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Is There a Virtuous Cycle Between Venture Capital Performance and Status?

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Abstract

We test the common assertion that venture capital firm (VC) status, measured as syndication network centrality, is positively related dynamically to VC performance. To measure performance we use unique data on VC book value as well as the number of startup IPOs and trade sales in a VC's portfolio. Status is measured by centrality in the VC firm syndication network. In addition to the conventional virtuous cycle, we pose an alternative relationship: that VCs engage in problemistic search, seeking higher status to mitigate a performance decline. We argue that the virtuous cycle and problemistic search should be found in different levels of the status hierarchy. Using a Bayesian dynamic estimator, we find that this is so: Problemistic search occurs in the top tier of firms, which are more flexible in their affiliations; the virtuous cycle is found among middle status firms, which are more conformist; and firms on the far periphery experience no association between status and performance. The data are VC firms in the U.S. from 1980 to 2001.

Abstract

We test the common assertion that venture capital firm (VC) status, measured as syndication network centrality, is positively related dynamically to VC performance. To measure performance we use unique data on VC book value as well as the number of startup IPOs and trade sales in a VC's portfolio. Status is measured by centrality in the VC firm syndication network. In addition to the conventional virtuous cycle, we pose an alternative relationship: that VCs engage in problemistic search, seeking higher status to mitigate a performance decline. We argue that the virtuous cycle and problemistic search should be found in different levels of the status hierarchy. Using a Bayesian dynamic estimator, we find that this is so: Problemistic search occurs in the top tier of firms, which are more flexible in their affiliations; the virtuous cycle is found among middle status firms, which are more conformist; and firms on the far periphery experience no association between status and performance. The data are VC firms in the U.S. from 1980 to 2001.

The purpose of this study is to test the common assertion that there is a positive feedback loop – or virtuous cycle – between an organization’s performance and its status (for a recent discussion see Jensen, Kim and Kim, 2011). Our measure of status derives from network structure, specifically an organization’s network centrality (Bonacich, 1987). In the status literature, more central firms are deemed higher status and are hypothesized to benefit in various ways from their superior positions through higher performance (see Hochberg, Ljungqvist, and Lu, 2007). Moreover, better performance should reinforce these positions, perpetuating the status hierarchy. An alternative argument is that, because higher status leads to better outcomes, firms should seek to improve their status when they perform poorly, an instance of agency or actor-centered behavior influencing network structure (Emirbayer and Goodwin, 1994; White, 1992, Chapter Six).

We test the effect of performance on status in the U.S. venture capital industry from 1980 to 2001. The VC industry has been extensively used to test theory regarding the effects of networks on partner choice (Sorenson and Stuart, 2001; Guler, 2007) and firm performance (). The network in this industry is constructed of syndicated investments in startup companies in a wide range of typically growth stage industries (examples: computer hardware and software, communications, biotechnology, internet hardware and software). Centrality in the syndication network has then been assumed to indicate VC firm status (Sorenson and Stuart, 2001, Guler, 2007). Performance in turn has been construed in terms of successful IPOs or trade sales in the portfolio (Hochberg et al, 2007).

Theory

The status of an organization refers to its hierarchical position in a social system (Merton, 1957) and has been found to have a positive impact on firm outcomes (Podolny,

1993). Examples of such outcomes are higher levels of innovation output (Ahuja 2000), growth rates (Hsu 2004), prices (Benjamin and Podolny, 1999), and cross-selling (Jensen, 2003). The suggested mechanisms for how status improves firm performance are threefold. The first is that organizational status is associated with a specific firm capability that produces a high quality output (Hochberg et al, 2007). Firms with better capabilities are assumed to occupy higher-status positions. Second, status may be associated with a more positive recognition from external audiences (Stuart, Hoang and Hybels, 1999). Status functions as a signal of quality, and audience attention to the positional information often creates a difference in rewards for different-status firms (Merton, 1967; Podolny, 1993). Finally, status may be correlated with superior bargaining power in transactions (Podolny, 1993; Guler, 2007).

Because of the benefits of a high-status position, organizations should attempt to raise their status over time (Jensen, Kim, and Kim, 2011). Thus, status hierarchies are not pre-determined and can be altered by members (Jensen, Kim, and Kim, 2011; Emirbayer and Goodwin, 1994). Previous studies show that organizations can climb up status hierarchies by improving performance or forming affiliations with higher-status organizations (Jensen, Kim, and Kim, 2011). Affiliations to prominent investment banks or venture capital companies, for example, often improve the status of entrepreneurial firms, which in turn positively affects their IPO successes. This characteristic of status distinguishes itself from reputation, which is solely determined by future expectations based on past performance.

The relationship between a firm's status, as reflected by its network position, and its performance over time is thus in part an outcome of firm agency (Emirbayer and Goodwin, 1994). In other words, firm actions occur independently of status hierarchies but determine in part how status hierarchies develop. As previously mentioned, investments in product quality or

affiliations with higher-status firms would be examples of agency that attempt to improve the organizations' status positions. Alternatively, investments that degrade quality or affiliations with more peripheral, that is, lower-status, firms might weaken the firm's status position (Jensen, Kim and Kim, 2011). These effects on status positions should be net of structural inertia. Notably, however, this hypothesis has not yet been tested, even though the importance of investigating the effect of agency on networks has been emphasized (Stuart and Sorenson, 2008).

The possibility of agency, however, does not mean that status is easy to change. It is well-documented that once markets have matured and status hierarchies have been established, they tend to perpetuate because of a virtuous cycle and/or status homophily (Podolny, 1993). First, from the performance perspective, better performance of higher-status organizations based on their positional advantages make them more desirable partners, creating the virtuous cycle between status and performance (Shipilov and Li, 2008). Secondly, from the affiliation perspective, status-leakage may decrease higher-status organizations' incentives to form partnerships with lower-status organizations. Status hierarchies, therefore, replicate themselves through status-homophily in which organizations prefer to choose similar-status organizations as transaction partners.

Given the perpetuating characteristic of status hierarchies, most studies in this vein have examined the influence of status on performance in cross-section without referencing their potential dynamics (but see Shipilov and Li, 2008). In most studies in which dynamics are not an issue (e.g. Hsu, 2004), performance is measured after status, and the feedback effect on status itself has not been examined. But for status to reflect an implicit promise of higher performance, however, performance itself must predict status (cf. Podolny, 1993). Podolny and

Phillips (1996) find such an effect in their study of investment banking firms, even as status persists over time. Nevertheless, they limit their analysis to two periods, reducing the power of their results. Shipilov and Li (2008) also find a virtuous cycle, although they do not test the inertial effects of status and performance or the intertemporal relationship between the two. In this paper, therefore, we contribute to status research by examining how the dynamic between status and performance evolves over many years when structural inertia is controlled for.

Hypotheses

Existing status research generally predicts a positive effect of performance on status, albeit only in cross-section (Hochberg et al, 2007). According to current status research, status hierarchies arise in part from the judgements of a firm's "past demonstrations of quality". These perceptions and judgements by external audiences then positively affect the attractiveness of the focal firm as a future partner. We therefore state the following hypothesis:

Hypothesis One (H1) (virtuous cycle): The performance of a VC firm's portfolio will positively influence the firm's status.

The theory of performance feedback, however, provides an alternative prediction about the performance-status relationship (Cyert and March, 1963; Greve, 1998). Performance feedback suggests that poor performance may initiate problematic search "that is stimulated by a problem ... and is directed toward finding a solution to that problem" (Cyert and March, 1963: 121). From this perspective, insofar as it is generally believed that status has a positive impact on firm performance, low-performing firms will attempt to solve their problem of low performance by trying to climb up the status hierarchy in their industry. As previously mentioned, affiliation with high-status actors can be a path for a focal firm to increase its status position, independent of its performance (Podolny, 1993). If the focal firm knows how to form affiliations with high-status actors (Shipilov, Li, and Greve, 2011), it can solve its problem of

poor performance through affiliations with high-status firms. Thus, unlike existing status literature that predicts a virtuous cycle, poor performance may lead to increased status. We hypothesize:

Hypothesis Two (H2) (problemistic search): VC performance should negatively influence the firm's status.

High-, Middle-, and Low-status Organizations and Status Dynamics

It is generally accepted in status research that there are largely three status groups: high, middle, and low (Phillips and Zuckerman, 2001; Jensen, Kim, and Kim, 2011; Blau, 1963; see also Menzel, 1960). High-status organizations are those within the social boundary of a given market (i.e. audiences regard them as typical members of the market). These organizations, in general, enjoy many positional benefits, including lower transaction costs (Podolny, 1994), higher visibility and recognition (Merton, 1968), and access to better knowledge (Phillips, 1996) than other organizations, and in turn, are more interested in maintaining the current social order and system (Podolny and Phillips, 1996; Podolny, 2005; Gould, 2002). Middle-status organizations are outside the core of the top group and are therefore nearer the boundary of the industry (Phillips and Zuckerman, 2001; Phillips, 2011). Middle-status organizations often confront the strongest pressures to follow norms and expectations in the market to claim and maintain the full market membership (Phillips and Zuckerman, 2001). In contrast, low-status organizations are located outside the market boundary and tend to be relatively free from existing norms and expectations. However, they face difficulties in obtaining critical resources and attention from external audiences because they are not typical members of the market

We argue that these three status groups will vary with respect to performance feedback effects. This argument contrasts with the logic of the virtuous cycle, which should be found in all status groups. According to the virtuous cycle, the better performance of an organization at

any level makes them a more visible and desirable future partner than others, which should increase their subsequent status. However, performance feedback theory in combination with research on status leakage predicts the effect of performance on status will vary across high, middle and low status groups.

Our focus is first on the difference between the top and middle tiers. Our argument is based on the higher conformity constraint experienced and enacted by the middle tier of organizations. Because organizations in the top status group in general have a more enduring social position, based typically on their size, age and visibility, they face lower constraints on adhering to affiliation norms. The firms in the middle tier, however, because they are positioned between the industry's core and its belt of peripheral firms, face a higher risk of status degradation when they "make a mistake" in affiliation. This contrast between the top and middle status groups suggests that they will respond differently to potential syndication partners that have experienced poor performance. In effect, top firms, which have less to lose, will be more willing to affiliate with those engaging in problemistic search. Our hypothesis is:

Hypothesis Three (H3): Firm performance will influence status more positively for the middle status group than in the top status group.

As for the bottom status group, lower-status organizations may not easily form affiliations with higher-status organizations because of high-status firms' status-leakage concerns (Podolny, 1994; Gulati and Gargiulo, 1999; Chung, Singh, and Lee, 2000; Shipilov, Li, and Greve, 2011). Even firms in brokerage positions with informational benefits, for example, could not easily initiate ties to other higher-status firms (Shipilov, Li, and Greve, 2011). Assuming the conformity constraints on middle status firms affect their affiliation with firms in the lower tier, we should see a lower willingness within the middle tier to syndicate with the lower tier in general. But because firms in the lower tier have zero or minimal status,

the only way they can improve their status is by affiliating with the middle tier. If H3 is valid and the middle tier is more likely to follow a virtuous cycle, middle group firms may respond positively to lower tier firms whose performance has improved. Affiliating with a higher performance partner, even though it is in the bottom tier, may increase the knowledge of the middle tier firm, improving its position in the virtuous cycle within its own group. Therefore we proposed the following hypothesis:

Hypothesis 4 (H4): Firm performance will influence status positively for the low status group.

Data

The unit of analysis in this study is the venture capital firm-year. The analysis is based on a unique data set covering 1429 venture capital firms and their investments from the beginning of 1980 to the end of 2001. The uniqueness comes from a subsample of 249 of these firms for which there are data over time on a firm's aggregate book value from the firm's portfolio of investments. These data come from a proprietary source and their summary characteristics have been reported elsewhere (Phalippou and Gottschalg, 2007). Other than this variable, the data set is the same as those firms found in Thompson's VentureXpert, a database that has been used extensively in studies of venture capital firms. The data contains 13501 startups and 20874 first or later round investments involving one or more venture capital firms. There are 4651 IPOs or trade sales in the data.

Measures

Dependent Variable: VC status: Following a host of earlier studies on organizational status from a network perspective (Podolny, 1993; Sorenson and Stuart, 2001; Guler, 2007), this variable is measured as a VC firm's centrality using Bonacich's measure (Bonacich, 1987) in the venture capital syndication network in year t . The syndication network is constructed in

rolling two year windows starting in 1980. Ties between firms are coded as the number of co-syndications. To measure status level, we separate centrality scores into three categories. We define the bottom status as those firms that have zero centrality; the middle status as those firms that are below the median in the set of firms that have positive centrality; and the top firms as those that are above the median. An examination of the distribution of log centrality scores (see Table 1) supports strongly using the median as a break point separating top and middle status groups.

Independent Variables: Performance is measured by two separate variables: 1) Good outcomes (GO) is measured as the number of IPOs or trade sales for the startups in a VC firm's portfolio in year t. 2) Change in Book Value (BV) is the total book value of the VC firm's startup portfolio at the end of year t minus the book value at year t-1.

Control Variables

Firm Heterogeneity is the a VC firm's Bonacich centrality in the network of squared proportions of deals (two year windows) as presented in Bothner, White and Smith (2012). Bothner et al (2012) show that this variable, which they call fragility, is significantly negatively correlated in cross section with an actor's Bonacich centrality. We therefore include it as a control variable.

Size is the natural log of US dollar amount of assets under management (in millions) in year t.

Age is natural log of the number of years since the firm's inception or, if the firm's start date is missing, the number of years since 1980.

Entropy measures the extent to which the VC firm's investments are concentrated by industry. Higher entropy indicates greater concentration. The measure follows Jacquemin and Berry (1979).

Portfolio size: This variable is measured as the number of startups in a VC's portfolio in year t .

Time Effects are included as dummy variables for each year, 1980-2001.

Industry Effects are included as the number of a firm's startups in each of nine industries at the two-digit VEIC level, using Thompson's coding in VentureXpert.

Selection for inclusion in book value sample: We use the predicted values from a probit regression on a firm's inclusion in the subsample (Lee, 1983).

Selection for VC exit. We use the same method to control for firm exit as for sample inclusion.

Method

We use a generalized Method of Moments estimator to test the hypotheses in a linear dynamic panel format. This model removes time-invariant firm effects through first differencing and includes levels of the independent variables as instruments to address the problem of weak instruments (Arellano and Bover, 1995; Blundell and Bond, 1998). This technique is appropriate for our analysis since status is quite highly autocorrelated, suggesting that weak instruments may be present. Also, this technique is designed for data sets with many panels (the VC firms) and few time periods, as found here. A criterion for its application is the absence of serial correlation in the higher order error terms of the differencing equation. We tested for this criterion and found it to be satisfied. We correct for clustering in the error term by using Huber-White robust standard errors. Because the syndication network has a large main component, we

run the regressions both for firms belonging to this component and for all firms, controlling for membership in this component with a dummy variable.

Results and Discussion

Table 1 shows the distributions of log centrality for the VC network every four years. Zero centrality firms are excluded from the graph. The plots are remarkably similar in shape and demonstrate that the median value of centrality is a reasonable cut point separating high and mid status firms.

Table 2 presents the means, standard deviations and correlations of the variables in cross section. Noteworthy are the high positive correlations between VC status and 1) the number of positive outcomes (IPO or trade sale), 2) the number of firms in a VC's portfolio, and 3) VC size in assets; and the negative correlations between VC status and 1) VC entropy, and 2) VC heterogeneity, which is consistent with Bothner et al. (2012). More IPOs are also associated with larger positive changes in the VC's book value, as is intuitive. High status firms are also more likely to be in the main component, also intuitive.

Table 3 presents the effects on VC status of performance and other predictors lagged one year and net of the serial correlation in status. Both measures of performance predict overall VC status negatively, supporting H2 and disconfirming H1. But these effects vary by status level. The table shows that the negative effect of performance occurs only for the top status group, and that there is a virtuous cycle for the middle group. These effects are significantly different, for both types of performance (GO and BV), supporting H3. Further, neither performance measure has an effect for the bottom status group, disconfirming H4.

We present Table 4 to show that seeking status is rational in the sense that higher status firms have more positive outcomes (IPO's and trade sales), consistent with earlier research, and

that more positive outcomes lead to a greater increase in book value. Note that there is no direct effect of status on changes in book value per se. This result rather strongly indicates that the effect of status on performance is based on superior signaling rather than superior capability.

Because we test the effect of performance on status in a dynamic model, controlling for the serial correction of status over time, our study contributes to the literature on how networks evolve (Gulati and Gargiulo, 1997; Ahuja, Soda and Zaheer, 2012). The model shows a very high serial correlation in centrality, consistent with earlier research. But we also show that micro effects on status levels are significant and importantly in different directions (see Bothner et al, 2010 for a discussion of micro and macro effects on status development). Thus, once a firm has overcome the overwhelming inertia in VC status ranking, it can expect structural benefits from being high status when it performs poorly (i.e., poor performers may become stronger through syndicating with more powerful partners). But to get to the top group, a middle tier firm must perform at a high level consistently; otherwise other middle tier firms will drop it.

Thus the VC status hierarchy is subject to agency at the top and in the middle, but not at the bottom. Presumably, as we have argued, this pattern occurs for two reasons. First, at the top, poor performers seeking higher status can reverse their performance decrement by affiliating with other top performers, and other top firms have the flexibility to affiliate with them. In this way, the top tier self-adjusts to account for performance deficits rather than being locked into a process of status-performance reinforcement. Middle and bottom firms, in contrast, do not have such flexibility. If a middle status firm performs poorly, it must turn itself around without the benefit of syndicating with higher status firms. At the same time, if it performs well, other firms in its tier (but not the top tier), are more likely to syndicate with it. Firms at the bottom - on the far periphery of the status hierarchy - can neither benefit from their

performance when it is good (like middle status firms) nor improve their performance when it is bad (like top tier firms). For them, how they perform is irrelevant for future syndications.

References

- Ahuja, G., 2000, "Collaboration Networks, Structural Holes, and Innovation: A Longitudinal Study," *Administrative Science Quarterly* , 45: 425-455.
- Ahuja, G., G. Soda, and A. Zaheer. 2012, "The genesis and dynamics of organizational networks." *Organization Science* 23:434-448.
- Arellano, M. and O. Bover. 1995. "Another look at the instrumental variable estimation of error-components models," *Journal of Econometrics*, 68: 29–51.
- Azoulay, P., T. Stuart and Y. Wang, 2011, "Matthew: Effect or Fable," working paper, Sloan School, MIT.
- Baum, J. T. Rowley, A. Shipilov and Y-T Chuang, 2005, "Dancing with Strangers: Aspiration Performance and the Search for Underwriting Syndicate Partners," *Administrative Science Quarterly*, 50:29-51.
- Benjamin, B. and J. M. Podolny, 1999, "Status, Quality, and Social Order in the California Wine Industry," *Administrative Science Quarterly*, 44: 563-589
- Blundell, R., and S. Bond. 1998. "Initial conditions and moment restrictions in dynamic panel data models," *Journal of Econometrics* 87: 115-143.
- Bonacich, P. 1987, "Power and Centrality: A Family of Measures," *American Journal of Sociology*, 92:1170-1182.
- Bothner, M. R. Haynes R., W. Lee, and E. Smith, 2010, "When Do Matthew Effects Occur?" *Journal of Mathematical Sociology*, 34: 80-114.
- Bothner, Matthew S., Edward Bishop Smith, and Harrison C. White. 2012, "A Model of Robust Positions in Social Networks1." *American Journal of Sociology* 116: 943-92.
- Cyert, W. and J. March, 1963, *A Behavioral Theory of the Firm*, Englewood Cliffs NJ.

- Emirbayer, M, and J. Goodwin, 1994, "Network Analysis, Culture, and the Problem of Agency," *American Journal of Sociology* , 99:1411-1454.
- Gould, R. 2002, "The Origins of Status Hierarchies: A Formal Theory and Empirical Test," *American Journal of Sociology* , 107: 1143-1178.
- Greve, H. R. 1998, "Performance, aspirations, and risky organizational change." *Administrative Science Quarterly* 43: 58-86.
- Gulati, R., and M. Gargiulo. 1999. "Where do interorganizational networks come from? 1." *American journal of sociology* 104: 1439-1493.
- Guler, I. 2007, "Throwing Good Money after Bad? Political and Institutional Influences on Sequential Decision Making in the Venture Capital Industry," *Administrative Science Quarterly* , 52:248-285
- Hochberg, Y., A. Ljungqvist and Y. Lu, 2007, "Whom You Know Matters: Venture Capital Networks and Investment Performance," *The Journal of Finance* , 62:251-301.
- Jacquemin, A. and C. H. Berry , 1979, "Entropy Measure of Diversification and Corporate Growth," *The Journal of Industrial Economics* , 27: 359-369.
- Jensen, M., B-K. Kim and H. Kim, 2011, "The Importance of Status in Markets: A Market Identity Perspective, in *Status in Management and Organizations*, Jone L. Pearce, (ed.), Cambridge University Press: Cambridge, UK, pp. 87-117.
- Lee, L-F, 1983, "Generalized Econometric Models with Selectivity," *Econometrica*, 51: 507-512.
- Mariolis, P. and M. Jones, 1982, "Centrality in Corporate Interlock Networks: Reliability and Stability," *Administrative Science Quarterly* , 27: 571-585.
- Merton, R. 1957, *Social Theory and Social Structure*, Free Press: New York.

- Phalippou, L. and O. Gottschalg, 2009, "The Performance of Private Equity Funds," *Review of Financial Studies*, 22: 1747-1776.
- Podolny, J. 1993, "A Status-Based Model of Market Competition," *American Journal of Sociology*, 98: 829-872.
- Podolny, J. and D. Phillips, 1996, "The Dynamics of Organizational Status," *Industrial and Corporate Change*, 5: 453-471.
- Shipilov, A. V., and S. Li. 2008. Can you have your cake and eat it too? Structural holes' influence on status accumulation and market performance in collaborative networks." *Administrative Science Quarterly* 53: 73-108.
- Shipilov, A. V., S. Li, and H. R. Greve. 2011, "The prince and the pauper: Search and brokerage in the initiation of status-heterophilous ties." *Organization Science* 22: 1418-1434.
- Sorenson, O. and T. Stuart, 2001, "Syndication Networks and the Spatial Distribution of Venture Capital Investments," *American Journal of Sociology* , 106:1546-1588.

Table 1

Distribution of Log Centrality by Year in Four Year Increments

(excluding VCs with zero centrality scores)

(Number of VC firms in the year on the horizontal axis)

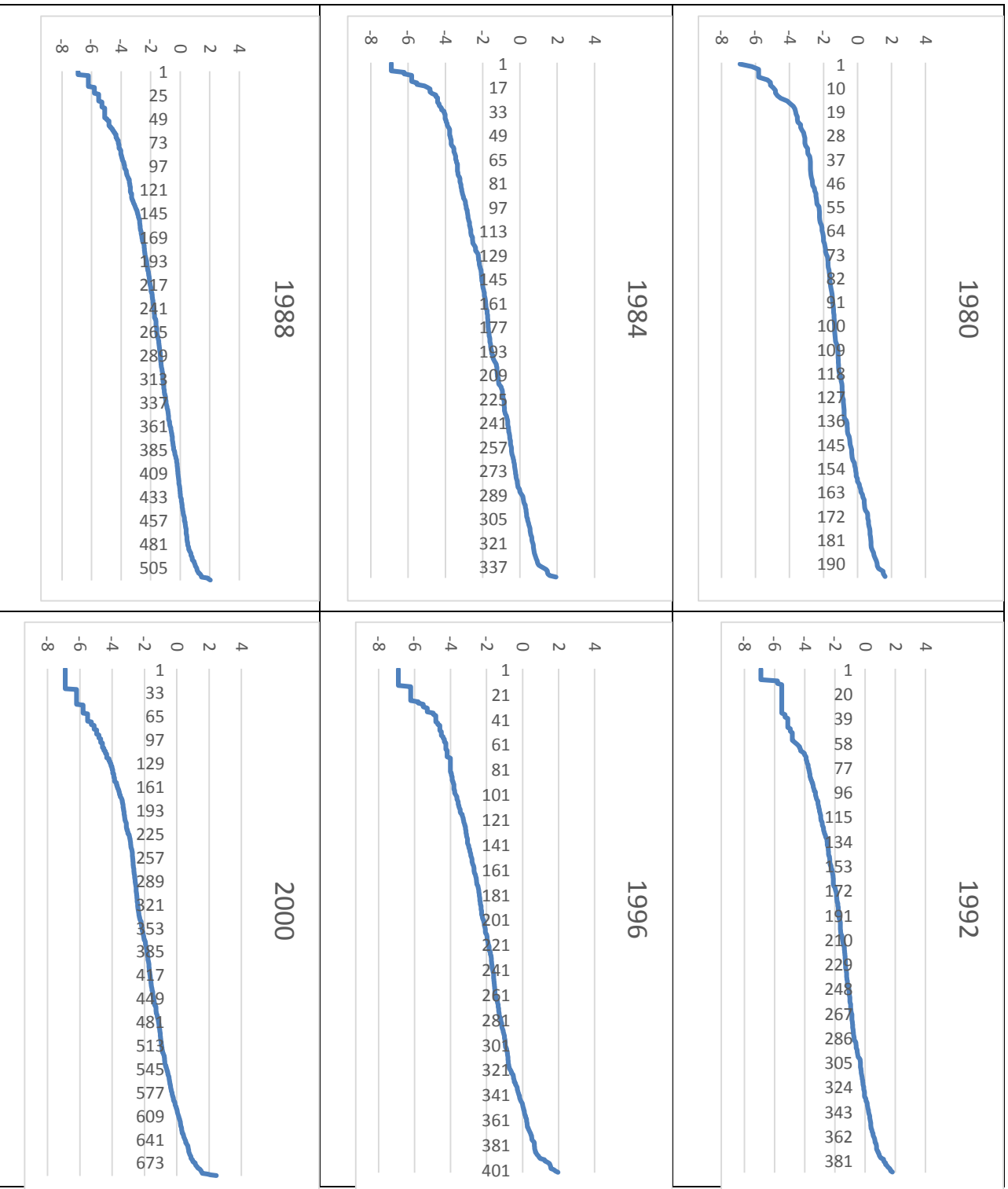


Table 2

Means, Standard Deviations, Correlations

	<u>Mean</u>	<u>Std. Dev.</u>	<u>Correlations</u>											
Status (VC centrality score)	0.20	0.627	1.00											
Change in VC Book Value	16342.8	172097.4	0.12	1.00										
# VC Good Outcomes (Startup IPOs or Trade Sales)	2.43	6.57	0.53	0.21	1.00									
VC Heterogeneity	0.24	0.58	-0.23	-0.02	-0.11	1.00								
(ln) VC Size	7.86	5.44	0.43	0.10	0.46	-0.12	1.00							
(ln) VC Age	1.39	1.11	0.12	0.06	0.36	0.02	0.67	1.00						
VC Entropy	-1.25	17.94	-0.55	-0.04	-0.48	0.13	-0.35	-0.14	1.00					
VC Portfolio Size	17.85	53.51	0.61	0.15	0.59	-0.14	0.59	0.44	-0.68	1.00				
Sample Selection	0.50	0.68	-0.22	-0.06	-0.26	0.55	-0.08	-0.16	0.14	-0.25	1.00			
VC Exit Selection	0.003	0.002	-0.11	0.06	0.18	0.084	0.3	0.71	-0.10	0.22	-0.15	1.00		
Main Component	0.42	0.49	0.27	0.01	0.17	0.23	0.43	0.18	-0.13	0.21	0.67	-0.11	1.00	

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Table 3
Dependent Variable: VC Status (Bonacich Centrality)
(All predictors lagged one year)

*p<.05

	Main component		All firms (controlling for main component)		Main component		All firms (controlling for main component)	
	Coeff	T-value	Coeff	T-value	Coeff	T-value	Coeff	T-value
VC Status	0.96*	25.29	0.92*	24.56	0.95*	25.04	0.92*	24.34
VC Heterogeneity	0.032*	2.92	0.019*	2.3	0.026*	2.44	0.017*	2.04
(ln) VC Size	0.042*	5.17	0.024*	4.03	0.043*	5.3	0.023*	4.06
(ln) VC Age	-0.036	-0.84	-0.21*	-4.44	-0.041	-0.93	-0.21*	-4.48
VC Entropy	-0.020*	-4.23	-0.020*	-4.11	-0.021*	-4.31	-0.021*	-4.19
VC Portfolio Size	-0.0028*	-2.14	-0.0023	-1.89	-0.0026*	-2.06	-0.0022	-1.75
Change in Book Value (BV)	-1.7E-07*	-2.37	-1.9E-07*	-2.61				
Low status VCs (LS) *BV					4.45E-08	0.37	1.27E-07	1.12
Mid status VCs (MS) * BV					2.6E-07*	3.62	3.10E-07*	3.91
High status VCs (HS) * BV					-2.2E-07*	-2.77	-2.1E-07*	-2.59
# VC Good Outcomes (GO)	-0.0038*	-2.57	-0.0040*	-2.62				
LS * GO					0.0052	1.57	-0.00034	-0.09
MS * GO					0.0014	0.76	0.00079	0.44
HS * GO					-0.0041*	-2.62	-0.0038*	-2.52
Selection for subsample	-0.039	-1.88	-0.43*	-6.02	-.045*	-2.21	-0.43*	-6.02
Selection for VC exit	-288.26*	-4.73	-52.44	-0.87	-286.77*	-4.69	-63.46	-1.08
Main component dummy			0.60*	6.55			0.60*	6.55
Constant	-0.11	-1.21	-0.13	-1.71	-0.11	-1.16	-0.13	-1.71
Sample size	3159		3611		3159		3611	
Wald χ^2 (df)	9056 (39)		8676 (40)		9433 (43)		9374 (44)	

Test for difference between levels of VC status * Change in BV					χ^2 (2) = 17.31, p = .0002	χ^2 (2) = 15.77, p = .0004
Test for difference between mid status*BV and high status *BV (H3)					χ^2 (2) = 16.41, p = .000	χ^2 (2) = 15.49, p = .0001
Test for difference between levels of VC status * # of Good Rounds					χ^2 (2) = 10.66, p=.0048	χ^2 (2) = 13.61, p=.001
Test for difference between mid status*GO and high status *GO (H3)					χ^2 (2) = 10.17, p = .0004	χ^2 (2) = 11.72, p = .0001

Is There a Virtuous Cycle Between Venture Capital Firm Status and Performance?

Table 4
 Dependent Variable: VC Firm Performance
 Change in VC Book Value or # of VC Annual Good Outcomes (IPOs or trade sales)
 (All predictors lagged one year)
 (Sample is all firms – both within and outside main component)

*p<.05

	Change in VC Book Value (Annual)				# of VC Good Outcomes (Annual)			
	Coeff	T-value	Coeff	T-value	Coeff	T-value	Coeff	T-value
# VC Good Outcomes					-0.048	-1.31	-0.0481	-1.3
Change in VC Book Value	0.094	1.7	0.094	1.7				
VC Heterogeneity	-375.05	-0.06	-1769.8	-0.31	-0.728*	-2.52	-0.799*	-2.03
(Ln) VC Size	1345.36	0.3	1596.8	0.39	0.230	1.84	0.232	1.87
(Ln) VC Age	-62180.4	-0.99	-58908	-0.81	-1.935	-1.5	-1.991	-1.19
VC Entropy	1515.71	0.35	1416.73	0.32	-0.393*	-2.79	-0.392*	-2.79
VC Portfolio Size	3122.25*	2.46	3124.6*	2.46	0.153*	5.16	0.153*	5.16
VC Status	31110.64	1.87			2.250*	4.29		
Low status VCs (LS)			2926.94	0.13			-0.264	-0.29
Mid status VCs (MS)			17062.8	0.27			1.205	0.38
High status VCs (HS)			31518.0	1.86			2.244*	4.2
Annual Change in VC Book Value (BV)					-2.53E-06	-1.14		
LS * BV							3.30E-06	0.99
MS * BV							-4.15E-06	-1.28
HS * BV							-2.51E-06	-1.07
# VC Good Outcomes (GO)	2500.16*	2.46						
LS * GO			2377.1	1.46				
MS * GO			3792.3*	2.64				
HS * GO			2454.6*	2.39				
Selection for subsample	-19281.3	-0.51	-17895.4	-0.52	-5.50*	-3.62	-5.33*	-3.72
Selection for VC exit	7.05E+07	0.5	7.01E+07	0.49	-705.60	-0.37	-696.21	-0.35
Main component dummy	37300.01	0.61	32009.03	0.58	8.24*	3.49	7.83*	3.6
Constant	-68883.5	-0.57	-44416.7	-0.39	-5.37*	-2.97	-5.33*	-3.72
Sample size	3611				3611			
Wald χ^2	200.38 (40)				246.97 (44)			

Test for difference between VC status levels			$\chi^2 (2) = 1.34, p = .51$			$\chi^2 (2) = 6.32, p = .043$
Test for difference between levels of VC status * performance (GO or BV)			GO: $\chi^2 (2) = 1.32, p = .51$			BV: $\chi^2 (2) = 2.79, p = .25$