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Venture Capital Distributions: Short-Run and Long-Run Reactions

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ABSTRACT

Venture capital distributions, a legal form of insider trading, provides an ideal arena for examining the share price impact of transactions by informed parties. These sales, which occur after substantial run-ups in share value, generate a substantial price reaction immediately around the event. In the months after distribution, returns apparently continue to be negative. When the short- and long-run reactions are decomposed, they are consistent with the view that venture capitalists use inside information to time stock distributions: Distributions of firms brought public by lower quality underwriters and of less seasoned firms have more negative price reactions.

AN ENDURING ISSUE IN THE CORPORATE finance literature has been the impact of trading by informed insiders on securities prices. Two cases initiated by the U.S. Securities and Exchange Commission (SEC) in the early 1960s[1] stimulated an interest in this relationship and its implications for social welfare (e.g., Manne (1966)) that continues to this day.

An extensive body of research has examined the trading by corporate insiders. Most notably, Seyhun (e.g., 1986, 1988) has documented the short- and long-run price impacts of trading by officers, directors, and other insiders. But as Meulbroek (1992) notes:

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[1] *In the Matter of Cady, Roberts and Co.*, SEC Release No. 6668, CCH Federal Securities Law Reporter par 76,803 (1961); *SEC v. Texas Gulf Sulphur Co.*, 401 F. Supp. 262 (S.D.N.Y. 1966), 401 F.2d 833 (2d Cir. 1968), 312 F. Supp. 77 (S.D.N.Y. 1970).

> Self-reported corporate transactions data [are] less appropriate for addressing [the impact of informed traders on stock prices]. The corporate transactions are by definition not based on material, non-public information. Because corporate insiders cannot legally trade on such information, they would most likely refrain from reporting their violative transactions to the SEC. (pp. 1662–1663)

This paper also attempts to address this problem by examining the stock price reaction to a set of transactions by informed parties that are not affected by these legal constraints. But rather than focusing on illegal trades, as Meulbroek does, we examine a class of legal transactions that are largely exempt from SEC oversight—the distribution of shares in public companies by venture capital funds to their limited partners. Venture capitalists raise money from investors and make equity investments in young, high-risk, high-growth companies. Most successful venture-capital-backed companies eventually go public in an underwritten initial public offering (IPO). Venture capitalists can liquidate their position in the company by selling shares on the open market and then paying those proceeds to investors in cash. More frequently, however, venture capitalists make distributions of shares to investors in the venture capital fund.

These distributions have several features that make them an interesting testing ground for an examination of the impact of transactions by informed insiders on securities prices. Because they are not considered to be "sales," the distributions are exempt from the antifraud and antimanipulation provisions of the securities laws. The legality of distributions provides an important advantage. Comprehensive records of these transactions are compiled by the institutional investors and intermediaries who invest in venture funds, addressing concerns about sample selection bias. Like trades by corporate insiders, transactions are not revealed at the time of the transaction. Venture capitalists can immediately declare a distribution, send investors their shares, and need not register with the SEC or file a report under Rule 16(a). The occurrence of such distributions can only be discovered from corporate filings with a lag, and even then the distribution date cannot be precisely identified. To identify the time of these transactions, one needs to rely (as we do) on the records of the partners in the fund. We can also characterize in detail the features of the venture funds making the distributions, the firms whose shares are being distributed, and the changes associated with the transactions in a way that can discriminate between the various alternative explanations for these patterns.

From the records of four institutions, we construct a representative set of more than 700 transactions by 135 funds over a decade-long period. The results are consistent with venture capitalists possessing inside information and with the (partial) adjustment of the market to that information. After significant increases in stock prices prior to distribution, abnormal returns around the distribution are a negative and significant -2.0 percent, com-

parable to the market reaction to publicly announced secondary stock sales. The sign and significance of the cumulative excess returns for the twelve months following the distribution are sensitive to the benchmark used. The market's ability to discern and react to the information content of distributions is consistent with Seyhun (1986) and Meulbroek (1992).

Significant differences appear in the returns for some subsamples. Distributions that occur in settings where information asymmetries may be greatest—especially where the firm has been taken public by a lower-tier underwriter and the distribution is soon after the IPO—have larger immediate price declines. Postdistribution price performance is related to factors that predict event window returns.

At the same time, we must acknowledge some important limitations to the analysis. Many of the recipients of these distributions (e.g., pension funds and endowments) will not desire to hold the distributed securities. Because distributions are not illegal, the limited partners have no reason to disguise their sales (aside from reasons of strategic trading). In this sense, the distributions resemble the legal insider transactions that have been extensively examined by Seyhun (1986) and others. Furthermore, at least two other factors may cause the share price to drop at the time of distribution: the ending of the venture capitalists' value-added monitoring (they often resign from the board at the time of the distributions) and the large increase in the public supply of shares after distribution (if demand for the company's stock is not perfectly elastic). To test these alternatives, we seek to explain the size of the short- and long-run reactions to these distributions. Variables that are consistent with these alternative hypotheses have little explanatory power.

In addition to works on insider trading, this study is related to several strands in the corporate finance literature. First, we draw on the methodological studies of the measurement of long-run returns of securities. Recent works include Ball, Kothari, and Shanken (1995), Barber and Lyon (1997), Kothari and Warner (1997), and Barber, Lyon, and Tsai (1998). Second, an extensive literature (e.g., Mikkelson and Partch (1985)) shows that announcements of firms' intentions to undertake secondary issues and sales of shares by corporate insiders lead to immediate negative market reactions. More recently, Kahle (1996) shows that firms issuing securities after insider sales experience significant negative excess returns, but other securities issuers do not. Another related strand is studies of the long-run performance of IPOs (e.g., Loughran and Ritter (1995)). The paper closest to this one is that of Brav and Gompers (1997), which contrasts the post-IPO stock returns of venture-backed and non-venture-backed firms. Though there certainly is overlap between the two analyses (most of the firms we examine had gone public relatively recently, on average one –and one-half years prior to the distribution), our focus here is different. Rather than studying the long-run returns of a particular class of securities, we are seeking to understand how rapidly transactions by informed insiders are incorporated into the stock price. At

the same time, our finding of greater efficiency in the market for venture-backed securities (when contrasted with Kahle's results) is reminiscent of their conclusions.

The rest of this paper is organized as follows. Section I provides an overview of venture capital distributions. The data are described in Section II. Section III analyzes stock price performance around distributions. Section IV concludes the paper.

I. Venture Capitalists and Distribution Policy

More than 80 percent of all institutional venture capital in the United States is organized as limited partnerships (Gompers and Lerner (1996)). The venture capitalist serves as general partner and the investors are limited partners. Venture capital funds have contractually determined lifetimes of about one decade, but the typical venture organization raises a new fund every few years. Venture capitalists are active investors in the companies they finance (typically, small privately held entities). They sit on the boards of directors, provide advice, hire key managers, etc. They may possess information that is not publicly available—e.g., the firm only met its profitability projections by booking a key sale in advance. In return for their services, the venture capitalist receives contractually agreed-upon compensation. This compensation usually entails a fixed fee based on capital or assets under management and a percentage of the profits (often 20 percent).

Venture capitalists typically exit successful investments by taking them public (Gompers and Lerner (1998)). They usually do not sell shares at the time of the IPO, but rather undertake a "lock-up" agreement with the investment banker underwriting the offering in which they promise to refrain from selling their shares for several months.[2] Even after the lock-up expires, venture capitalists often continue to hold shares in the company for months or even years. Once they decide to liquidate their positions, they have two alternatives: They can sell the shares they hold on the open market and distribute cash to limited partners, or, as is more often the case, they can distribute shares to each limited partner and (frequently) themselves.

There are a number of reasons for the preponderance of distributions in kind. First, SEC rules restrict sales by corporate insiders. Insiders, including the venture capitalist, are only allowed to sell shares each quarter up to the greater of 1 percent of the outstanding equity or the average weekly trading volume. The venture capital fund may hold a large fraction of the company's equity and selling the entire stake may take a long time. By

[2] Lin and Smith (1995) show that the shares sold by venture capitalists during 497 venture-backed IPOs in the years 1979 to 1990 (representing 77 percent of the total number of venture-backed IPOs in this period) totaled less than $400 million. This represents about 1 percent of the total amount raised by venture capital funds in this period.

distributing shares to limited partners, who are usually not considered insiders,[3] the venture capitalist can dispose of a large block of shares more quickly.

Second, tax motivations may also provide an incentive for the venture capitalist to distribute shares. If venture capitalists sell shares and distribute cash, taxable limited partners (e.g., individuals and corporations) and the venture capitalists themselves are subject to immediate capital gains taxes. These investors might prefer to postpone the taxes by receiving distributions in kind and selling the shares at a later date. (These considerations will be unimportant to tax-exempt limited partners such as pension funds and endowments.) By distributing stock, venture capitalists provide limited partners with the flexibility to make their own decisions about selling the stock.

Third, if selling the shares has a large negative effect on prices, venture capitalists may want to distribute shares. The method of computing returns employed by limited partners and outside fund trackers (e.g., Venture Economics) uses the closing price of the distributed stock on the day the distribution is declared. The actual price received when the limited partners sell their shares may be lower. If prices decline after the distribution, actual returns to limited partners could be substantially less than calculated returns. Venture capitalists care about stated returns on their funds because they use this information when they raise new funds.

Finally, the venture capitalist's compensation can be affected by distribution policy. If the venture capital fund has not returned committed capital to its limited partners, most funds distribute shares of portfolio companies in proportion to the partners' actual capital commitments (usually 99 percent to limited partners and 1 percent to general partners). By distributing overvalued shares prior to the return of committed capital, the venture capitalist moves closer to the point where general partners collect a larger share of the profits. Once committed capital has been returned, venture capitalists still have an incentive to distribute overvalued shares. They may be able to sell their portions at a high valuation before limited partners receive their shares and the market discerns that a distribution has occurred. This problem is exacerbated if the venture partnership agreement allows, as many do, the venture capitalist to receive distributions at his own discretion prior to the return of the investors' committed capital. In these instances, the venture capitalist has even greater flexibility in choosing whether to include himself in the distribution.

[3] Limited partners in a venture capital fund would not be considered insiders unless they had board representation or some other affiliation with the portfolio company or held 10 percent of the company's equity. Though the venture capitalist might hold 10 percent, once the distribution is made, it is unlikely that any limited partner would. It is extremely improbable that a limited partner would have board representation because to do so would risk the partner's limited liability status.

A venture capitalist's reputational concerns may not overcome the incentive to distribute overvalued shares. First, many institutional investors and advisors also care about stated return. They may be compensated based on how well the venture funds they select do relative to a benchmark (calculated using the distribution price). This is particularly true if the shares are transferred immediately on receipt of the distribution to the investor public equity managers. Any price decline may be attributed to the public equity group. Second, certain investors may be unaware of the problem. Investors may not track stock price performance against an appropriate benchmark. Similarly, record keeping of the price at which the shares were sold is often incomplete.

Few SEC regulations cover distributions by private equity investors. Rule 16(a) states that individuals who are affiliates of a firm, such as directors, officers, and holders of 10 percent of the company's shares, must disclose any transactions in the firm's stock on a monthly basis. Provision 16(a)-7, however, explicitly exempts distributions of securities that (i) were originally obtained from issuers and (ii) are being distributed "in good faith, in the ordinary course of business." An interpretation widely accepted within the industry is that venture capitalists distribute investments in the normal course of business, and that they do not convey any information unless the venture capitalist makes an explicit recommendation to hold or sell the shares at the time. Venture capital lawyers have applied the same principles when considering the applicability of Rule 10(b)-5, the most general prohibition against fraudulent activity in the purchase or sale of any security.

II. The Data

We collect data on the date, size, and sources of all distributions received by two institutional investors in venture funds and two investment advisers. We eliminate distributions from funds that primarily invest in leveraged buyouts and from publicly traded small business investment companies because the nature of these funds' investments and the incentives introduced by their compensation schemes and structures are quite different. In the relatively modest number of cases where contradictory information is recorded about the same distribution, we check with the organizations to reconcile the discrepancies. These deletions and corrections leave 731 distributions of shares in 259 firms by 135 venture capital limited partnerships.

The first panel of Table I summarizes the IPOs and distributions in our sample. The increasing trend in distributions reflects two factors. First, the IPO market has hot and cold periods. The early 1990s saw a prolonged "hot issue" market with many IPOs. Second, venture capital under management grew substantially during this period: the venture pool being twelve times larger (in inflation-adjusted dollars) in 1993 than in 1980. The panel also shows how the aggregate number of venture-backed IPOs and distributions by venture capitalists increases over this period.

In Panel B of Table I, we examine the representativeness of the venture funds for which we are able to collect distribution data. We compare the venture partnerships in our sample with all the partnerships identified by Venture Economics that closed prior to 1993 (for an overview of the database and our emendations to it, see Gompers and Lerner (1998)) on several dimensions: the age of the venture organization sponsoring the fund (the span between the date when the venture organization's first fund closed and the first closing of this fund), the size of the venture organization (the sum of funds in 1993 dollars that the venture organization has raised in the decade prior to the distribution), and the ordinal rank of the fund (the count of this fund among those raised by the venture organization). Though our sample is representative in terms of closing date, it is biased toward larger, older venture capital firms that have raised more previous funds.

More information about the distributions is presented in Panel C. The typical distribution occurs nearly twenty months after the firm goes public. This distribution is skewed, with the median distribution occurring a little more than one year after the IPO. Only one percent of the distributions occur in the three months immediately after going public because the lock-up agreements that restrict insiders from selling shares after an IPO (typically for 40 to 180 trading days) preclude stock distributions as well.[4]

In many cases, there are multiple distributions for each firm because of the presence of several venture investors in the firm rather than multiple distributions of shares in the company by the same venture capitalist. Venture capitalists tend to distribute the entirety of their holdings at once; Panel C of Table I reports that the average distribution involves 67 percent of shares that the venture capitalist holds. The table also provides summary data on two representative distributions: the first and fifth distributions of shares in a company. Not surprisingly, fifth distributions tend to occur later and involve a smaller percentage of the venture capitalist's original holdings. (If there are many distributions, it is more likely that the venture capitalists are distributing their shares in several installments.) We discuss the issues posed by multiple distributions below.

We have already noted an important distinction between venture distributions and illegal insider trading: The limited partners may have few incentives to disguise the fact that a distribution has occurred. Additional

[4] We do not present summary statistics about the time from share purchase to ultimate distribution. Because venture capitalists typically invest in successful firms in multiple rounds, it is difficult to determine how long the distributed shares have been held. Venture partnership agreements typically bar the distribution of shares covered by SEC Rule 144, which during the period under study prohibited sales for two years after the purchase of restricted stock and limited the pace of sales between the second and third year after the purchase. These restrictions applied not only to the venture investor, but also to the limited partners in their funds. Cases involving distributions of shares held for less than two years appear to comprise at most only a few distributions in the sample, and those of less than three years under 10 percent. Conversations with practitioners similarly suggest that such distributions are very rare. For a discussion, see Denning and Painter (1994).

Table I

Sample Summary Statistics

In Panel A, the venture capital stake of initial public offerings (IPOs) is the value of all shares held by venture capital (VC) limited partnerships in firms that went public in that year valued at the IPO price. The distribution series is the value of shares distributed by all venture capital limited partnerships to their investors, and is based on the records of Shott Capital Management (including distributions not in our sample). Panel A also presents the number of IPOs and distributions in each year of the sample. In Panel B, the first two columns compare the characteristics of the funds in our sample with those within the Venture Economics funds database whose first closing was in December 1992 or earlier but are not in our sample. We present both the mean and the median (in parentheses) of several measures. The third column presents the *p*-values of *t*-tests and Wilcoxon signed-rank tests (in parentheses) of the null hypotheses that these distributions are identical. Panel C presents some key characteristics of the distributions, as well as of some important independent variables.

Panel A: Summary of IPO and Distribution Activity

	All Activity (billions of 1993 dollars)			
Year	Venture Stake in IPOs	Venture Distributions	No. of IPOs in Sample	No. of Distributions in Sample
1978			1	0
1979			0	0
1980	0.05	0.09	2	0
1981	0.39	0.12	3	0
1982	0.22	0.30	3	0
1983	2.19	0.53	18	1
1984	0.37	0.27	11	0
1985	0.36	0.33	8	19
1986	1.43	0.35	27	33
1987	1.29	0.62	22	55
1988	0.74	0.26	16	21
1989	0.63	0.40	15	51
1990	1.17	0.69	20	80
1991	3.15	1.48	55	134
1992	3.19	1.42	44	195
1993	3.52	1.70	14	142
Total	18.69	8.55	259	731

Panel B: Comparison of Funds Included and Not Included in the Sample

	Included in Sample	Not in Sample, but in Venture Economics Database	*p*-Value, Test of No Difference
Number of observations	135	1139	
Date of fund's first closing	Mar.1984 (Jan.1984)	Oct. 1983 (Apr. 1984)	0.143 (0.908)
Size of Fund (millions of 1993 dollars)	99.2 (69.3)	42.9 (28.9)	0.000 (0.000)
Size of venture firm (millions of 1993 dollars)	206.4 (118.0)	109.1 (50.8)	0.000 (0.000)
Age of venture firm at time of fund's first closing (years)	5.63 (4.17)	3.65 (1.17)	0.000 (0.000)
Ordinal rank of fund	3.20 (3)	2.65 (2)	0.000 (0.000)

Table I—*Continued*

Panel C: Characteristics of Distributions			
	Mean	Median	Std. Dev.
All distributions			
Time from IPO (years)	1.78	1.02	1.90
Percent of VC's holdings distributed	67.2	68.9	33.6
First distributions only			
Time from IPO (years)	1.69	0.90	1.87
Percent of VC's holdings distributed	81.0	100	29.4
Fifth distributions only			
Time from IPO (years)	2.57	2.60	1.45
Percent of VC's holdings distributed	26.0	24.4	16.6
Key independent variables			
Age of VC firm at time of distribution (years)	5.41	4.09	5.07
Underwriter rank	8.53	8.88	1.11
Market value of firm's equity at time of IPO (millions of 1993 dollars)	158.1	139.3	102.9

differences stem from the fact that, unlike an illegal insider trade, there are other events occurring at the time of the distribution. First, venture capitalists hold large equity stakes and board seats even after the IPO. When the venture capitalist declares a distribution, an active, large-block shareholder is essentially dissolved. Theoretical and empirical work by Jensen and Meckling (1976), Shleifer and Vishny (1986), and others have shown that large-block shareholders, who are often willing to incur the costs of monitoring management, can play an important role in increasing firm value. The unanticipated dissolution of a large–block holding provides an alternative explanation for stock price declines at the time of the distribution.

A second explanation is driven by the increased number of publicly tradable shares associated with distributions. Though the findings are not uncontroversial, a number of studies (e.g., Harris and Gurel (1986) and Shleifer (1986)) have suggested that demand curves for shares may slope downward. If the demand for shares is not totally elastic, then increasing the supply of publicly tradable shares would decrease their price. The median lead venture capitalist controls 11.8 percent of the shares of the company subsequent to the IPO (Barry et al. (1990)). Because a typical venture-backed IPO has only about 30 percent of the shares in the initial public float, the distribution and subsequent sale of the venture capitalists' securities represent a substantial increase in the number of publicly traded shares and may trigger a price decline.

Liquidity may play a role in price movements even if long-run demand curves for shares are not downward-sloping. Bid-ask spreads or temporary price movements may be related to abnormal volume in the market. For example, a large block of shares may trade at a lower price because the

market for the company's equity is not very liquid. If liquidity is the primary reason for price movements, stock prices should decline around distributions but quickly recover thereafter.

One way to address these alternative explanations is to examine how stock price reactions to distributions are associated with the characteristics of the venture capitalist and the firm. Though many of these individual items can be criticized for their imprecision, if the evidence is consistent with a considerable majority of one set of predictions, we will be more comfortable with that view. We first examine the impact of the age of the venture organization making the distribution. If the markets are reacting to insider trading by the venture capitalists, distributions by more experienced venture capitalists should produce more negative price reactions. The corporate control alternative also predicts a negative relationship, because older venture firms may be better monitors and the elimination of their oversight reduces firm value more. We determine venture firm age from the Venture Economics database.[5]

The size of the equity stake held by the venture firm may be related to the incentive to monitor and the quality of information about the company. Both our central insider trading hypothesis and the corporate control alternative predict a negative relationship between the size of the equity stake and the price reaction to the distribution. The downward-sloping demand curve suggestion predicts that only the size of the equity stake actually distributed should affect prices. The stock price reaction should be independent from the total equity stake held (but not distributed) by the venture capital firm. (If the market can forecast future distributions at the time of the first distribution, stock price reaction to the first distribution may be related to the size of the equity stake held.) This information is obtained from the parties receiving the distributions.

Underwriters may also play a role in limiting asymmetric information. The number and quality of analysts are often correlated with the reputation of the underwriter. If the market is reacting to insider trading by the venture capitalists, then companies going public with higher quality underwriters should have less-negative price reactions because there are fewer information asymmetries. The characteristics of the IPOs of the distributed companies are found in Securities Data Corporation's Corporate New Issues database. We denote the quality of the underwriters using their relative standing in the period from 1985 to 1991 (Carter, Dark, and Singh (1998)).

The level of asymmetric information between the venture capitalists and the market may be considerably higher for companies that have been public for a short time because such firms are likely to have less analyst coverage

[5] We might anticipate that this relationship would be nonlinear: Venture firms that were about to disband might behave differently from ongoing organizations. This is difficult to predict in advance, however. Many venture firms raise series of successful funds; others never raise a follow-on to their first fund.

as well as a shorter track record over which their management and prospects can be assessed. If venture capitalists have access to inside information suggesting that these firms are severely overvalued, they may quickly distribute recent IPOs. On average, the market should interpret distributions soon after the IPO as a sign of relatively greater overvaluation, and the length of time from the IPO to distribution should be positively related to abnormal returns. The corporate control and downward-sloping demand alternatives suggest that the price response should be independent from the length of time that the shares have been held. If the market is reacting to insider trading or if the corporate control alternative holds, then most of the negative information will be conveyed in the first distribution of a company's shares. Later distributions should have much smaller price responses because the first distribution reveals that the venture capitalist considers the firm overvalued or that he intends to exit the investment.

Availability of information may also be related to the size of the firm. Larger firms are likely to be tracked by more and better analysts and are more likely to be scrutinized in the media, thereby reducing the level of asymmetric information. The ability to trade on inside information should therefore be lower for larger firms and price declines at distribution should be smaller. The alternative views have no clear predictions about the relationship between the price reaction and firm size. We employ the valuation at the close of the first trading day for this analysis.

Board representation may also be associated with greater access to inside information. Consequently, if the market is reacting to insider trades, there should be more negative price reactions to distributions by board members. The corporate control alternative would also predict that a company's stock price declines more when venture capitalists leave the board at distribution. Not only is a large block dissipated, but the venture capitalists no longer have the same control rights or information flows once they leave the board. Board membership and share ownership at and after the IPO date are obtained from prospectuses and annual proxy statements.

Contracts governing venture partnerships can also specify whether venture capitalists must distribute or sell shares soon after the IPO. If distributions within a certain time are mandatory, the market should not infer any negative information from the distribution event. If the alternative corporate control view or the downward-sloping demand curves view explains price reactions, then distribution restrictions should not affect the magnitude of the price decline at distribution. Unfortunately for our empirical tests, the bulk of the distribution restrictions (which we collect from partnership agreements provided by the four institutions who contribute distribution data) are quite weak: The partnership agreements of funds with restrictions almost invariably allow distributions to be deferred with the approval of the majority (or supermajority) of the fund's advisory board. In practice, it appears that these distribution restrictions have a relatively limited effect on behavior: For the 20 venture-backed IPOs in the sample where

distributions were made by funds both with and without distribution restrictions, the distribution dates were not significantly different from each other. In fact, the average distribution by a fund without such a restriction occurred two weeks *before* that by a fund with a restriction. (This result was not driven by a single outlier among the restricted distributions. There was actually a lower variance in the time from IPO to distribution among the restricted distributions, though the difference was not significant.) Thus, the extent to which this measure can help us distinguish between hypotheses seems limited.

III. Stock Price Reaction to Distributions

A. Event Window Returns

The stock price response to distributions is estimated using a two-factor market model employing daily CRSP stock price data. The two-factor market model utilizes $R_{m,t}$, the return on the CRSP Value-Weighted Nasdaq Index, and $R_{s,t}$, the return on the Nasdaq smallest decile, to determine daily abnormal returns. Equation (1) is estimated for each firm using daily data.

$$R_{j,t} = \alpha_j + \beta_{j,m} R_{m,t} + \beta_{j,s} R_{s,t} + \epsilon_t. \tag{1}$$

The regression coefficients (factor loadings) are calculated from trading day −260 to day −61 and from trading day +160 to day +360 relative to the distribution (or for the available subsets of these periods). We designate as day 0 the day that the venture capitalist declared the distribution.[6] The coefficients are then used to calculate predicted returns. The difference between the predicted and actual return is labeled an abnormal return (AR), as shown in Equation (2):

$$AR_{j,t} = R_{j,t} - (\alpha_j + \beta_{j,m} R_{m,t} + \beta_{j,s} R_{s,t}). \tag{2}$$

Table II documents the large price appreciation before the distribution. The cumulated ARs (CARs) for the twenty days prior to distribution is +3.7 percent. The abnormal returns for the three trading days following the distribution are all negative and significant. From day 0 to day +3, the CAR is −2.0 percent. The next seventeen trading days show little price movement. Figure 1 plots the CARs for all distributions. After a major rise of +7.4 percent from day −60 to day −1, the three days after the distri-

[6] Of the original 731 distributions, 726 distributions have at least 60 trading days on CRSP in the estimation period. Events that have fewer than 60 days to calculate factor loadings are not used. The inclusion of these five observations in the sample, using the average coefficients from the other regressions, has little impact on the results. The results are also robust to one-factor market models (i.e., omitting the small firm return proxy) and to substituting other market indices for the Nasdaq indices used in the results.

Table II

Abnormal Returns, Cumulative Abnormal Returns, and Trading Volume around Distributions

The sample is 731 distributions by 135 venture capital funds between January 1983 and December 1993. The abnormal returns (ARs) are derived from a market model using both the CRSP Value-Weighted Nasdaq Index and the Nasdaq smallest decile as factors. Cumulative abnormal returns (CARs) are calculated by summing the ARs for the period specified. *t*-statistics calculated from the cross section of abnormal returns or cumulative abnormal returns are in parentheses. Average daily trading volume is in thousands of shares.

Day from Distribution	AR	*t*-Statistic	CAR	*t*-Statistic	Volume (000s)	Day from Distribution	AR	*t*-Statistic	CAR	*t*-Statistic	Volume (000s)
Day −20	+0.11%	(0.71)	+0.11%	(0.71)	149	Day 0	−0.18%	(−1.18)	−0.18%	(−1.18)	214
Day −19	+0.39%	(2.63)	+0.50%	(2.46)	154	Day 1	−1.03%	(−7.89)	−1.21%	(−6.72)	225
Day −18	+0.41%	(3.31)	+0.91%	(3.85)	150	Day 2	−0.33%	(−2.41)	−1.54%	(−6.76)	191
Day −17	+0.22%	(1.48)	+1.13%	(4.06)	161	Day 3	−0.43%	(−3.41)	−1.97%	(−7.79)	177
Day −16	+0.20%	(1.48)	+1.32%	(4.43)	147	Day 4	+0.18%	(1.36)	−1.79%	(−6.54)	176
Day −15	−0.03%	(−0.20)	+1.30%	(4.11)	146	Day 5	−0.37%	(−2.82)	−2.16%	(−7.18)	175
Day −14	+0.07%	(0.52)	+1.36%	(4.10)	154	Day 6	−0.03%	(−0.23)	−2.19%	(−6.83)	169
Day −13	+0.01%	(0.09)	+1.38%	(3.86)	136	Day 7	−0.05%	(−0.43)	−2.24%	(−6.87)	162
Day −12	+0.28%	(1.88)	+1.66%	(4.40)	152	Day 8	−0.03%	(−0.19)	−2.27%	(−6.69)	167
Day −11	+0.23%	(1.79)	+1.88%	(4.70)	139	Day 9	+0.01%	(0.09)	−2.25%	(−6.36)	162
Day −10	+0.32%	(2.30)	+2.21%	(5.32)	153	Day10	+0.05%	(0.40)	−2.21%	(−5.73)	161
Day −9	+0.07%	(0.54)	+2.28%	(5.22)	160	Day11	+0.06%	(0.41)	−2.15%	(−5.31)	168
Day −8	−0.20%	(−1.57)	+2.08%	(4.59)	172	Day12	+0.30%	(2.26)	−1.84%	(−4.43)	171
Day −7	+0.22%	(1.60)	+2.29%	(4.80)	166	Day13	−0.12%	(−0.85)	−1.96%	(−4.41)	176
Day −6	+0.19%	(1.43)	+2.48%	(5.10)	166	Day14	+0.14%	(1.01)	−1.82%	(−3.94)	171
Day −5	+0.40%	(2.99)	+2.88%	(5.84)	155	Day15	−0.07%	(−0.43)	−1.89%	(−3.73)	175
Day −4	−0.01%	(−0.04)	+2.87%	(5.75)	160	Day16	−0.15%	(−1.10)	−2.04%	(−3.95)	180
Day −3	+0.36%	(2.49)	+3.23%	(6.25)	167	Day17	+0.02%	(0.15)	−2.02%	(−3.75)	181
Day −2	+0.07%	(0.49)	+3.30%	(6.09)	173	Day18	+0.06%	(0.45)	−1.96%	(−3.63)	185
Day −1	+0.42%	(2.71)	+3.72%	(6.62)	185	Day19	−0.31%	(−2.15)	−2.27%	(−4.01)	179
						Day20	+0.14%	(0.93)	−2.13%	(−3.74)	187

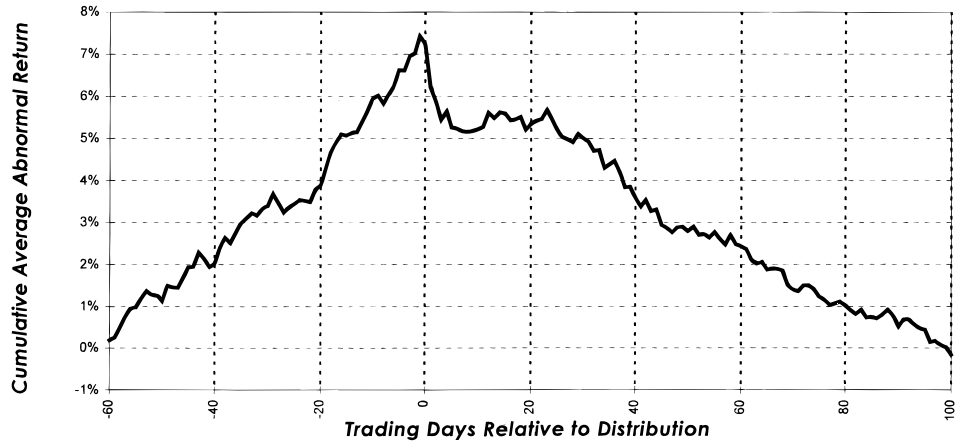

Figure 1. Cumulative average abnormal returns for the entire sample of distributions. The abnormal returns are derived from a market model using both the CRSP Value-Weighted Nasdaq Index and the Nasdaq smallest decile as factors. Cumulative abnormal returns are calculated by summing the abnormal returns. The sample is 731 distributions by 135 venture capital funds between January 1983 and December 1993.

bution date have negative CARs. Over the next three weeks the stock price reacts very little. From day +20 to +100, the CAR is once again significantly negative, −5.5 percent. This overall pattern is only suggestive of long-run returns. Cumulating daily returns over long time horizons may introduce biases. Section III.B explores long-run returns using buy-and-hold excess returns.

Table III, Panel A, summarizes the short-run reactions to distributions. CARs are calculated from day 0 to day +3 (the event window). This is somewhat different from many event studies that examine the CARs from the day before the event to the day after. Unlike many phenomena examined in event studies (e.g., takeover bids), it was unlikely that there would be any "leakage" of news prior to the event: The decision to distribute is usually made solely by the venture group without consultation with outside advisors or financial intermediaries. Thus, we feel it inappropriate to include the day prior to the distribution. (Indeed, as Table II indicates, the abnormal volume in the day before the offering was little different from the other days prior to the distribution.) Because distributions are not publicly announced, we think that the market would incorporate the information into the stock price more slowly. Many distributions also occur after the market closes. It might take several days for investors to receive their certificates. We consequently employ a four-day window. The table also presents p-values from t-tests comparing differences in the mean CARs for the various subsets of firms. The only significant differences are between the underwriter ranking: Issues

brought public by more reputable underwriters experienced greater declines. As discussed above, the presence of a high-quality underwriter suggests reduced asymmetric information.[7]

Panel B of Table III presents regression analyses of these patterns. The dependent variable is the CAR from day 0 to day +3. All regressions are weighted least squares, where the weight is the inverse of the variance of stock returns for the firm in the estimation period. Though the regressions are very noisy and the goodness-of-fit low, the significant coefficients are consistent with the insider trading hypothesis.[8] First, companies going public with higher quality underwriters have less-negative price declines at distribution. Second, as predicted by the hypothesis that the market is reacting to insider trading, distributions that occur soon after the IPO lead to more negative price reactions.

These variables are not only statistically significant but are also economically meaningful. Consider the leftmost regression in the second panel. At the mean of the independent variables, the predicted net-of-market return in the distribution window is −1.8 percent. A one-standard deviation reduction in the Carter–Manaster ranking of the book underwriter (*i.e.*, by 1.1 rank) leads to a predicted event window return of −2.8 percent. A one-standard deviation increase in the time from IPO to distribution (that is, by

[7] One concern about this analysis is that the use of four-day event windows increases the probability of correlation between the observations. Though we are examining market- and size-adjusted returns, the clustering of distributions in particular industries may mean that the observations are not completely independent and that test-statistics are potentially overstated. We address this concern in two ways. First, we repeat the tabulations and regressions in Table III using two- and three-day windows. The magnitudes of some of the differences and coefficients are slightly smaller, but the differences that are significant in the reported analyses remain so at conventional confidence levels. In these shorter windows, there is less overlap across distributions, and consequently less concern about inflated significance levels. Second, we calculate an upper bound for the impact of the effect, following the generalized least squares methodology of Hansen and Hodrick (1980). In particular, we create a variance-covariance matrix Ω, where each element is constrained to be zero if the two distribution windows do not overlap, 0.5 (a degree of correlation in the size- and market-adjusted abnormal returns of different distributed firms that was considerably higher than that actually observed) if the distributions occurred on the same day, and proportional to the degree of overlap otherwise. We then compute the standard errors from the matrix $(X(\Omega^{-1}X)^{-1}$. (Were there no overlap, Ω would be an identity matrix, and the earlier results would be unchanged.) In this way, overlapping distributions are assigned less weight. Using various specifications, we find that this correction increases the standard errors on average by just under 10 percent.

[8] A natural question relates to the correlation of the independent variables. All correlation coefficients are less than 0.35. We explore the impact of deleting one of these pairs of variables with correlation coefficients that are statistically significant—for example, either the logarithm of firm market value or the market value of the stake held by the venture capitalist. These deletions have little impact on the results in this set of regressions or those reported below. Results are little changed when we use substitutes for several of independent variables such as ordinal rank of the venture fund for fund age, the market value of the company holdings by the venture capitalist for the percentage stake, and a dummy variable indicating whether the venture capitalist left the board for the board seat dummy.

Table III

Returns around and after Distributions

The sample is 731 distributions by 135 venture capital funds between January 1983 and December 1993. The distribution window abnormal returns (ARs) are derived from a market model using both the CRSP Value-Weighted Nasdaq Index and the Nasdaq smallest decile as factors. Cumulative abnormal returns (CARs) are calculated by summing the ARs for the period from the day of distribution to three days after the distribution. The postdistribution excess returns (ERs) are for months +1 to +12 relative to the distribution month. The ERs are the difference between the firms' returns and the buy-and-hold return on the CRSP Value-Weighted Nasdaq Index times the mean beta for the entire sample (in Panel A), and the buy-and-hold return from a portfolio matched by size and book-to-market ratio and the matching Fama–French industry portfolio (in Panel B). In Panel A, we report the sample means for observations where the variable is above the median or where the answer to the posed question is "yes"; the sample means for observations where the variable is below the median or where the answer to the posed question is "no"; and the *p*-values from *t*-tests of the difference in means. Panel B presents four regressions: the distribution window regressions are weighted least squares where the weight is the inverse of the variance of stock returns for the firm in the estimation period, and the postdistribution ones are ordinary least squares. Net-of-market returns before the distribution are the CARs from day −20 to day 0 in the second regression; and ERs from month −6 to month −1 in the fourth regression. Absolute *t*-statistics are in parentheses.

Panel A: Sample Means

	Mean CAR in Distribution Window			Mean ER in Year after Distribution		
Variable	Above Median or Yes	Below Median or No	*p*-Value from *t*-Test	Above Median or Yes	Below Median or No	*p*-Value from *t*-Test
Venture firm age (in years)	−2.38%	−1.55%	0.104	−6.70%	−3.86%	0.544
Distributions as a percentage of equity	−1.97%	−1.97%	0.995	−6.01%	−4.77%	0.791
Underwriter ranking	−1.45%	−2.88%	0.006	1.19%	−10.82%	0.015
First distribution for firm?	−2.01%	−1.90%	0.844	−6.18%	−4.51%	0.734
Market value of IPO firm's equity at IPO (in millions of 1993 dollars)	−1.57%	−2.37%	0.115	0.62%	−11.42%	0.010
Venture capitalist on board at IPO?	−2.15%	−1.74%	0.418	−5.64%	−5.09%	0.907
Venture capitalist leaves board?	−2.18%	−1.95%	0.790	−4.56%	−5.48%	0.910
Distribution restriction on venture fund?	−3.18%	−2.10%	0.235	−6.15%	−9.15%	0.712

Panel B: Four Regressions

	Dependent Variable: CAR in Distribution Window		Dep. Variable: ER in Year after Distribution	
	Two Factor Adjusted CAR	Two Factor Adjusted CAR	Size and Book-to-Market Adjusted	Fama–French Industry Adjusted
Venture firm age (in years)	−0.0002 (0.45)	−0.0003 (0.56)	−0.0039 (0.71)	−0.0009 (0.17)
Share of IPO company's equity distributed	−0.0004 (0.64)	−0.0003 (0.55)	0.0036 (0.62)	−0.0030 (0.51)
Underwriter ranking	0.0090 (3.11)	0.0070 (2.22)	0.6830 (2.38)	0.0267 (0.87)
Time from IPO to distribution (in years)	0.0042 (2.41)	0.0042 (2.42)	0.0201 (1.20)	0.0108 (0.63)
First distribution for IPO company?	−0.0001 (0.01)	0.0007 (0.12)	−0.0317 (0.53)	−0.0500 (0.84)
Share of equity held by venture firm at time of IPO	−0.0001 (0.25)	−0.0001 (0.25)	−0.0040 (0.94)	0.0037 (0.84)
Venture capitalist on board at IPO?		−0.0003 (0.01)		−0.0476 (0.84)
Logarithm of the market value of firm's equity at IPO (in millions of 1993 dollars)		0.0074 (1.57)		0.0987 (2.09)
Net-of-market returns before distribution		−0.0054 (0.30)		0.0500 (0.74)
Constant	−0.1000 (3.74)	−0.1195 (3.91)	−0.4918 (1.87)	−0.6428 (2.16)
Adjusted R^2	0.022	0.021	0.006	0.005
F-statistic	3.34	2.52	1.56	1.35
p-value	0.003	0.008	0.157	0.208
Number of observations	628	628	573	602

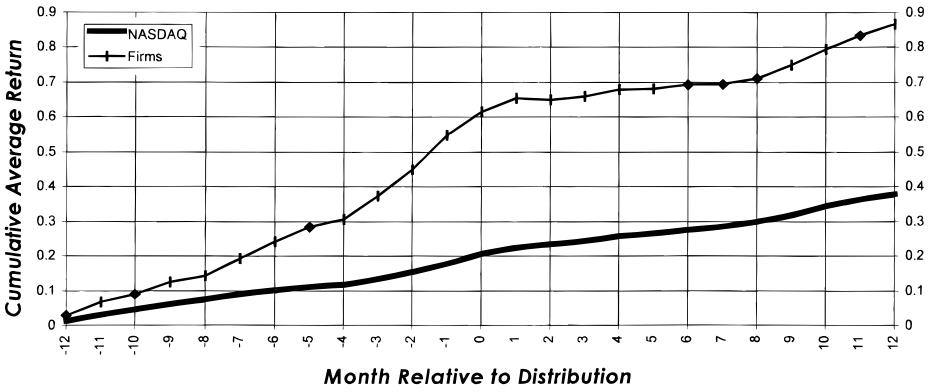

Figure 2. Cumulative average nominal buy-and-hold returns for the entire sample of distributions. For reference, the return on the CRSP Value-Weighted Nasdaq Index is included. The sample is 731 distributions from 135 venture capital funds between January 1983 and December 1993.

22 months) generates a predicted return of −1.0 percent. Neither the corporate control nor the liquidity alternative receives much support from the regression results.

B. Long-Run Excess Returns

Figure 1 provides some evidence of long-run price appreciation before distribution and price declines after distribution, but the pattern is only suggestive. The magnitude of the price movements may be biased by cumulating abnormal returns over long horizons. In order to compute long-run returns, we use monthly returns from CRSP. Figure 2 plots the nominal buy-and-hold returns for the firms from twelve calendar months prior to twelve calendar months after distribution. For comparison, the return on the CRSP Value-Weighted Nasdaq Index is plotted as well. The graph shows that returns increase sharply starting four months prior to the distribution. From the month after the distribution to month +8, nominal returns are quite modest. These are computed using calendar months. For a distribution occurring in January, we designate the firm's February stock return as that of month +1, whether the transfer occurred on January 2 or January 31. The predistribution run-up is not biased upward by first-day returns of IPOs. Venture-backed firms, like other IPOs, are typically underpriced, and gain on average 8.4 percent on their first day (Barry et al. (1990)). To avoid this bias, we exclude from this and subsequent analyses any firms completing an IPO in a given month; firms are included in the sample only in their second and later calendar months of trading.

We employ three approaches to calculating excess returns. First, we estimate a standard market-adjusted return. The appropriate measure of expected returns for these companies must be calculated outside the sample period. Because many of the companies went public less than one year prior

to distribution, some distributions have little out-of-sample data. To overcome this problem, we estimate the beta from monthly data for all firms that have fifteen trading months of returns outside of the window from six months before to twelve months after the distribution. (We use all available monthly observations on the CRSP tapes through December 1995.) The mean beta is 1.596, the median is 1.511, and the interquartile range is 1.26 to 1.94. Excess returns (ERs) are calculated by subtracting 1.596 times the buy-and-hold return of the CRSP Value-Weighted Nasdaq Index from the buy-and-hold return of the company,[9] as shown in equation (3).

$$ER_{i,(a,b)} = \prod_{t=a}^{b}(1 + R_{i,t}) - 1.596 * \prod_{t=a}^{b}(1 + R_{NASDAQ,t}). \tag{3}$$

A second approach is to calculate returns net of benchmark portfolios composed of firms matched by size and book-to-market equity values. Comparing performance to size and book-to-market portfolios seems reasonable given the work of Fama and French (1992), which shows that size and book-to-market are important determinants of stock returns. We form the size and book-to-market portfolios as described in Brav, Géczy, and Gompers (1996). We use all NYSE stocks to create quintiles of firms based on market capitalization, with an equal number of NYSE firms in each quintile. We obtain our accounting measures from the COMPUSTAT quarterly and annual files and define book value as book common equity plus balance sheet deferred taxes and investment tax credits for the fiscal quarter ending two quarters before the sorting date, the same definition as in Fama and French (1992). Within each size quintile we form five book-to-market portfolios (with an equal number of NYSE firms in each book-to-market quintile) for a total of 25 (5×5) size and book-to-market portfolios.[10] Value-weighted returns are calculated for each portfolio for the next three months. We repeat the above procedure for April, July, and October of each year. In order to avoid comparing distributed firms to themselves, we eliminate firms undertaking initial or follow-on public offerings from the various portfolios for five years after their equity issue. Each issue is matched to its corresponding benchmark portfolio. Each quarter the matching is repeated, thus controlling for the time-varying firm risk characteristics of each distribution.

[9] One question that this procedure poses is whether we should also employ the alpha from the regression in computing our benchmark returns. The mean coefficient on the constant term, 0.0035, or 0.35 percent per month, is positive and significant. Nonetheless, we do not include it, even though omitting it may bias our benchmark downward and make our excess returns seem more positive than they would be otherwise. Our concern is that some of the predistribution run-up might be occurring in the estimation period (e.g., in the seventh month prior to the distribution), thereby biasing our estimate of alpha upwards.

[10] If the book value is missing from the quarterly statements, we search for it in the annual files. For firms that are missing altogether from the quarterly files, we use the annual files. Following the convention of Fama and French (1992) and Barber et al. (1998) we exclude all firms with negative book values from the analyses.

Finally, we calculate returns net of an industry benchmark. We match the firms to the forty-nine value-weighted industry portfolios developed by Fama and French (1997). For each distribution we compute the difference between the firm's returns and the return on the relevant industry benchmark. The sample sizes are somewhat smaller as certain firms cannot be matched to an industry portfolio due to the incompleteness of the Fama–French industry classification scheme.

If prices fully react to the informational content of the distribution, long-run excess returns should be zero on average in the months after the distribution. If the market underreacts or it takes time to learn that the venture capitalist has distributed his shares, then long-run drifts in prices may occur. Table III explores the long-run excess returns for the twelve months after the distribution. The results are sensitive to the benchmark used. Using market-adjusted returns, the distributed shares lose 5.4 percent of their value in the next year. The use of portfolios matched by book-to-market and size or industry groupings as a benchmark, however, leads to positive excess returns.[11] Long-run excess returns are positively correlated with underwriter rank, just as in analysis of abnormal returns in the event window. Sorting firms based on valuation at the close of the first trading day reveals that smaller firms have lower returns than their larger counterparts.

Multivariate examinations of the long-run returns are presented in the second panel. The dependent variable is the excess return from month +1 to month +12. Independent variables are the same as the ones used in the short-run analysis. Once again, the regression results are noisy. Factors that predict the short-run reaction to distributions also seem to have at least some power to explain the long-run price response. In the left regression (and several unreported ones), underwriter ranking is positively related to performance in the months after the offering. The magnitude of the effect declines when firm size (also positively associated with returns) is used as an independent variable. Overall, the market appears to quickly incorporate into the stock price the information contained in the distribution.

A major concern relates to the independence of observations. Though the magnitude of the distribution run-up and run-down is similar throughout the sample period, correlations across the observations may lead to an understating of the standard errors. This problem has two dimensions. First, the data set includes distributions of shares of the same firm by different venture capital funds. Additionally, venture capitalists may distribute shares of different firms in particular industries, such as comput-

[11] In unreported analyses, we examine excess returns in the six months prior to distribution. Using the various market benchmarks, the returns are significantly different from zero (+15 percent and +21 percent). Distributions of shares of smaller companies are associated with significantly greater price appreciation: Excess returns for companies that were smaller than the median at the end of their first trading day vary from +20 percent to +25 percent, as opposed to +10 to +17 percent for large companies. Smaller companies may give venture capitalists more opportunity to exploit private information.

ers and biotechnology, at approximately the same time. Because the returns of these young firms may be quite correlated, the observations may not be truly independent.

We address concerns about the nonindependence of the observations in two ways. First, we calculate all the long-run returns using only the first distribution for each firm. Results are qualitatively similar, although significance levels fall in the regressions reflecting the smaller sample sizes. We also address the correlation across different firms. Bernard (1987) discusses this problem and demonstrates that the primary source of bias in such settings is intraindustry cross-correlations as opposed to correlations across industries. One way to address this problem is to compute returns for firms net of the appropriate industry benchmark rather than a general market index. As discussed above, the results using this approach are broadly consistent with the other analysis. These concerns are also addressed by Barber et al. (1998), who find that forming excess returns using size and book-to-market matched portfolios eliminates many of the biases in long horizon returns, including the skewness of the test statistics as well as much of the cross-sectional correlation induced by the clustering of observations in calendar time. At the same time, it is important to acknowledge that there may still be significant cross-sectional correlations in the residuals, leading to understated standard errors and overstated *t*-statistics.

In a supplemental analysis, we examine trading volume, which an extensive literature (e.g., Easley and O'Hara (1987)) suggests is a key mechanism through which the market discovers trades by informed insiders. Table II shows that the distribution window is associated with considerably larger trading volumes than other times.[12] We examine abnormal volume by estimating an ordinary least squares regression. Following earlier work, we use the logarithm of firm trading volume as the dependent variable and control for such variables as day of the week, news events, and Nasdaq market volume. Abnormal volume is significantly higher during the distribution window. In supplemental analyses, we show that the higher volume is associated with greater price movements, but the effect is not significantly stronger in the distribution window.

IV. Conclusion

This paper examines the distribution of venture capital investments to the investors in venture capital funds by the funds' general partners. This is a unique environment where transactions by informed insiders are exempt from antifraud provisions. The legality of these transactions allows us to

[12] The average volume on the distribution day and the two subsequent days is 207 thousand shares; elsewhere in the forty days around distributions, the average volume is 165 thousand. This comparison is limited to days without any news events. News days are defined as those on which a story about the firm (excluding routine earnings announcements) appeared in the *Wall Street Journal* (and was included in the *Wall Street Journal Index)*, as well as the trading days immediately before and after the day the story appeared.

build a systematic database. The evidence is consistent with the market reacting to the inside information of the venture capitalist; the 2 percent drop around the distribution is akin to the reaction to public announcements of secondary stock sales even though venture capital distributions are not publicly disclosed.

When we disaggregate the market reactions, the patterns appear to be consistent with the view that this is a reaction to insider trading rather than the two other explanations we offer. In particular, distributions for firms backed by higher quality underwriters also appear to lower asymmetric information and reduce the negative cumulative abnormal returns at distribution. Distributions of less seasoned firms, which may be associated with greater asymmetric information, also trigger larger immediate price declines. The long-run postdistribution returns are more ambiguous. Though the extent and significance of the market reaction appears to vary with the benchmark employed, at least some evidence suggests that the market does not fully incorporate information at the time of distribution.

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