			
Ln(Articles)			0.049***		
			(0.012)		
VC-Backing × High Headlines				0.055*	
				(0.031)	
High Headlines				-0.000	
				(0.022)	
VC-Backing × High Articles					0.048
					(0.034)
High Articles					0.002
					(0.028)
CM Rank	0.080***	0.087***	0.084***	0.079***	0.079***
	(0.008)	(0.009)	(0.008)	(0.008)	(0.008)
Ln(Asset)	0.073***	0.064***	0.062***	0.074***	0.073***
	(0.006)	(0.007)	(0.007)	(0.007)	(0.007)
Fraction Sold	-0.093	-0.114*	-0.115*	-0.090	-0.090
	(0.182)	(0.186)	(0.179)	(0.185)	(0.177)
Observations	3,180	3,180	3,180	3,180	3,180
Adjusted R-squared	0.282	0.274	0.278	0.282	0.282
Industry FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Exchange FE	Yes	Yes	Yes	Yes	Yes

Table 12: Univariate Comparisons of Secondary Market Valuations for VC-Backed and Non-VC-Backed IPO Firms over Time

This table presents the secondary market valuations of VC-backed and non-VC-backed IPO firms over time. Panels A, B, and C present the medians of secondary market valuations of IPO firms from the close of the first trading day in the secondary market up to three years after IPO, which are computed based on market price-to-sales, market price-to-EBITDA, and market price-to-earnings multiple of an industry peer, respectively. The industry peer is a comparable publicly traded firm generated by the comparable firm approach. ***, **, and * represent statistical significance at the 1, 5, and 10 percent levels, respectively, for the differences in median valuations between VC-backed and non-VC-backed subsamples.

	VC-Backed IPOs		Non-VC-Backed IPOs		Test of Differences	
Number of Years after IPO	No. of Issues	Median	No. of Issues	Median	Difference	p-value
Panel A: RVS_t based on Price/Sales Multiple						
0	1442	2.625	1658	1.488	1.137***	0.000
1	1261	1.821	1556	1.182	0.640***	0.000
2	1157	1.590	1345	1.015	0.575***	0.000
3	997	1.305	1136	1.062	0.243***	0.000
Panel B: RVS_t based on Price/EBITDA Multiple						
0	859	2.022	1412	1.282	0.740***	0.000
1	738	1.704	1233	1.128	0.576***	0.000
2	665	1.601	1036	1.027	0.574***	0.000
3	576	1.470	898	1.047	0.424***	0.000
Panel C: RVS_t based on Price/Earnings Multiple						
0	681	1.686	1087	1.267	0.419***	0.000
1	588	1.487	964	1.093	0.394***	0.000
2	480	1.373	764	1.068	0.306***	0.000
3	411	1.301	613	1.142	0.158**	0.035

Table 13: The Dynamics of Secondary Market Valuations over Time

Panel A reports the relationship between VC-backing, investor attention around a firm's IPO (as proxied by pre-IPO media coverage), and the secondary market valuations of IPO firms from the close of the first trading day in the secondary market up to three years after IPO. Panel B reports the relationship between high- and low-reputation VC-backing, investor attention, and the secondary market valuations over time. *Ln(RVS$_t$)* is the natural log of the relative valuation of an IPO firm in the secondary market in the *t*-th year after IPO, where *t* equals 0, 1, 2, and 3, and year 0 means at the close of the first trading day in the secondary market. *Time Trend* is a linear trend, defined as the number of years after IPO. *VC-Backing* is a dummy variable equal to 1 if the firm is venture capitalist backed and 0 otherwise. *High-Rep-VC-Backing* is a dummy variable equal to 1 if the average market share of funds raised by the IPO firm's lead VC investors is above the 75th percentile of the sample and 0 otherwise. *Low-Rep-VC-Backing* is dummy variable equal to 1 if the average market share of funds raised by the IPO firm's lead VC investors is equal to or below the 75th percentile of the sample and 0 otherwise. *High Headlines* is a dummy variable equal to 1 if the number of headlines that have mentioned the IPO firm is above the sample median and 0 otherwise. *High Articles* is a dummy variable equal to 1 if the number of articles that have mentioned the IPO firm is above the sample median and 0 otherwise. Constant, firm fixed effects, and calendar year fixed effects are included in all regressions. All standard errors are adjusted for clustering at the firm level and are reported in parentheses below the coefficient estimates. ***, **, and * represent statistical significance at the 1, 5, and 10 percent levels, respectively.

Panel A: VC-Backing, Investor Attention, and the Dynamics of Secondary Market Valuations over Time

	(1)	(2)	(3)	(4)
VARIABLES	$Ln(RVS_t)$	$Ln(RVS_t)$	$Ln(RVS_t)$	$Ln(RVS_t)$
Time Trend	-0.152***	-0.106***	-0.104***	-0.114***
	(0.023)	(0.019)	(0.021)	(0.020)
Time Trend × VC-Backing		-0.097***	-0.085***	-0.060**
		(0.024)	(0.029)	(0.028)
Time Trend × VC-Backing × High Headlines			-0.024	
			(0.045)	
Time Trend × High Headlines			-0.005	
			(0.022)	
Time Trend × VC-Backing × High Articles				-0.077*
				(0.042)
Time Trend × High Articles				0.019
				(0.032)
Observations	10,496	10,496	10,496	10,496
Adjusted R-squared	0.071	0.074	0.074	0.074
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes

Panel B: High- and Low-Reputation VC-Backing, Investor Attention, and the Dynamics of Secondary Market Valuations over Time

	(1)	(2)	(3)
VARIABLES	$Ln(RVS_t)$	$Ln(RVS_t)$	$Ln(RVS_t)$
Time Trend	-0.107***	-0.106***	-0.113***
	(0.020)	(0.021)	(0.020)
Time Trend × High-Rep-VC-Backing	-0.103***	-0.041	-0.068**
	(0.026)	(0.030)	(0.027)
Time Trend × Low-Rep-VC-Backing	-0.091***	-0.093***	-0.060*
	(0.024)	(0.029)	(0.031)
Time Trend × High Headlines × High-Rep-VC-Backing		-0.122***	
		(0.040)	
Time Trend × High Headlines × Low-Rep-VC-Backing		0.003	
		(0.047)	
Time Trend × High Headlines		-0.004	
		(0.023)	
Time Trend × High Articles × High-Rep-VC-Backing			-0.070*
			(0.035)
Time Trend × High Articles × Low-Rep-VC-Backing			-0.067
			(0.050)
Time Trend × High Articles			0.016
			(0.032)
Observations	10,496	10,496	10,496
Adjusted R-squared	0.074	0.074	0.074
Firm FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Time Trend × High-Rep-VC-Backing – Time Trend × Low-Rep-VC-Backing	-0.012		
Time Trend × High Headlines × High-Rep-VC-Backing – Time Trend × High Headlines × Low-Rep-VC-Backing		-0.125***	
Time Trend × High Articles × High-Rep-VC-Backing – Time Trend × High Articles × Low-Rep-VC-Backing			-0.003

Table 14: Instrumental Variable Analysis of the Effect of VC-Backing on IPO Characteristics

This table reports the second-stage results of the Instrumental Variable regressions for the effect of VC-backing on various IPO characteristics. The instrumental variable used here is *LP Returns*, which is defined in Section 5.2. *VC-Backing* is a dummy variable equal to 1 if the firm is venture capitalist backed and 0 otherwise. *Ln(PR)* is the natural log of one plus the absolute value of the percentage difference between the IPO offer price and the midpoint of original filing range. *Ln(RVS_0)* is the natural log of the valuation of an IPO firm at the close of the first trading day in the secondary market relative to an industry peer. *Ln(RVO)* is the natural log of the valuation of an IPO firm at offer relative to an industry peer. *Initial Ret* is the percentage change from the offer price to the first-day closing price in the secondary market. *Ln(N_Inst)* is the natural log of the number of institutions that hold the stocks of the firm at the end of the first fiscal year after IPO. *Ln(N_An)* is the natural log of the number of analysts providing earnings forecast at the end of the first fiscal year after IPO. *CM Rank* is the Carter-Manaster rank of the lead underwriter for the IPO firm. *Ln(Asset)* is the natural log of the firm's pre-IPO assets. *Fraction Sold* is the fraction of firm equity sold in the IPO. Constant, industry fixed effects based on Fama French 48 industry classifications, IPO year fixed effects, and stock exchange fixed effects are included in all regressions. All standard errors are adjusted for clustering at the industry level and are reported in parentheses below the coefficient estimates. ***, **, and * represent statistical significance at the 1, 5, and 10 percent levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	2nd Stage	2nd Stage	2nd Stage	2nd Stage	2nd Stage	2nd Stage
VARIABLES	Ln(PR)	Ln(RVS_0)	Ln(RVO)	Initial Ret	Ln(N_Inst)	Ln(N_An)
VC-Backing	0.079**	0.785***	1.295***	0.566***	0.995***	0.454***
	(0.032)	(0.229)	(0.337)	(0.082)	(0.269)	(0.157)
CM Rank	0.006**	0.004	0.020	-0.016**	0.121***	0.059***
	(0.003)	(0.017)	(0.029)	(0.007)	(0.025)	(0.014)
Ln(Asset)	0.001	-0.173***	-0.183***	0.004	0.216***	0.088***
	(0.002)	(0.015)	(0.042)	(0.005)	(0.023)	(0.013)
Fraction Sold	-0.005	-0.901***	-0.920***	-0.065*	-0.032	-0.038
	(0.015)	(0.228)	(0.289)	(0.034)	(0.094)	(0.057)
Observations	3,258	3,140	2,571	3,331	3,204	2,951
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Exchange FE	Yes	Yes	Yes	Yes	Yes	Yes

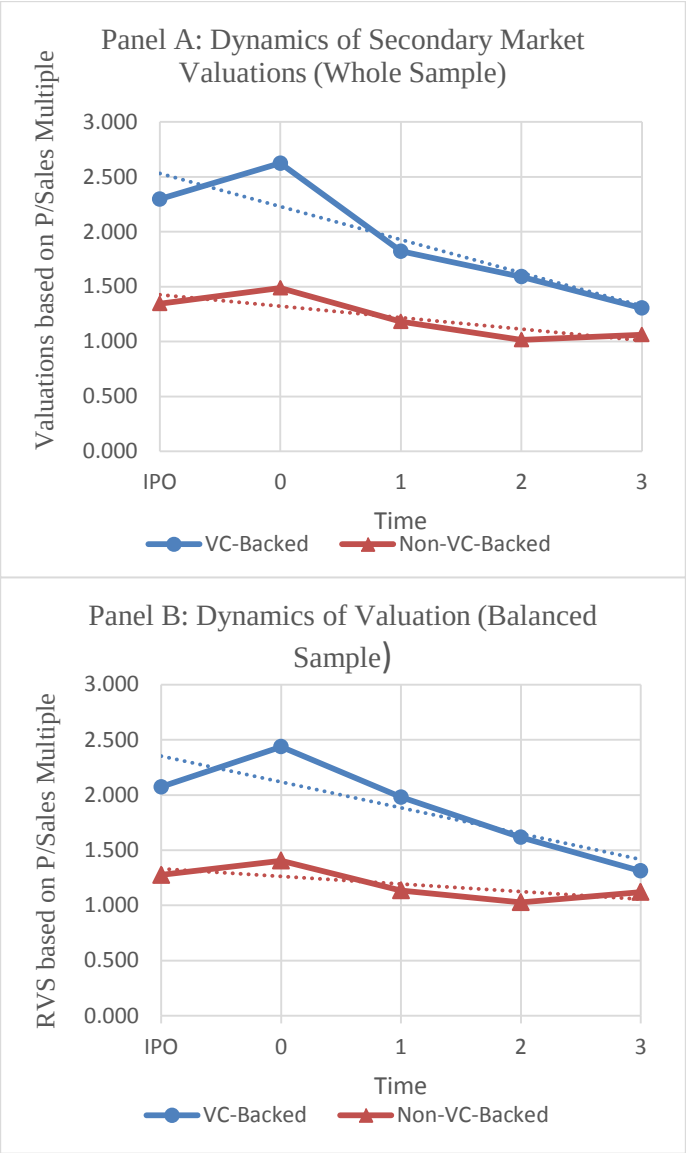

Figure 2: Valuations of VC-Backed and Non-VC-Backed IPOs over Time

This figure depicts the median firm valuations of VC-backed and non-VC-backed firm IPOs over time from the IPO date up to three years after the first trading day in the secondary market. On the horizontal axis, time *IPO* is the firm's IPO date. Time *0* is the close of the first trading day in the secondary market, while times *1* through *3* correspond to exactly one, two, and three years after the first trading day in the secondary market.