What is the Effect of the Current Financial Crisis on Venture Capital Financing? Empirical Evidence from US Internet Start-ups

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Abstract:

Employing a large dataset regarding venture capital investments in US Internet firms, we analyze the effect of the current financial crisis on the venture capital market. Using regression analysis, we find that the financial crisis led to a 20% decrease in the average amount of funds raised per funding round. This effect, however, can only be found in later funding rounds. We argue that firms in later financing rounds that need capital to survive cannot avoid a deduction induced by the financial crisis, whereas firms that seek initial funding postpone their funding and expansion plans until the capital markets have stabilized. Furthermore, firms in later phases of the venture cycle are more likely to be negatively affected by the weak IPO market than firms seeking initial funding. Our results suggest that the financial crisis can lead to a severe "funding gap" in the financing of technological development and innovation.

JEL-Codes: L26, G24, O30
Keywords: Entrepreneurship, Financial Crisis, Venture Capital, Innovation Finance

1. Introduction

The financial crisis became clearly visible on September 15th, 2008, when the imminent bankruptcy of Lehman Brothers was announced. Immediately after that, the large insurance company American International Group (AIG) suffered a liquidity crisis following a downgrade in its credit rating. Following this, many other financial institutions in the US and around the world were affected, losing large portions of their value, and could only be saved from bankruptcy by government funds. Stock prices declined, and a recession began.

This paper deals with the effects of the financial crisis on the venture capital market (hereafter: VC market). We expect the financial crisis to have a severe impact on the VC market for three reasons. First, VC firms will encounter significant difficulty in finding investors. Investors in VC funds are usually large institutional investors, such as pension funds, insurance companies, and large banks (Gompers and Lerner, 1998). At the least, the latter two are negatively affected by the financial crisis. They are likely to decrease their investments in risky assets such as VC funds. Second, given the current low activity in the IPO market and the decline in stock prices, VC firms face a severe exit problem. Black and Gilson (1998), for example, argued that the amount of funds raised by VC firms depends strongly on a vibrant market for IPOs. Finally, if the current economic crisis turns into a long recession, VC-backed firms will have problems generating sufficient revenues. Consumers will have less money to spend and will be likely to postpone purchases. This in turn increases the risk encountered by VC firms and leads to lower firm valuations.

Thus far, to the best of our knowledge, there exists no study that has empirically analyzed the impact of a financial crisis on VC activity. The collapse of Lehman Brothers and other events leading to the current financial crisis provide a good research opportunity to address this question in greater detail. The following three research questions are studied:

1. Did the financial crisis lead to a reduction in the total volume of VC funds raised? Is there a strong decrease in the number of VC deals?
2. Has the financial crisis led to a reduction in the average amount of funds raised in each funding round? If so, what is the size of this decrease?
3. Concerning the effects of the financial crisis, is there a difference between the impacts on early and later stage financing?

Why is it important to study the effects of the current financial crisis on the VC market? VC is an important and vital source of funding for start-ups in innovative industries.

Venture capital is important in the early periods of a firm's life, when it begins to develop innovative products and to commercialize its innovation (Gompers and Lerner, 2001; Zider, 1998). At such early stages, firms do not have other institutions to turn to in order to raise money, and VC fills this void. The inherent risks of a start-up in that stage will not be accepted by banks, so early-stage companies cannot obtain loans to fund their operations. Furthermore, banks require lent money to be secured by hard assets, which are usually not available with innovative start-ups. Public equity is also not accessible at that stage, since the sales required for gaining public interest are still too low. Consequently, if the financial crisis leads to a strong decrease in VC funds provided, a funding gap in the commercialization of innovation arises with negative effects on economic development and growth. VC funding has a strong positive impact on firm growth, technological development, and the evolution of innovative industries (cf. Audretsch and Thurik, 2001; Bottazi et al., 2002; Florida and Kenney, 1988; Keuschnigg, 2004; Kortum and Lerner, 2000; Timmons and Bygrave, 1986). In one of the few empirical studies on this issue, Kortum and Lerner (2000) found that increases in an industry's VC activity lead to higher patent activity. In their paper, they estimated that VC is responsible for about 10% of US industrial innovations.

The next section introduces the data and variables. Section 3 presents the empirical analysis, which is then discussed in Section 4. Section 5 concludes and gives an outlook for further research.

2. Data and variables

The data were collected from the website http://www.crunchbase.com/funding-rounds in the first weeks of March 2009. CrunchBase summarizes information about venture capital activities in the US technology sector with a particular focus on Internet start-ups. The web-site is a free database of technology firms, people, and investors that anyone can edit. It is operated by TechCrunch (see http://www.techcrunch.com), one of the most highly regarded blogs concerning technological innovations related to the Internet. As of April 1st, 2009, the database of CrunchBase included more than 16,000 firms, more than 1,800 financial organi-zations, and more than 5,200 funding rounds.

Our unit of analysis is the funding round, i.e., the financing round where start-ups raise money to finance their operations and development efforts. Table 1 shows the steps un-

dertaken to create the data set, which comprises 1,420 funding rounds[1] and 1,136 VC-backed firms. Our dependent variable is the amount of funds raised in the funding round (*raised amount*). Our independent variables are as follows. The variable *financial crisis* is a dummy variable that indicates whether funding took place from October 2008 to February 2009, the months after the crash of the Lehman Brothers Bank. A total of 210 of the 1,420 funding rounds occurred during this period. To distinguish between the effects of the financial crisis and other firm, industry, and VC characteristics, we constructed several control variables such as the stage of the financing (first round versus a later round) or the type of VC investor (e.g., strategic investor). Table 2 summarizes the variables and gives the exact definitions of the variables used.

[*Insert Table 1 and 2 here*]

3. Empirical analysis

3.1 VC funding in US Internet start-ups from January 2007 to February 2009

Table 3 shows the evolution of VC activity in the US Internet sector from January 2007 to February 2009 based on the dataset described above. Two trends can be observed. First, during the time period before the crash, the VC market grew significantly. For example, the total amount of funds raised increased from $438 m in January 2007 to $1,094 m in January 2008. Accordingly, the number of funding rounds per month also increased from 42 rounds in January 2007 to 93 rounds in January 2008. Second, when comparing the time period before the crisis with the period of the crisis, a decrease in VC activity can be observed. In August 2008 (September 2008), the total funding volume was $598 m ($512 m), whereas the total funding volume in October 2008 (November 2008) was only $366 m ($365 m). The number of funding rounds per month dropped as well, with 57 in August and 50 in September versus 49 in October and 39 in November. In summary, there is a decrease in VC activity due to the financial crisis, although it is not as large as one might have expected. This might be explained by ongoing negotiations initiated before the crash in September 2008 that became effective some months later. In summary, the VC market did not come to an immediate and complete halt.

[*Insert Table 3 here*]

[1] These funding rounds involved 3,724 VC investments. Note that a funding round often involves several investors (e.g., start-up A is financed by an investment consortium that consists of investors B, C, and D).

3.2 Univariate analysis: VC funding before and during the financial crisis period

Tables 4a and 4b show descriptive statistics regarding the characteristics of the funding rounds in the periods before and during the crisis. The period before the crash includes the months from January 2007 to August 2008; the period of the crisis includes the months from October 2008 to February 2009.[2] As we only have information on a monthly basis, we had to make a choice concerning the month of September 2008. We decided to include this month in the category *before the financial crisis*. The reason is that we expect a time lag of some weeks between the negotiations by the investors and the start-up company leading to the financing and the date when the deal is announced publicly. In the comparison of characteristics of the funding rounds, we distinguished between first and later rounds. The first funding rounds are conducted to provide initial seed money to start-up companies. Second and later rounds are required to equip start-up firms with additional substantial funds so that they can continue with their development, marketing, or internationalization efforts. For example, in September 2004, Facebook received its first financing round, which amounted to $0.5 m. This first funding round was followed by several later financing rounds, which provided Facebook with an additional funding volume of $515.5 m.[3]

Table 4a shows this comparison for the sample of first funding rounds (N=840 funding rounds). The results are surprising. Except for the lower share of the industry category *web* (37% before the crisis vs. 24% during the crisis, $p<0.05$), there are no significant differences in VC funding between the time periods before and during the crisis. Most importantly, we do not observe a decrease in the average funding amount (the mean is $8.8 m before the crisis vs. $9.3 m during the crisis, $p=0.804$).

The situation is fairly different when the sample of later funding rounds is examined (N=580 funding rounds). Table 4b reports the results of this comparison. The average amount of funds raised in each funding round decreases strongly (the mean is $12.6 m before the crisis vs. $9.5 m during the crisis, $p<0.05$). Two other trends can also be observed: the share of financing rounds led by a consortium increases (73.1% before the crisis vs. 82.4% during the crisis, $p<0.05$), as does the average firm age of the funded company (the mean is 937 days vs. 1,132 days, $p<0.1$).

[*Insert Table 4a and 4b here*]

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2 The end date of February 2009 is determined by the date in which the data collection ended (March 25th, 2009). This allowed us to use the entire month of February.

3 Data source: http://www.crunchbase.com/company/facebook (accessed March 25th, 2009).

3.3 Regression analysis: the effect of the financial crisis on VC funds raised

To analyze the impact of the financial crisis on VC funds raised while accounting for characteristics of the firm, the VC, and the industry, we estimated several regression models. Before we proceeded with these regressions, we calculated correlation values and variance inflation factors (VIFs). The results are displayed in Table 5. The low VIFs indicate that multicollinearity is not an issue in our investigations.

[*Insert Table 5 here*]

We wanted to investigate the effect of the financial crisis on the average amount of funds raised in each funding round. We therefore used *raised amount* as the dependent variable. Table 6 shows the results of the regressions. In Model I, an OLS regression with *raised amount* per funding round as the dependent variable is estimated. Model II shows a regression that uses the natural log of *raised amount* as the dependent variable. Finally, Model III is a quantile regression that estimates the median of the amount of funds raised (Koenker and Hallock, 2001). The results are as follows: the financial crisis does not have a significant impact on the amount of funds raised per funding round in Model I (ß=-1.95, $p>0.1$) or Model II (ß=-0.11, $p>0.1$), but it does have a significant impact in Model III (ß=-1.00, $p<0.05$). This leaves us with mixed results concerning the impact of the financial crisis on the average amounts of funds raised per funding round. We explain the differences between Model I and Model III, with the existence of outliers that influence the results of the OLS model but do not have an impact on the quantile regression.[4] Quantile regressions estimate conditional quantile functions—that is, models in which quantiles of the conditional distribution of the dependent variable such as the median are expressed as functions of several independent variables (Koenker and Bassett, 1978; Koenker and Hallock, 2001). Quantiles such as the median are more robust to outliers than the mean, which is estimated in OLS regressions. In this paper, we estimated a quantile regression on the median of the dependent variable. This kind of model is often simply referred to as a median regression.

The control variables have the expected signs. If the firm is financed by an investment consortium, the median amount of funds raised increases by about $1 m (e.g., Model III: ß=3.83, $p<0.01$). The variable *firm age* has a positive impact on the amount of funds raised (e.g., Model III: ß=1.15, $p<0.01$). Firms in the second or later funding rounds raise larger

[4] In nine cases, the amount of funds raised was greater than $100 m. The maximum is $300 m (the funded company was ZeniMax Media Inc., which is a firm that develops online games).

amounts of capital than do firms in the first round (e.g., Model III: ß=1.50, p<0.01). Industry variables are found to be jointly significant in Models II and III (p<0.01) but insignificant in Model I (p>0.1). Overall, the findings are reasonable and in line with our prior expectations. The explanatory power of our models is acceptable (e.g., R^2=0.28 in model II).

In the next step, we divided the sample into two sub-samples: Sample I includes only the first funding round, whereas Sample II includes only the second or later funding rounds. Table 7 shows the results of both sub-sample regressions. A strong difference can be observed. The variable *financial crisis* has a strong negative effect on the amount of funds raised in the sample of second or later funding rounds (Model II: ß=-0.22, p<0.05), but it has no significant effect in the sample of first funding rounds (Model I: ß=0.02, p=0.889).[5] That is, the effect of the financial crisis seems to differ with regard to the stage of financing. We interpret this finding in the discussion section.

[*Insert Table 6 and 7 here*]

3.4 Robustness check: correction for treatment effects using propensity score matching

To verify the robustness of the results, we conducted an estimation using propensity score matching. Propensity score matching is a method for reducing the bias in the estimation of treatment effects (Rosenbaum and Rubin, 1983). Treatment effects may arise if the assignment of observations to the treatment and control group is not a random process. In our case, this means that firms seeking VC during a financial crisis are not randomly drawn out of the total population of firms that seek VC. Or, put differently and explained more directly, firms that seek VC in a financial crisis might differ from firms that would normally seek VC (e.g., they are older, have a better-developed business concept, etc.). By using propensity score matching, we seek to "correct" the estimation of the effect of the financial crisis by comparing the outcome of funding rounds that are as similar as possible except for the fact that one funding round did occur during the financial crisis (treatment group) and the other did not (control group). Here, to find the control group, we used the propensity score matching algorithms provided by Becker and Ichino (2002).

The results are in line with the regression results in the previous sections. Controlling for treatment effects, we find a strong negative effect of the financial crisis on the amount of funds raised in later funding rounds (the effect varies between -15% and -19%, depending on

[5] A Chow test of the equality of coefficients (Chow, 1960) is weakly significant (p=0.100).

the matching algorithm used—see Table 8c). As in the regressions discussed above, we obtain insignificant results if the sample includes only the first funding rounds. In the full sample, the effect varies between -1% and -18% (Table 8a).[6]

[*Insert Table 8a, 8b, and 8c here*]

3.5 Summary of main results

Summarizing our main results, our empirical analysis shows that the current financial crisis has an effect on VC activity in the US Internet sector. The total volume of funds decreased, as did the number of funding rounds. The VC market, however, did not come to an abrupt halt but instead exhibited a systematic and remarkable decline in transaction size. We find that the financial crisis had a negative impact on the amount of funds raised per funding round. The effect, however, seems to be present only when later funding rounds are concerned. The next section discusses our findings.

4. Discussion of the results

The most surprising finding is that the effect of the financial crisis differs with regard to the stage of financing. During the financial crisis, firms in later financing rounds received about 20% less funds than they would have received during the period before the financial crisis. For firms obtaining initial financing, no such devaluations are observed. How can this result be explained? Our first explanation is that firms already at a later stage of the venture cycle cannot avoid the deduction due to the financial crisis since they need capital to survive. Another explanation concerns the current unhealthy state of the IPO market. VC firms usually do not provide patient capital, instead intending to sell the firm in which they have invested after a certain time period (usually a few years) in order to provide adequate returns for investors in the VC fund. Conducting an IPO in a recession is not an attractive option.[7] Firms at later stages of the venture cycle become less attractive as investment targets, especially because the prospects of a revival of the IPO market in the immediate term are poor.

The situation is different for firms seeking initial funding: These firms can (and will) postpone their funding and expansion plans until the capital markets stabilize. Some entrepreneurs might even refrain from starting a company at all because they do not expect to ob-

[6] This does not include the insignificant estimate obtained from the radius matching approach.
[7] Another exit avenue would be to get acquired by a larger firm.

tain adequate funding. Entrepreneurs of early-stage companies might consider alternative employment options.

5. Conclusions and outlook

5.1 Implications for firms seeking venture capital

Firms that seek VC are affected by the financial crisis. Our analysis shows that the financial crisis has led to a decrease in the amount of funds raised, particularly in later funding rounds. Firms that seek VC should keep this in mind and consider regions or countries that are less strongly affected by the financial crisis instead of the US. Moving the business is an option to consider. Start-ups that have already received initial funding and now want (or need) to obtain further funding should include in their business planning a discount of 20% as a result of the financial crisis. Cutting costs or postponing expansion plans might be necessary. In an unhealthy VC market, they will encounter difficulties in raising the funds required to further finance their product development, marketing, and internationalization efforts.

5.2 *Implications for the evolution of innovative industries and technological development*

VC is an important means of funding for start-ups in innovative and technology-driven industries because it is the vehicle used to turn innovative ideas into products that can be sold to customers. VC particularly matters when firms start to commercialize their innovations, that is, when they develop their products, apply for patents, look for distribution partners, seek first customers, conduct their internationalization strategies, or simply scale up their operations. (Gompers and Lerner, 2001; Zider, 1998). VC firms not only provide financial means but also offer management support (Schefczyk and Gerpott, 2001) and access to expanded networks. Florida and Kenney (1988, p. 119) see VC firms as “technological gatekeepers accelerating the process of technological change.” So, if, due to an external shock caused by a financial crisis, the VC market dries up, this can have long-lasting negative effects with regard to the evolution of innovative industries. Innovative firms might run into severe liquidity problems, and the speed of commercialization of technological innovations might slow down. Ultimately, the country’s path to economic growth can be negatively affected.

5.3 *Outlook*

To the best of our knowledge, this is the first study to empirically document and analyze the effects of a financial crisis on VC activity. VC is still a relatively new phenomenon, but it has become an element vital to the current economy. In the 1980s, VC became an important source of funding for innovative start-ups (Gompers, 1994). In our present paper, we argue that a financial crisis can have a strong, exogenous impact on VC activity, which can then lead to a severe "funding gap" in the financing of technological development and innovation. Unlike the last slowdown of VC activities after the collapse of the New Economy bubble in the year 2000, the current slowdown came more as an exogenous shock. In the current crisis, it was clearly not unrealistic expectations regarding the Internet and the New Economy but instead a malfunctioning financial sector that initiated the downturn that caused the slowdown.

Many questions are left unanswered and provide good opportunities for future research. Does the impact of financial crises on VC activity differ among industries or regions? For example, is there a similar effect of the financial crisis in biotechnology or semiconductor fields? How do start-ups receiving funding in this financial crisis differ from start-ups that had received funding before the financial crisis? Is there a kind of selection effect, where only the more promising ventures receive funding? How do the start-ups respond to the challenges posed by the financial crisis and the difficulties encountered in the search for VC funding? Does a lower success rate of VC-backed companies lead to a decline in the performance of VC funds? And ultimately, over a long time period, does VC as a financing instrument for innovative start-ups become severely harmed as an effect of the crisis?

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Table 1: Construction of the sample

Total number of funding rounds in the period from January 2007 to February 2009	2,935 obs.
- Amount of funds raised is missing.	359 obs.
- Variable *investment consortium* is a missing value.	427 obs.
- Industry category is *biotech* (6 obs.), *cleantech* (39 obs.), *semiconductor* (12 obs.), or *other* (25 obs.).	82 obs.
- Investment is not given US-$ (92 obs.) or is not in the US (494 obs.).	586 obs.
- Firm did not survive until February 2009.	14 obs.
- Funding round is a debt round.	47 obs.
Final sample	**1,420 obs.**

Table 2: Variable descriptions

Variable name	Description
Raised amount	Funds raised in the funding round (in US-$).
Log(raised amount)	Natural log of raised amount.
Financial crisis	Dummy variable, 1 if funding occurred in the period from Oct. 2008 to Feb. 2009.
First round	Dummy variable, 1 if first funding round.
Second or later round	Dummy variable, 1 if second or later funding round.
Investment consortium	Dummy variable, 1 if funding round consists of at least two VC investors.
Strategic investor in investment consortium	Dummy variable, 1 if at least one of the investors is a non-financial firm.
Business angel in investment consortium	Dummy variable, 1 if at least one of the investors is a person (and not a firm).
Firm age	Date of funding round minus founding date of firm; missing values are imputed with sample median.
Firm age is missing	Dummy variable, 1 if firm age is a missing value (which is the case in N=857 obs.).
Industry dummies	12 dummy variables indicating the industry categories: web, advertising, ecommerce, enterprise, games and video, hardware, mobile, network hosting, public relations, search, security, and software. The industry categories were obtained from CrunchBase.

Table 3: VC funding in US Internet start-ups from January 2007 to February 2009

	2007											
Variables	**Jan.**	**Feb.**	**Mar.**	**Apr.**	**May**	**June**	**July**	**Aug.**	**Sep.**	**Oct.**	**Nov.**	**Dec.**
N funding rounds	42	39	33	34	60	70	57	62	71	77	53	53
N first rounds	27	23	20	20	44	48	35	49	47	61	40	38
N second or later rounds	15	16	13	14	26	22	22	13	24	16	13	15
First rounds in % of total	64%	59%	61%	59%	73%	69%	61%	79%	66%	79%	75%	72%
Total raised amount (in m $)	438	368	243	356	439	475	642	625	789	964	653	668
Mean raised amount in each round (in m $)	10.4	9.4	7.4	10.5	7.3	6.8	11.3	10.1	11.1	12.5	12.3	12.6
Median raised amount in each round (in m $)	5.5	7	5	8	5.2	5.1	5	5.3	7.4	6	7	6

	2008											
Variables	**Jan.**	**Feb.**	**Mar.**	**Apr.**	**May**	**June**	**July**	**Aug.**	**Sep.**	**Oct.**	**Nov.**	**Dec.**
N funding rounds	93	56	71	72	46	64	50	57	50	49	39	37
N first rounds	55	35	44	31	18	30	26	32	26	27	19	18
N second or later rounds	38	21	27	41	28	34	24	25	24	22	20	19
First rounds in % of total	59%	63%	62%	43%	39%	47%	52%	56%	52%	55%	49%	49%
Total raised amount (in m $)	1,094	505	550	936	483	605	481	598	512	366	365	322
Mean raised amount in each round (in m $)	11.7	9.0	7.7	13	10.5	9.5	9.6	10.5	10.3	7.5	9.4	8.7
Median raised amount in each round (in m $)	8.1	5	5	6	6.6	7.1	7.3	8	6.4	5.5	7	8

	2009	
Variables	**Jan.**	**Feb.**
N funding rounds	48	37
N first rounds	17	10
N second or later rounds	31	27
First rounds in % of total	35%	27%
Total raised amount (in m $)	578	349
Mean raised amount in each round (in m $)	12.0	9.4
Median raised amount in each round (in m $)	6	7.8

Data source: http://www.crunchbase.com/funding-rounds (accessed March 25th, 2009)

Table 4a: Univariate analysis: VC funding before and during the crisis—first rounds only

Variable	**Before crisis** (Jan. 2007 to Sep. 2008) **Mean (Std. dev.)**	**During crisis** (Oct. 2008 to Feb. 2009) **Mean (Std. dev.)**	**p-value** [1]
Raised amount per funding round (in m $)	8.8 (16.3)	9.3 (26.0)	p=0.804
Investment consortium (in %)	61.2	60.4	p=0.876
Strategic investor in investment consortium (in %)	22.2	16.5	p=0.213
Business angel in investment consortium (in %)	18.0	14.3	p=0.377
Firm age (in days) [2]	759 (782)	852 (885)	p=0.586
Industry categories			
Web (in %)	36.8	24.2	p=0.017
Advertising (in %)	8.5	6.6	p=0.525
Ecommerce (in %)	3.2	5.4	p=0.259
Enterprise (in %)	4.4	7.7	p=0.165
Games and video (in %)	11.5	15.4	p=0.278
Hardware (in %)	4.7	7.7	p=0.212
Mobile (in %)	9.9	9.9	p=0.998
Network hosting (in %)	5.7	2.2	p=0.156
Public relations (in %)	1.3	3.3	p=0.152
Search (in %)	2.5	1.1	p=0.400
Security (in %)	1.2	3.3	p=0.112
Software (in %)	10.0	13.2	p=0.348
N funding rounds (first rounds only)	749	91	

[1] = Test of equality of means or test of equality of proportions
[2] = Based only on non-missing observations (N=294)
Data source: http://www.crunchbase.com/funding-rounds (accessed March 25th, 2009)

Table 4b: Univariate analysis: VC funding before and during the crisis—second and later rounds only

Variable	**Before crisis** (Jan. 2007 to Sep. 2008) **Mean (Std. dev.)**	**During crisis** (Oct. 2008 to Feb. 2009) **Mean (Std. dev.)**	**p-value** [1]
Raised amount per funding round (in m $)	12.6 (16.1)	9.5 (7.6)	p=0.043
Investment consortium (in %)	73.1	82.4	p=0.038
Strategic investor in investment consortium (in %)	28.0	27.7	p=0.957
Business angel in investment consortium (in %)	13.7	10.9	p=0.429
Firm age (in days) [2]	937 (683)	1,132 (696)	p=0.062
Industry categories			
Web (in %)	30.0	38.7	p=0.068
Advertising (in %)	9.3	6.7	p=0.371
Ecommerce (in %)	3.9	6.7	p=0.185
Enterprise (in %)	6.0	4.2	p=0.432
Games and video (in %)	12.8	7.6	p=0.114
Hardware (in %)	4.3	3.4	p=0.633
Mobile (in %)	10.4	7.6	p=0.352
Network hosting (in %)	7.6	5.9	p=0.521
Public relations (in %)	2.0	0.8	p=0.406
Search (in %)	3.9	5.9	p=0.344
Security (in %)	0.7	0.8	p=0.824
Software (in %)	9.1	11.8	p=0.382
N funding rounds (second and later rounds only)	461	119	

[1] = Test of equality of means or test of equality of proportions
[2] = Based only on non-missing observations (N=269)
Data source: http://www.crunchbase.com/funding-rounds (accessed March 25th, 2009)

Table 5: Correlations and descriptive statistics

		Mean	Std. dev.	Min.	Max	1	2	3	4	5	6	VIF
1	Raised amount (in m $)	10.1	16.6	0.1	300							
2	Financial crisis (dummy)	0.15		0	1	-0.02						1.03
3	Second or later round (dummy)	0.41		0	1	0.09	0.13					1.08
4	Investment consortium (dummy)	0.67		0	1	0.08	0.05	0.14				1.09
5	Strategic investor in investment consortium (dummy)	0.24		0	1	0.14	-0.01	0.07	0.09			1.03
6	Business angel in investment consortium (dummy)	0.16		0	1	-0.11	-0.04	-0.06	0.15	-0.07		1.10
7	Firm age (in yrs)	1.60	1.44	0.08	11.76	0.28	0.10	0.14	0.06	0.03	-0.19	1.32

N=1,420 funding rounds
VIF=Variance inflation factor (industry dummies and the dummy variable indicating missing values with *firm age* are included in the calculation of the VIFs)
Correlations with an absolute value greater than 0.05 have a p-value ≤ 0.05. The Pearson correlation coefficient is used for metric variables, the point-biserial correlation coefficient is used in case one variable is dichotomous, and Cramer's V is used if both variables are dummy variables.

Table 6: Regressions of raised amount per funding round

	Model I (OLS)	Model II (OLS)	Model III (Quantile regression) [1]
Dependent variable	**Raised amount (in m $)**	**Log(*raised amount*)**	**Raised amount (in m $)**
Independent variable	**ß (SE)**	**ß (SE)**	**ß (SE)**
Financial crisis (dummy)	-1.95 (1.49)	-0.11 (0.08)	-1.00 (0.40) **
Second or later round (dummy) [2]	2.15 (0.76) ***	0.44 (0.06) ***	1.50 (0.29) ***
Investment consortium (dummy)	2.38 (1.18) **	0.92 (0.08) ***	3.83 (0.31) ***
Strategic investor in investment consortium (dummy)	4.41 (1.37) ***	-0.06 (0.10)	0.99 (0.33) ***
Business angel in investment consortium (dummy)	-4.08 (1.53) ***	-1.02 (0.10) ***	-4.40 (0.40) ***
Firm age (in yrs) [3]	1.62 (0.37) ***	0.21 (0.03) ***	1.15 (0.11) ***
Industry dummies [4, 5]			
Advertising	2.92 (1.45) **	0.25 (0.12) **	1.79 (0.54) ***
Ecommerce	3.96 (2.09) *	0.30 (0.19)	0.81 (0.75)
Enterprise	0.01 (1.31)	0.30 (0.13) **	0.90 (0.67)
Games and video	3.81 (2.07) *	0.33 (0.13) **	1.40 (0.47) ***
Hardware	4.45 (2.13) **	0.60 (0.13) **	5.35 (0.70) ***
Mobile	1.11 (0.95)	0.24 (0.12) *	1.72 (0.51) ***
Network hosting	3.18 (1.84) *	0.23 (0.15)	1.23 (0.61) **
Public relations	3.46 (2.98)	0.47 (0.17) ***	1.36 (1.11)
Search	5.00 (4.08)	0.26 (0.23)	1.72 (0.81) **
Security	1.92 (2.63)	0.42 (0.29)	2.89 (1.31) **
Software	1.25 (1.32)	0.30 (0.10) ***	1.39 (0.50) ***
Constant	0.91 (1.00)	0.19 (0.12) *	0.33 (0.45)
N funding rounds (firms)	1,420 (1,136)	1,420 (1,136)	1,420 (1,136)
F-test	p<0.001	p<0.001	
R^2	0.07	0.28	
Adjusted R^2	0.06	0.27	
Pseudo R^2			0.13

In the OLS models: standard errors (SE) are robust and clustered by firms. * p≤0.10; *** p≤0.05; *** p≤0.01; two-sided tests employed.

[1] The quantile regression estimates the median value of *raised amount*.

[2] *First round* is used as a reference category.

[3] In some cases, *firm age* is imputed with the median computed from the non-missing observations. To correct for this imputation, we included a dummy variable in the regression indicating when imputation took place.

[4] Industry category *web* is used as a reference category.

[5] An F-test of the joint significance of the industry variables is significant in Model II (p<0.01) and Model III (p<0.001) and insignificant in Model I.

Data source: http://www.crunchbase.com/funding-rounds (accessed March 25th, 2009)

Table 7: The effect of the financial crisis on first and later funding rounds

	Model I		Model II		
	Sample: First rounds only		Sample: Second or later rounds only		
Dependent variable	Log(*raised amount*)		Log(*raised amount*)		Chow test of the equality of coefficients
Independent variable	OLS ß (SE)		OLS ß (SE)		
Financial crisis (dummy)	0.02	(0.13)	-0.22	(0.09) **	p=0.100
Investment consortium (dummy)	1.03	(0.11) ***	0.73	(0.10) ***	p<0.001
Strategic investor in investment consortium (dummy)	-0.28	(0.15) *	0.24	(0.09) ***	p<0.001
Business angel in investment consortium (dummy)	-1.10	(0.13) ***	-0.92	(0.15) ***	p=0.079
Firm age (in yrs.) [1]	0.22	(0.04) ***	0.19	(0.04) ***	p<0.001
Industry dummies [2, 3]					
Advertising	0.24	(0.18)	0.28	(0.14) **	p=0.032
Ecommerce	0.24	(0.29)	0.26	(0.23)	p=0.247
Enterprise	0.43	(0.15) ***	0.13	(0.17)	p=0.937
Games and video	0.36	(0.17) **	0.25	(0.16)	p=0.134
Hardware	0.65	(0.18) ***	0.37	(0.20) *	p=0.588
Mobile	0.26	(0.17)	0.20	(0.15)	p=0.154
Network hosting	0.36	(0.20) *	0.09	(0.18)	p=0.803
Public relations	0.32	(0.24)	0.57	(0.24) **	p=0.034
Search	0.06	(0.36)	0.38	(0.24)	p=0.091
Security	0.24	(0.29)	0.92	(0.54) *	p=0.100
Software	0.35	(0.14) **	0.17	(0.13)	p=0.351
Constant	0.12	(0.14)	0.84	(0.16) ***	
N funding rounds	840		580		
F-test	p<0.001		p<0.001		
R^2	0.26		0.27		
Adjusted R^2	0.24		0.25		

Standard errors (SE) are robust and clustered by firms. * p≤0.10; ** p≤0.05; *** p≤0.01; two-sided tests applied.

[1] In some cases, *firm age* is imputed with the median computed from the non-missing observations. To correct for this imputation, we included a dummy variable in the regression indicating when imputation took place.

[2] Industry category *web* is used as a reference category.

[3] An F-test of the joint significance of the industry variables is significant in Model I (p<0.1) and insignificant in Model II.

Data source: http://www.crunchbase.com/funding-rounds (accessed March 25th, 2009)

Table 8a: Propensity score matching estimation – all funding rounds

Dependent variable: log(*raised amount*)
#

Matching approach [1]	**N of treatment group** [2]	**N of control group** [3]	**Average treatment effect**	**Std. err.**	**t-statistic**
Nearest neighbor matching (random weights) (attnd.ado)	210	648	-0.185	0.096	-1.920
Nearest neighbor matching (equal weights) (attnw.ado)	210	648	-0.181	0.108	-1.680
Radius matching (attr.ado)	210	1,203	0.064	0.090	0.706
Kernel matching (attk.ado)	210	1,203	-0.013	0.085	-0.158

[1] Stata command in parentheses
[2] Number of funding rounds during the financial crisis
[3] Number of funding rounds before the financial crisis
The propensity score is calculated using the control variables included in the regressions in Table 6.
Standard errors are calculated using bootstrapping (number of bootstraps is 50).
Data source: http://www.crunchbase.com/funding-rounds (accessed March 25th, 2009)

Table 8b: Propensity score matching estimation—first funding rounds only

Dependent variable: log(*raised amount*)

Matching method [1]	**N of treatment group** [2]	**N of control group** [3]	**Average treatment effect**	**Std. err.**	**t-statistic**
Nearest neighbor matching (random weights) (attnd.ado)	91	391	-0.066	0.170	-0.389
Nearest neighbor matching (equal weights) (attnw.ado)	91	391	-0.151	0.159	-0.951
Radius matching (attr.ado)	91	734	0.141	0.143	0.986
Kernel matching (attk.ado)	91	734	0.102	0.140	0.729

[1] Stata command in parentheses
[2] Number of first funding rounds during the financial crisis
[3] Number of first funding rounds before the financial crisis
The propensity score is calculated using the control variables included in the regressions in Table 7 (Model I).
Standard errors are calculated using bootstrapping (number of bootstraps is 50).
Data source: http://www.crunchbase.com/funding-rounds (accessed March 25th, 2009)

Table 8c: Propensity score matching estimation—second and later rounds only

Dependent variable: log(*raised amount*)
#

Matching approach [1]	**N of treatment group** [2]	**N of control group** [3]	**Average treatment effect**	**Std. err.**	**t-statistic**
Nearest neighbor matching (random weights) (attnd.ado)	119	446	-0.147	0.108	-1.359
Nearest neighbor matching (equal weights) (attnw.ado)	119	223	-0.182	0.124	-1.473
Radius matching (attr.ado)	119	446	-0.147	0.107	-1.372
Kernel matching (attk.ado)	119	446	-0.191	0.089	-2.153

[1] Stata command in parentheses
[2] Number of second and later funding rounds during the financial crisis
[3] Number of second and later funding rounds before the financial crisis
The propensity score is calculated using the control variables included in the regressions in Table 7 (Model II).
Standard errors are calculated using bootstrapping (number of bootstraps is 50).
Data source: http://www.crunchbase.com/funding-rounds (accessed March 25th, 2009)