Venture Capital and Industry Structure: Evidence from Local U.S. Markets*

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Abstract

This paper uses a panel of U.S. manufacturing industries to test how venture capital affects the size distribution of business firms. The estimates suggests that an increase in the supply of venture capital affects positively the number of firms and mean firm size, and it has an ambiguous effect on median firm size. These results are robust to specifications that address the endogeneity in the supply of venture capital, as well as to controlling for the effect of bank deregulation. The empirical evidence is consistent with the idea that venture capital is simultaneously conducive to new business creation and to the emergence of new industry leaders.

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1 Introduction

After being at the forefront of economic research for the better part of two decades, the question of the effect of finance on growth appears to have been largely settled: economists today tend to agree that broader, deeper, and more efficient financial markets are associated with higher long-term economic growth.[1] In pursuit of a more complete picture, research effort has moved towards studying the effect on economic growth of various types of financial markets,[2] as well as studying the mechanisms through which this growth is realized.[3] One of the financial markets to come under most intense research scrutiny of late has been the venture capital industry, and the effect of financial markets on the firm size distribution has been an increasingly active research stream of late. However, there has been no systematic attempt to link the two, which is surprising given the range of questions some well-documented developments on both fronts in the wake of the information and communication revolution have given rise to. For example, does the fact that most of the new industrial leaders - like Microsoft, Cisco, Oracle, and Google - are in the high-tech sector imply that venture capital has contributed to the emergence of today's corporate giants? Did the explosion of early-stage risk capital in the past 30 years contribute through new business creation to an increased within-industry competitive pressures, followed by an increased turnover of indus-

[1]The idea to link finance and growth in a causal way traces back to Schumpeter (1912) and later Goldsmith (1969) and McKinnon (1973). The modern impetus to studying the nexus is usually attributed to King and Levine (1993a,b), and includes influential studies by Demirguc-Kunt and Maximovic (1998), Rajan and Zingales (1998), and Levine, Loyaza, and Beck (2000), among others. For recent surveys, see Beck, Demirguc-Kunt, Levine, and Maksimovic (2001), Wachtel (2001), and Levine (2005).

[2]For example, see Jayaratne and Strahan (1996) for a study into the effect of bank competition on growth, and Levine and Zervos (1998) for an empirical investigation of the effect of stock markets on growth, among others.

[3]For example, see Kortum and Lerner (2000) for a study on the effect of venture capital on industrial innovation, Cetorelli and Strahan (2006) for an empirical investigation of the effect of bank competition on new business creation, and Aghion, Fally, and Scarpetta (2007) for a study on the effect of credit markets on the post-entry growth of firms, among others.

try leaders?[4] What specific characteristics of industries are affected by finance so that it eventually translates into a real effect on the size distribution of business firms?

My paper addresses these questions by studying the impact of venture capital (VC) on well-defined measures of industry structure in U.S. local markets between 1980 and 2001. More precisely, I investigate how the total number of firms and the skewness of the firm size distribution have evolved in industries and states where venture capitalists have been active relative to industries and states which venture capitalists have largely ignored. The firm size distribution is an important determinant of market performance and economic growth. For example, the skeweness of the firm size distribution can explain a large part of the cross-market variation in job creation or per-worker income (Davis and Haltiwanger, 1992; Alfaro, Charlton, and Kanczuk, 2008). Linking in a convincing fashion finance to the distribution of firm sizes can therefore help clarify some of the channels through which financial markets affect various macroeconomic outcomes.

My results suggest that more vigurous activity by venture capitalists is associated with a higher number of firms and a higher mean firm size, while the effect on median firm size is ambiguous. The evidence thus implies that the firm size distribution has become somewhat more skewed to the right over time, both due to the influx of new firms and due to the growth in the average size of large firms. I also find that the latter result can not only be attributed to the further growth of already existing large firms, as the *number* of large firms has also increased in VC-active industries. I therefore interpret the results in the sense of the ability of venture capital finance to sustain the emergence of successful firms in possession of large projects that over time grow to be the industry leaders of tomorrow.

There are endemic problems associated with identifying the causal effect of venture cap-

[4]Comin and Philippon (2005) document that the 5-year ahead exit rate from the top 20% of industry, based on market value, increased from 5% in 1980 to 25% in 2000.

ital on real economic activity which I try to deal with carefully. For one, both the structure of industrial sectors and venture capital activity may be driven by a common factor. For instance, a greater availability of specialized human capital may have increased VC investment efficiency and at the same time exerted an independent effect on the industry structure through a better matching of capital to entrepreneurial talent. Alternatively, demand for VC funds may be higher in industries which exhibit higher business churn for technological reasons, or in markets populated by larger and more efficient firms. I address these simultaneity issues in two different ways. First, I employ a fixed effects panel estimation strategy which allows us to net out the effect of common unobservable factors at the state and sector level. Second, I use the size of state and local pension funds together with the structural break induced by a policy innovation opening the door to pension funds to invest in risk capital[5] as instruments to identify the supply of venture capital. I also vary the empirical methodology in order to account for concurrent developments in other financial markets (most notably, interstate and intrastate branching deregulation), for errors-in-variables induced by the fluctuating nature of VC investment, and for the highly skewed distribution of VC investment across states and industries, among others. The overall results remain qualitatively robust to all alternative specifications.

The paper relates to three main lines of empirical literature. First, various researchers have sought to link general financial development to the distribution of firm sizes. For example, Kumar, Rajan, and Zingales (1999) find that the median firm in sectors dependent on external finance tends to be larger in countries with more efficient financial systems. Cabral and Mata (2003) study the evolution of the firm size distribution in a sample of Portuguese

[5]In 1979, the U.S. Department of Labor clarified that investments in venture capital funds by pension funds do not violate the prudent man rule in the Employee Retirement Income Security Act (ERISA). See Gompers and Lerner (1999) for details.

manufacturing firms, and show that financial constraints can be linked to the fact that the distribution of older firms is more symmetric than the distribution of younger firms (Cooley and Quadrini (2001) offer a formal theoretical treatment). However, recently Angelini and Generale (2008) have questioned this result, providing evidence that financial frictions exert little effect on the firm size distribution in developed economies. Second, recent empirical research has sought to link venture capital involvement with firm growth. For example, Hellmann and Puri (2000) show that VC-backed firms hire more workers, controlling for firm age and industry. Bottazzi and Da Rin (2002) find that venture capital is effective in helping firms overcome credit constraints, be born in the first place, and grow faster conditional on entry. Finally, my paper adds to a remarkably limited research on the effects of venture capital on aggregate economic growth, rather than on firm-level performance. Among the few studies on the subject, Kortum and Lerner (2000) and Hirukawa and Ueda (2008) show that venture capital investment in the United States is associated with more innovation as measured by patent counts and patent citations at the industry level, and Tang and Chyi (2008) find that venture capital investment enhances productivity growth.

Mine is the first study to explore the effect of venture capital on the overall firm size distribution. This is crucial as it goes to the heart of policies aimed at improving economic efficiency. For example, venture capital has been shown to bring to the marketplace new firms in possession of disruptively innovative ideas, both in the U.S. and in Europe (Popov and Roosenboom, 2009; Samila and Sorenson, 2011). However, the effect of this process on the full firm size distribution is unknown. Have the industry leaders become smaller and less dominant, or is it rather that new, larger, and more viable industry leaders have emerged as a result from this increased competition? It is therefore essential to provide knowledge on whether it is indeed the superior ideas that quickly benefit from venture capital finance to become full-blown corporate giants like Microsoft and Google. In addition, it is important to know whether this development is equally strong in "old" and in "new" industries. By observing the firm size distribution development at the industry level, I am able to answer the above question by distinguishing more traditional industries from those at the forefront of technological progress.

The remainder of the paper is organized as follows. Section 2 describes the theoretical links between venture capital and the firm size distribution. Section 3 describes the data used in the analysis. In Section 4, I discuss the empirical model. Section 5 reports the results from the main models and from exercises designed to address various endogeneity and robustness issues. Section 6 concludes with the main findings of the paper.

2 Venture capital and industry structure: Theoretical arguments

What is the effect of venture capital finance on the firm size distribution in non-financial industries? To begin with, financial constraints tend to play a significant role in firms' investment decisions (Fazzari, Hubbard, and Petersen, 1988), and this is particularly true for young firms (Evans and Jovanovic, 1989). Cooley and Quadrini (2001), Cabral and Mata (2003), and Albuquerque and Hopenhayn (2004) put forth theories which use financial constraints to generate scale dependence, or rates of growth and exit rates declining with establishment size. In these theories, the relaxation of financial constraints is systematically reflected in the size distribution of establishments by allowing young firms to grow faster and challenge established incumbents. King and Levine (1993b) develop a model in which financial intermediaries screen potential entrepreneurs and mobilizes resources to finance the most promising investment projects, thereby improving the probability of successful innovation and accelerating economic growth. The practical implication of these theories is that a more efficient financial system should increase the right-skew of the firm size distribution by improving the survival chances of small young firms and by ensuring that the largest and most viable projects receive funding.

Although credit markets have inspired a host of empirical tests of these theoretical predictions (Cetorelli, 2004; Cetorelli and Strahan, 2006), banks are often reluctant to finance small young firms because of high uncertainty, information asymmetries, and agency costs (Beck, Demirguc-Kunt, and Maksimovic, 2004). In comparison, venture capitalists are specialized to overcome these problems through the use of staged financing, private contracting, and active monitoring (Hellmann, 1998; Gompers and Lerner, 2001; Kaplan and Stromberg, 2001; Casamatta and Haritchabalet, 2007), and are therefore more likely to finance early stage and technology companies. In general, there are three main mechanisms suggested by the literature via which venture capital should lead to higher rates of new business creation. First, venture capitalists may directly assist the birth of new firms through, for example, seed capital. Hellmann and Puri (2000) show that VC-backed firms have a significantly higher probability of bringing an actual product to the marketplace than non -VC-backed firms. Keuschnigg (2004) develops a model in which the entrepreneur's own wealth constitutes a binding constraint, and so venture capitalists stimulate new business creation by ensuring that good ideas receive funding even when conceived by entrepreneurs without substantial assets. Second, nascent entrepreneurs may recognize the need for capital in the future and only establish firms when they have reasonably high expectations of obtaining such funding. This implies that not just seed capital, but later financing stages, like start-up and expansion finance, should matter too for firm entry (Samila and Sorenson, 2011). Third, firms may be engaged in "entrepreneurial spawning" or in spin-offs. Gompers, Lerner, and Scharfstein (2005) show that younger public firms located in main hubs of venture capital activity are the most likely to create new ventures. Sevilir (2010) develops a model in which the availability of new firm financing through venture capitalists makes it more desirable for employees to exert effort, generate a new business idea, and start their own firm. Alternatively, new firms may be established by existing corporations themselves. Fulgieri and Sevilir (2009) argue that when the competition to innovate intensifies, firms move from internal to external organization of projects to increase the speed of product innovation and to obtain a competitive advantage with respect to rival firms in their industry.

To the extent that these theories say little about the competitive effects of firm entry, they give rise to Hypothesis 1: *Venture Capital is associated with a larger number of firms, and a lower mean and median firm size.*

In addition to linking venture capital finance to new business creation, the literature has made predictions about the effect of venture capital on the right tail of the firm size distribution. Early field research by Sahlman (1990) suggested that the value of venture capital lies in providing not only money but also ancillary services, such as selecting good firms and "professionalizing" companies. This argument has two subpoints. For one, venture capitalists can screen firms better than banks and consequently take on larger but riskier projects. For example, in Ueda (2004) firms choose the type of finance based on the trade-off between technological expertise and the risk of expropriation, whereby larger projects are financed by VC and VC-backed projects achieve faster growth. In Winton and Yerramilli (2008), there is a trade-off between VC expertise and the higher return demanded by venture capitalist to compensate for the liquidity restrictions imposed by VC funds on their investors. Their model yields similar predictions in that in equilibrium, venture capitalists end up financing larger projects than banks.[6] To the extent that such large but risky projects may not have been selected for financing by banks in the first place, VC should then be associated with the entry in product markets of potentially larger firms. Puri and Zarutskie (2011) provide some support for this conjecture by demonstrating that venture capitalists invest in firms with large scale.

For two, venture capitalists provide value-added services by mentoring entrepreneurs, hiring executives, formulating strategies, and helping the companies they finance establish themselves in the marketplace. In particular, Berlin (1998) argues that venture capitalists work in close collaboration with the stock market to take the firms they fund public. Kaplan and Stromberg (2001) suggest that venture capitalists not only screen companies, but also actively monitor them over time, thereby improving their market strategy. Hellmann and Puri (2002) argue that venture capitalists play an active role in helping their portfolio companies recruit professional CEOs and skilled workers at various hierarchy levels. The immediate implications for the firm size distribution of these arguments is that venture capital does not simply create companies, but it results in larger companies in equilibrium.

These theories give rise to Hypothesis 2: *Venture Capital is associated with a larger number of firms and a higher mean firm size. The effect on median size is an empirical issue.*

3 Data sources

These ideas suggest that venture capital could play an important role in determining the industry structure in product markets: either new firms enter and remain small, exerting

[6] Lending empirical gravitas to this prediction, Kaplan and Stromberg (2002) find that venture capitalists invest a median of $4.5 million in their portfolio companies in each stage, which is significantly more than the median amount lent by banks to start-up firms.

competitive pressure on established industry leaders, or new firms enter and over time grow to be the industry leaders of tomorrow. Empirically putting these ideas to the test requires data on venture capital investment and on well-defined measures of the firm size distribution over time. Below I describe the data used in this study.

3.1 Venture capital investment

The venture capital investment data come from Thomson VentureXpert. Venture capital investments include seed/start-up, development, early, balanced, expansion and later stage investments. By definition, they exclude buyouts, mezzanine financing, turnaround financing, distressed debt investments, and other private equity investments by secondary funds and fund of funds. The Thomson VentureXpert database contains information for all venture capital deals realized, by state and industry class, from 1960 on. I focus on the period from 1980 to 2001 for one practical reason. In 1979, the U.S. Department of Labor clarified that investments in venture capital funds by pension funds do not violate the prudent man rule in the Employee Retirement Income Security Act (see Gompers and Lerner, 1999, for details). Partially as a result of this policy shift, investment in new venture capital funds increased 10-fold over the next decade, and by 1986 pension funds accounted for more than half of all contributions (Kortum and Lerner, 2000). Therefore, I focus on a period which is not contaminated by a structural shift in VC finance due to this policy change.

The original VentureXpert data contain information about deal value, in millions of current USD, as well as each portfolio company's industry affiliation codes. However, the latter cannot be matched automatically to SIC 1987. This necessitates aggregating the data along broader industry classes using a concordance key described in Section 3.3.

3.2 Industry structure

Next, I construct a panel data set of manufacturing establishments across U.S. states between 1980 and 2001. Data on establishments are available at a disaggregated industry level on an annual basis from the County Business Patterns, which is an annual survey by the Census Bureau. I exploit the same source of data on establishments as Cetorelli and Strahan (2006), who focus on 1977-1994, but I extend the sample period in order to capture as much of the development of the effect of venture capital on the industry structure as possible.[7] The data provide the best opportunity to observe the industry structure in local U.S. markets over a long period of time. However, further disaggregation by industry code or geography creates substantial difficulties with missing values (Cetorelli and Strahan, 2006), and so I choose to focus on two-digit SIC codes in terms of industry disaggregation and on the state level in terms of geographic disaggregation.

Given that the focus of the study is to test predictions about the evolution of industry structure, I use the original data to compute three main variables. The first variable is total number of establishments per capita, calculated by dividing the total number of establishments in each industry-state-year by total population in the respective state-year. The second variable is mean firm size, defined as total employment divided by total number of establishments in each industry-state-year. The third variable is median firm size. The original data are grouped by employment bins and therefore it is not possible to know automatically the size of the median firm. Therefore, I use the technique proposed by Kumar, Rajan, and Zingales (1999): for each state-industry-year, I first determine which employment bin contains the median firm. Next, I define median firm size as total employment in that employment bin divided by total number of establishments in that employment bin.

[7]2001 is the last year for which data is available in the County Business Patterns.

By means of an example, there are a total of 88 employees in a total of 9 establishments in Industry 9 ("Primary metals") in Idaho in 1983. 2 of these establishments are in the "1-4" employment bin, 4 are in the "5-9" employment bin, 2 are in the "10-19" employment bin, and 1 in the "20-49" employment bin. Therefore, the median establishment resides in the "5-9" employment bin. There are a total of 30 employees in this bin, and hence I calculate the size of the median firm as $\frac{30}{4} = 7.5$.

Finally, although the number of establishments and the number of firms is not perfectly correlated, the correlation over the period has been very close to 1 in recent years: for example, in 2001, 94% of the U.S. firms (measured using IRS-issued Employer Identification Numbers) had a single establishment.[8]

3.3 Concordance key

One complication involved in combining the County Business Patterns database and VentureXpert is industry concordance. County Business Patterns uses 2-digit SIC to code industries up to 1997, and 2-digit NAICS to code industries from 1998 to 2001, and VentureXpert records the primary 4-digit SIC codes of the VC financed companies. Consequently, I need a concordance key which can convert the three industry classifications into a common one.

I start by converting the VentureXpert data into the Kortum-Lerner manufacturing classes using the concordance procedure developed in Hirukawa and Ueda (2008). Although the 4-digit SIC code is well recorded until 1992 (84% of the 25,328 VC deals between 1965 and 1992 record this information), only 9.9% of the 42,003 VC deals between 1993 and 2001 record the primary SIC code. Instead of SIC codes, VentureXpert uses its own proprietary industry classification system, the Venture Economics Industry Code ("VEIC"). There is no

[8]See the Bureau of Labor Statistics Business Emploment Dynamics for details.

missing record for this VEIC variable. However, a single industry in VEIC may consist of more than one industry in SIC and vice versa. In addition, differences in terminology across the two databases add another difficulty: for instance, a firm classified in "Biotech Related Fine Chemicals" (VEIC 4311) may belong to "Chemicals and allied products" (SIC 2-digit, 28) or to "Research, development, and testing services (except noncommercial research organizations)" (SIC 3-digit, 873).

To facilitate convergence, Hirukawa and Ueda (2008) use the classification employed by Kortum and Lerner (2000) who aggregate 3-digit level SIC industries into 20 industries. To construct VC investment data along the Kortum and Lerner classification, first the missing records of SIC are filled using the SDC Platinum Global New Issue and CRSP through CUSIP match. Next, D&B Million Dollar Database and the business description written in VentureXpert is used to fill in missing SIC codes. Finally, for deals with recorded SIC codes, VC investment is aggregated into a Kortum and Lerner classification code using the concordance given in Table 1. For deals for which SIC codes are not recorded, the recorded VEIC is used to distribute the investment amount into SIC-based industries. The distribution rule is constructed from the data records with SIC codes and thereby Kortum-Lerner classification assigned in the way described above. For each VEIC, the distribution of investment amount over Kortum and Lerner classification codes is obtained and used for assigning Kortum and Lerner classification codes to each venture capital deal without SIC codes. Finally, Kortum and Lerner industries which correspond to 3-digit SIC classes are merged into 2-digit SIC classes, to facilitate matching to the County Business Patterns database, and all relevant information is aggregated.

Next, I convert the NAICS industries from the 1998-2001 County Business Patterns into a classification which can be matched to SIC without loss of information. This procedure involved the merging of several sets of industries. For example, the various 4-digit subgroups of NAICS code 333 correspond both to SIC 2-digit codes 35 and 36; the various 4-digit subgroups of NAICS code 334 correspond to SIC 2-digit codes 35, 36, and 38; and all 4-digit subgroups of NAICS code 335 corresponds to SIC 2-digit code 36. Consequently, NAICS codes 333-335 are merged into one class and matched to the SIC class resulting from the merging of SIC codes 35, 36, and 38. Analogically, NAICS codes 311, 312, 316, 323, and 339 are merged into one class and matched to an aggregate SIC class comprised by SIC codes 20, 21, 27, 31, and 39. This procedure guarantees that I do not lose information through imperfect matching.

This matching procedure across three separate industry classification results in 12 final industries (See Table 1). Although this number is lower than the original 20 SIC/NAICS/Kortum and Lerner industries, it represents the highest number of sectors into which data across all three industrial classifications can be matched without any loss of information.

3.4 Descriptive statistics

Tables 2-4 give descriptive statistics of the measures of interest across years, states, and industries. There are on average 0.12 manufacturing establishments per 1,000 of population, the average establishment has 63.3 workers, and the median 16.6 ones. Clearly, the firm size distribution is skewed to the right. Both mean and median size gradually declined between 1980 and 2001, from 79 to 57.9 and from 21.7 to 14.6, respectively. However, there are substantial differences across states and industries. For example, the average number of establishments per 1000 of population was over the period 3 times higher in Rhode Island than in Louisiana (0.22 vs. 0.07); the mean manufacturing establishment was over the period 6 times bigger in Virginia than in Alaska (102.1 vs. 16.7); and the median manufacturing establishment was over the period 6.5 times bigger in Kentucky than in Alaska (31.9 vs. 4.9).

Also, it easy to see that venture capital investment is clustered along all three dimensions. For example, 83.5% of all VC investment, in constant 1980 dollars, was recorded between 1995 and 2001. Also, California and Massachusetts accounted for roughly half of all venture capital investment at any point in time. Finally, industry 11 - Office and computing machines, other non-electrical machinery, communication and electronics, other electrical equipment, professional and scientific instruments - accounted for around three quarters (73.8%) of total venture capital investment over the period.

Table 2 in particular shows the growth pattern of venture capital investment in the U.S. manufacturing industry over the two decades before the burst of the dot-come bubble. The amount of investment in 2000 was 59 times as much (in real terms) as the one mere 9 years earlier. Part of this increase was due a sequence of regulatory changes favorable to venture capital. These changes involve the already mentioned clarification of ERISA prudent man rule in 1979, the reduction of capital gains tax rate (Gompers and Lerner, 1999), and the introduction of Bayh-Dole Act[9] that facilitated technology transfers from the universities to the private sectors. However, the whole VC industry experienced a downturn in the early 1990s due to asset quality problems of pension funds. Those funds were pulled out from private equity investments to reduce riskiness of their portfolios. With pension funds being the main financing sources for U.S. venture capitalists, this asset reallocation by pension funds severely hit the ability of venture capitalists to invest. Overall, the VC data is almost identical to the data in Kortum and Lerner (2000) and Hirukawa and Ueda (2008) for the

[9]Enactment of the Bayh-Dole Act (P.L.96-517), the "Patent and Trademark Act Amendments of 1980", on December 12, 1980 created a uniform patent policy among the many federal agencies that fund research. Bayh-Dole enables small businesses and nonprofit organizations, including universities, to retain title materials and products they invent under federal funding. See Hirukawa and Ueda (2008) for details.

period in question.

4 Empirical model and identification strategy

I use the underlying data to estimate the effect of venture capital investment on various characteristics of the firm size distribution in a fixed-effects model, as follows:

$$Y_{ijt} = \alpha \cdot Industry\ trend_{jt} + \beta \cdot Market\ trend_{it} + \gamma \cdot Employment\ share_{ijt} + \delta \cdot VC_{ijt} + \varepsilon_{ijt} \quad (1)$$

where in separate regressions Y_{ijt} equals the natural logarithm of the number of firms, the natural logarithm of mean firm size, and the natural logarithm of median firm size in state i in industry j during year t. While not exhaustive in fully describing the firm size distribution, the number of firms, mean, and median firm size suggest themselves as a sufficient set of characteristics to study, given the prediction of theoretical models described in Section 2 as well as various empirical regularities observed in practice (see, for example, De Wit, 2005). VC_{ijt} denotes various proxies for venture capital investment in state i in industry j during year t.

The $Industry\ trend_{jt}$ variable is a matrix of industry-year indicator variables controlling for any industry-specific, time varying effects on industry structure. Analogically, the $Market\ trend_{it}$ variable is a matrix of state-year indicator variables controlling for any market-specific, time-varying effects on industry structure. Controlling for these is important given the potential confounding effect of industry and market unobservables. These fixed effects also account for convergence phenomena as in Barro and Sala-i-Martin (1992).

Industry j's share of total manufacturing employment in state i during year t (*Employment*

$share_{ijt}$) controls for the relative importance of a given sector in the market. Studies of cross-sector industrial growth consistently predict that sectors which have already grown fast in the past grow less in the future (Rajan and Zingales, 1998) and have larger average firm size (Cetorelli and Strahan, 2006). In addition, theories of the industry's lifecycle predict that sectors which are already relatively large should have lower rates of new business incorporation (Klepper, 1996). Alternatively, firms' ability to take up new business opportunities increases with the number of opportunities already exploited (Bottazzi and Secchi, 2006). Hence, the share variable included in the regression should capture the different propensity to entry and growth due to life-cycle specific reasons. Finally, ε is the idiosyncratic error.

Albeit parsimonious, the empirical model has the important advantage that the fixed effects matrices control for time-variant differences in firm size due to unexplained factors that differ across states and industries. For example, anti-trust law may prevent firms from growing too big due to competition considerations, or corporate taxes and environmental regulations may be discouraging firms from entering. The procedure also controls for the business cycle. However, I still need to worry about omitted variable bias and reversed causality at the state-industry-year level. I explain in detail how I deal with this problem in the next Section.

5 Results

In this Section, I discuss the empirical estimates from the main model, as well as from extensions designed to address various endogeneity and robustness issues.

5.1 Venture capital and industry structure: Main result

Table 5 presents the OLS regression results for the log of the number of establishments, the log of mean establishment size, and the log of median establishment size. The first three columns report the results using a measure of venture capital calculated as the natural logarithm of average VC investment in a particular state-industry pair in the current year. The next three columns report the results using a dummy variable equal to 1 if there has been any venture capital investment in a particular state-industry pair in the current year. As noted above, the full set of state/year and industry/year fixed effects is included to net out the effect of time-varying unobservables at the market and sector level.

The reported estimates suggest that an increase in venture capital investment is associated with a larger number of total establishments and with a lower median firm size (implying greater entry of small firms), but with a higher mean firm size (implying large firm growth). Numerically, depending on what proxy for venture capital is employed, a doubling of VC investment is associated with an increase in the number of establishments in a particular industry per 1,000,000 population by between 1 and 5,[10] an increase in average firm size by up to 3 workers, and decreases median firm size by up to 1.5 workers.Differently put, venture capital is associated with both the entry of new "projects" and with the survival and growth of larger "projects", increasing the right skew of the firm size distribution. The evidence is thus fully consistent with Hypothesis 2.

[10]We use total firms divided by population in order to be consistent with Cetorelli and Strahan (2006). The results remain qualitatively unchanged when we use total number of firms instead of normalizing by state population.

5.2 Addressing the endogeneity of venture capital investment

Although the model eliminates the effect of time-variant unobservables at the state and sector level, the possibility still remains that the results are biased by unobservables or by reversed causality at the state-industry-year unit of observation. For example, markets that are away from knowledge networks may have little supply of ideas attractive to VC investors. Such markets will tend to rely more on low-tech industries and have small volumes of VC finance. Finding a positive association between VC investment and larger firms across states and industries could simply be picking up this market characteristic. Also, the positive correlation between VC and the total number of firms may be driven by the fact that venture capitalists are attracted to more dynamic states-industries where the returns to entrepreneurship are higher. Venture capitalists choosing a region where to locate their offices would presumably find places with more firms per capita more attractive (Samila and Sorenson (2011)).

In order to address these endogeneity concerns, I need to use a variable that is correlated with VC finance but uncorrelated with unobservable state-industry shocks, and then use it in a instrumental variables context with fixed effects. In other words, I need to pursue identification by exploiting exogenous variations across states in the supply of VC finance. I use two such supply-shifters suggested by the literature (see Kortum and Lerner (2000)), namely the size of state and local pension assets and the volume of state and local pension contributions. As pointed out in Gompers and Lerner (1999), the 1979 clarification of the ERISA by the U.S. Department of Labor led to a five-fold increase in VC investment in the next two decades. State law also requires pension funds to invest in risk capital markets for diversification purposes. How much they would invest in reality is of course a function of their size. Therefore, the size of total assets of and the volume of contributions to state and local pension funds are ideal instruments as they are correlated with VC finance but not with technological opportunities (Kortum and Lerner, 2000; Mollica and Zingales, 2008). The use of both assets and contributions is motivated by the fact that both stocks and flows are expected to be correlated with VC investment, potentially to a different degree as pension fund managers adjust their investment strategy in the wake of business cycle shocks.

I am not quite done yet, because the size of state and local pensions should have a differential effect across industries. VC investment in states with large pension funds will increase relatively more in industries which are naturally mroe sensitive to VC investment. I can therefore look at how attractive industries were to venture capitalists before the 1979 ERISA policy shift. Industries with a high level of VC investment before the policy change should experience a greater increase in VC funding in states with larger pension funds. This will be especially true in the case of industry specialization of individual venture capitalists (Kortum and Lerner, 2000). Therefore, the level of venture capital financing prior to the policy shift, interacted with current state and local pension fund assets/contributions, is an appropriate instrument for current venture capital investment at the state-industry-year unit of observation.

I proceed to collect data on the size of assets of and the volume of contribution to state and local pension funds from the State and Local Government Employee-Retirement Systems survey of the U.S. Business Census. The survey covers the period 1992-2007, so unfortunately I lose the data on establishment size and VC associated with the 1980-1991 period.[11] Next, I collect venture capital data for the 5-year period 1975-1979, which gives us the industry's attractiveness to venture capitalists, uncontaminated by the later increase in VC funding due to the 1979 policy shift. I then interact this variable with the average of both the logarithm of state and local pension fund assets and the logarithm of state and local

[11]Some idea of the development of state pension funds over time was given in Table 2.

pension fund contributions for each year after 1992. The predetermined component of the industry's sensitivity to venture capital investment, interacted with a VC supply-shifter at the state level, should eliminate the endogenous element of contemporaneous venture capital investment.

Instrumental variables can reduce dramatically the bias in the OLS estimates when simultaneity is present, but only if they are strongly correlated with the explanatory variable of interest (validity condition) and if they do not affect the independent variable directly or through other channels, and so they can be excluded from the second stage (exclusion restriction). The estimates from the first stage, which allows us to test the first condition, are reported in Panel A of Table 6. The results are encouraging: in all cases, the sign of the coefficient on pension funds size is positive and the effect is significant at the 1% statistical level. The F-statistics in each case is higher than the critical value required for the IV estimates to have no more than 10% of the bias of the OLS estimates (Stock and Yogo, 2005).

The estimates from the second stage regression are reported in Panels B and C of Table 6. In Panel B, the distribution of firm size is regressed against contemporaneous log VC in each state-industry pair, and in Panel C against a dummy equal to 1 if there is any VC investment in a particular state-industry in each year. The two VC variables are instrumented using industry VC sensitivity interacted with the logarithm of state and local pensions funds assets (Columns (1)-(3)), the logarithm of state and local pensions funds contributions (Columns (4)-(6)), and both interaction terms (Columns (7)-(9)). The overidentification in the last three columns allows us to test the exclusion restriction, namely that the general demand of institutional investors for alternative assets, including venture capital, does not depend on the number of firms or on firm size. Hansen's J-statistics tests the correlation between the instruments and the second stage error terms, and therefore the probability that the exclusion restriction is violated. In all cases, the J-statistics implies that it is not.

Turning to the estimates from this 2SLS procedure, they clearly continue to imply that larger venture capital investment is associated with higher entry of new small firms but also with a growth in the size of large firms, leading to a larger right skew in the distribution of firm sizes. This result is consistent across specifications, although not consistently significant. The magnitude of the coefficients is higher than in the OLS specification, implying that the OLS estimates are a lower bound for the effect of venture capital on the industry structure. However, part of this increase in magnitude is also due to the decrease in sample size relative to the OLS regressions, as now only the years after 1992 are used when real VC investment was on average much higher than during the 1980s.

Finally, the sign of the effect of venture capital on median firm size becomes positive. This result implies that over time, a sufficient amount of new entrants become large enough to shift the median further to the right. Recall that there is no firm basis in theory regarding median firm size, and so I concluded that this was an empirical issue. The evidence thus continues to be consistent with Hypothesis 2.

5.3 Accounting for bank deregulation

One important policy development that was completed during the first part of the sample period is branching and interstate deregulation. Therefore, some of the effect I record may be contaminated by concurrent developments in the banking sector. Cetorelli (2004) points out to the several counterveiling channels via which the best defined characteristic of banking markets - competition - affects product markets structure. Market power may reduce the effect of the informational opacity of the firm via the channel of long-term relationship building. For this reason, small firms may tend to thrive on local banking monopolies (Petersen and Rajan (1995)). This could allow them to successfully challenge large firms in the marketplace and prevent large firms from growing further, increasing the right skew of the firm size distribution. Market power may also reduce credit in general due to banks exploiting their monopoly position. This will result in less credit for everyone. On the other hand, market power may be hurting small firms and favouring large incumbents. For instance, competition may induce banks to be more efficient and give them incentives to evaluate - via the use of various analytical credit scoring models - small opaque projects that wouldn't have received debt finance before. Also, the value of a bank's current lending relationship will depend on the future profitability of its borrowers. Consequently, the bank's incentive to support the profitability of its existing clients will restrict its willingness to expand credit to small firms and/or newcomers (Cestone and White, 2003). Finally, a concentrated banking system may support relationship lending and be detrimental to new business creation, favouring large firms (Perotti and Volpin, 2004). In this set-up, banking concentration is a form of a barrier to entry, resulting in fewer firms and a firm size distribution less skewed to the right.

Various papers have tested these theories. For example, Cetorelli (2004) shows that more bank concentration is associated with a delayed exit of large old firms. Beck, Demirguc-Kunt, and Maksimovic (2004) find that higher banking concentration favours large firms by erecting steeper financial constraints before small firms and new entrants. Cetorelli and Strahan (2006) find that increased banking competition has resulted in an influx of entrants, driving average firm size down, and decreasing the share of large firms.

To account for this potential contamination of my results, I recalculate the external financial dependence measure from Cetorelli and Strahan (2006) for the 12 industries in my sample, weighting the original sensitivities to external finance by each SIC 2-digit industry's share of employment in the 12 aggregated industries used in the paper. Then I create an indicator variables equal to 1 if the industry belongs to the top half of the distribution of external financial dependencies. Next, I interact this industry dummy with dummy variables equal to 1 if the respective state is observed after branching deregulation / interstate deregulation has taken place, and include these two state-industry interactions in empirical model (1). Once again, the model is not able to identify the direct effect of bank competition and external financial dependence on the industry structure, as those are fully captured by the two sets of fixed effects.

The results of this model are reported in Table 7. I find a positive effect of interstate deregulation on the number of firms and a negative effect on mean and median firm size (albeit the estimates are not significant). Branching deregulation has had the opposite effect. These results appear to be consistent with Cetorelli and Strahan (2006) who find the same, especially for interstate deregulation, and attribute this phenomenon to increased rates of new business incorporation. Importantly, the effect of venture capital on the industry structure which were recorded in Table 5 - an increased right skew of the firm size distribution resulting from a larger number of small firms and from an increase in the average size of larger firms - survives this robustness check.

5.4 VC investment timing

I have so far found that more vigorous activity by venture capitalists is associated with shifts in the number of active firms and the skewness of the firm size distribution in a state-industry pair, and that this effect is not driven by omitted variables, by the endogeneity of the VC series, or by its high correlation with concurrent developments in other financial markets. One important question that the evidence so far naturally raises is, how quickly does venture capital investment map into the firm size distribution? In particular, it is logical to hypothesize that this effect is not immediate. If VC investment is associated with gestation periods lasting a couple of years, and given that the median age of an IPO issuing firm over 1980-2001 has been in the neighborhood of 5 years (see, for example, Loughran and Ritter (2004)), then one would expect lagged values of VC investment to do a better job in explaining variations in, for example, total number of active firms and average firm size than contemporaneous ones. Given my empirical approach so far, this fact may remain hidden by aggregation.

I investigate this question in Table 8. In terms of my empirical model, I include, in addition to the log of contemporaneous VC investment, 4 lags of the same variable (Columns (1)-(3)). I proceed analogically in the case of the dummy variable equal to 1 if there has been any VC investment in a particular state-industry in a particular year (Columns (4)-(6)). Although these lagged values are correlated along the investment period, they are not highly so (for example, the simple correlation between the probability of VC investment in $t = 0$ and in $t = 4$ is 0.38). The estimates broadly confirm the intuition that lagged VC investment explains a larger portion of variations in the firm size distribution across states and industries. In particular, the magnitude of the effect of VC investment on the total number of firms and on mean firm size at $t - 4$ is up to twice higher than the effect of VC investment at $t - 1$, and more significant from a statistical point of view, for both log and dummy proxies for VC activity. The evidence thus confirms the intuition that given the time response of individual firm growth, the effect of VC on the firm size distribution is not immediate, and that it is important to account explicitly for the slow-moving nature of the employment series. At the same time, the fact that in some cases contemporaneous VC investment does a better job in explaining changes in the firm size distribution than, for instance, 2-period lagged VC investment (see Column (2)), suggest that VC investment is indeed partially driven by current market demands, and so it justifies the 2SLS approach undertaken in Table 6.

5.5 Data robustness: Excluding states and industries with ”too much” venture capital investment

Next, I perform my first data robustness check. In particular, it is possible that the results so far are driven by the industries and states in the sample which command the highest average VC investment over time. In particular, as already mentioned, California and Massachusetts accounted for roughly half of all venture capital investment at any point in time during the sample period. In addition, whereas the 20 Kortum and Lerner industries allow for a finer spread of venture capital investment across industries which are of interest to venture capital, my classification has one clear outlier. Namely, industry 11 - a collection of information and communication technology SIC 2-digit industries which are particularly attractive to venture capital - accounted for almost three quarters of total venture capital investment over the period. Consequently, my results can be affected by this concentration across state and industry dimensions.

In Table 9, I first exclude industry 11 (Panel A) and then California and Massachusetts (Panel B) from the regressions. Although the statistical significance of the results decreases in at least one case, the gist of the results remains largely unchanged, implying that the effect of venture capital on industry structure is not affected by states and industries which are outliers in the supply of VC over time.

5.6 Data robustness: Excluding 1998-2001

By the necessity to merge SIC, NAICS, and VEIC industry classes into a common classification, a great deal of industry information was lost - for instance, the original 20 SIC 2-digit industries were reduced to 12 aggregated versions of those. One way to increase industry variation is to exclude the period 1998-2001, for which the industry structure data come in NAICS classification, and focus on the 1980-1997 period, which would only necessitate matching SIC to VEIC. The downside of this process is that there are only 6 years in the resulting panel for which data on pension funds is available. I also lose the peak of the dot-com years, which is an important period in the development of the U.S. venture capital industry. On the bright side, the only industry aggregattions necessary now are merging into one class SIC industries 22 and 23 ("Textile mill products" and "Apparel and other textiles"), SIC industries 24 and 25 ("Lumber and wood products" and "Furniture and fixtures"), and SIC industries 21, 27, 31, and 39 ("Tobacco manufacturing", "Printing and publishing", "Leather and leather products", and "Miscellaneous manufacturing"). All of the three sets of SIC industries are not perfectly distinguishable from the point of view of VEIC. As a result, although I lose 4 years of data, I gain 3 industries, so the resulting panel increases from a maximum of 13,464 observations to a maximum of 13,770 observations.

The estimates of the effect of venture capital on industry structure in this re-balanced panel are reported in Table 10. I report estimates from both an OLS fixed effects regression (replicating the estimates in Table 5) and from a 2SLS model (replicating the estimates from Table 6). In the 2SLS case, the VC variables of interest are instrumented using both available instruments (pension funds assets and pension funds contributions). The broad picture reported in Table 5 is confirmed and even strengthened in terms of statistical significance in the case of median firm size, where the effect of VC is significant at least at the 10%

statistical level. However, the sign on that particular effect switches once again when we employ the 2SLS procedure, implying that we cannot conclusively sign the direction of the VC effect in this particular case. However, the effect of VC on the number of total firms and on mean firm size remain qualitatively unchanged. The results are encouraging as they imply that the effects I recorded before are not due to the loss of information entailed in matching disparate industry classes.

5.7 Errors-in-variables in the venture capital series

One final concern with the analysis so far is errors-in-variables. The problem is linked to the nature of VC investment. As pointed out by Kortum and Lerner (2000), the VC disbursements series tends to fluctuate a lot from year to year, partly because a single financing round may be providing funds to be spent over several years. Thus, the venture funding measure is prone to an errors-in-variables problem that might lead to downwardly biased coefficients. A natural solution is to aggregate all variables in periods longer than 1 year in order to eliminate transitory fluctuations and the effect of staging.

In order to circumvent the potential bias stemming from this problem, I adopt a version of Kortum and Lerner's (2000) proposed technique, namely computing averages of the logs of each variable over a several-year period. The new series results from aggregation into 3- and 4-year intervals (1980-1983, 1984-1987, 1988-1990, 1991-1994, 1995-1998, 1999-2001). Then I repeat the estimation procedure from before on the aggregated data. Although this strategy allows to eliminate the fluctuations of the VC disbursement series, it comes at the expense of lower time variation. In addition, the matrix of state and industry dummies is now interacted with dummies for longer time periods, essentially assuming that any relevant market and sector trends only work their way into the industry structure in longer time periods rather than annually.

The results of these regressions are reported in Table 11. The coefficients imply a somewhat smaller effect, but are close in magnitude to the ones reported in Table 5, alleviating concerns about the errors-in-variables problem. The estimate continue to suggest that the main development in the industry structure resulting from an increase in venture capital investment is a more pronounced right skew of the firm size distribution, brought about both by a higher rate of new business creation and by an increase in the average size of the largest firms.

5.8 Venture capital and the mechanisms of large firm growth

By looking simultaneously at total numbers, means, and medians, I can conclude with a reasonable degree of certainty that venture capital stimulates new business creation. This is consistent with the results in Samila and Sorenson (2011), which they record at the level of the local economy rather than the level of the local industry. However, the mechanism involved in the second result - the increased average firm size in the right-hand tail of the distribution - is not immediately clear. In particular, it could be because already existing large firms have grown in size, or because venture capital has enabled larger projects to enter and then grow into the new corporate giants. The evidence so far is unable to answer these questions, and so I now turn to examining the effect of venture capital on the number of large firms only. If VC has been associated with entry of small firms and growth of large existing ones, one should see the number of large firms remaining unchanged. If VC has enabled new entrants to grow over time into new industry leaders, one should see the number of large firms increase as large projects reach their optimal scale thanks to venture capital finance.

In Table 12, I report the estimates of fixed effect regressions where the number of establishments with more than 100 and with more than 250 employees, respectively, has been regressed on the main measures of venture capital investment. The effect of venture capital on the number of large firms is strictly positive and statistically significant in 3 out of the 4 specifications. Numerically, doubling VC investment has increased the number of large firms by up to 2%. The evidence therefore supports Hypothesis 2, namely that VC has been beneficial to larger projects in the sense of enabling them to either jump bins or enter and relatively quickly become large firms. This contrasts with the result on bank deregulation in Cetorelli and Strahan (2006) who show that the share of large firms has either decreased or stayed unchanged (depending on how a "large firm" is defined) following competitive developments in the U.S. banking sector. Whereas they argue that financial markets should have little effect on large establishments which are likely to be part of firms with access to nationwide securities markets, I find that in a dynamic set-up in which the industry leaders frequently change, VC finance affects both the equilibrium size and number of large firms in the economy. In that sense, I find support for the competition explanation of the industry leadership volatility recorded in Comin and Philippon (2005) and for the fact that this effect is relatively larger during economic booms.

6 Conclusion

In this paper, I set out to investigate the impact of venture capital on the firm size distribution. Empirically, I study the effect of VC investment on the total number of establishments and on mean and median establishment size in U.S. local markets between 1980 and 2001. I employ in the process an identification strategy which allows us to evaluate differential responses, eliminate the effect of unobservables, and address endogeneity problems. In particular, I employ the policy shift in 1979 which allowed state and local pension funds to invest in risk capital, alongside the absolute size of state and local pension funds, as an instrument for contemporaneous VC finance.

In all specifications employed I find strong evidence that higher venture capital investment increases the right skew of the firm size distribution due to an increased entry of new firms and to an increase in the average size of large firms. I find no evidence that this effect is driven by the two states that have been responsible for the bulk of the venture capital investment in the two decades after 1980 - California and Massachusetts - or by the industries that attract most VC. My tests also exclude the possibility that the results I find are driven by unobservable market or industry trends. The estimates remain significant when I use the size of local and state pension funds as an instrument to correct for the endogeneity of VC finance, suggesting a causal link between VC and industry structure. The results remain unchanged when I account for errors-in-variables in the VC series, and for the slow-moving nature of the employment series. I also find that not only the size, but the number of large firms has increased with venture capital investment. I argue that these results are broadly consistent with theoretical models of the screening, monitoring, and value-enhancing role of venture capitalists. Given the full extent of the evidence, I interpret the overall results in the sense of the ability of venture capital finance to enable the emergence of successful firms in possession of large projects that over time grow to be the industry leaders of tomorrow.

These findings suggest a number of interesting policy implications. For example, one concern associated with competition-stimulating policies has always been that too much competition could reduce the size and scale of the industry leaders, weakening the competitive position of the U.S. in the world economy. I find such concerns to be unfounded. The picture paint by the results is rather one in which increased competitive pressure through finance-driven new business creation has by no means been associated with a decrease in the size and, by extension, domestic or international competitive position of the largest firms. Although the explosion of VC investment in the last 30 years has undoubtedly resulted in more competition in most high-tech markets, by no means has it hurt the ability of these industries to produce corporate giants. On the contrary, I argue that since 1980, VC has been associated simultaneously with higher product market competition and with the emergence of even larger and, potentially, healthier industry leaders, especially so in industries which are at the forefront of today's economy. In addition, it is possible that not only have companies benefiting from venture capital finance become larger and more viable, but also incumbent companies have been forced to improve their efficiency. In that sense, VC may have welfare implications which go beyond the scope of this paper.

The paper leaves a number of important questions unanswered. To name just one, large differences in firm size exist not just across US states, but across economic areas. For example, the list of the world's 500 largest listed companies includes 26 U.S. companies that were created after 1975 (out of a total of 168), and only 3 European companies created after 1975 (out of a total of 146; see Philippon and Veron (2008) for details). Can these differences be explained by the explosion of VC in the U.S. in the last 30 years and by the larger dependence of Europe's corporate landscape on bank finance? Although my results strongly suggest that finance can indeed affect the firm size distribution, questions that remain unanswered grant further exciting investigations.

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Table 1. Industry Conversion Key: Kortum-Lerner, SIC, and NAICS

SIC-NAICS Industry	Kortum-Lerner industry	SIC code	NAICS code
1. Food and kindred products, tobacco, and other machinery	1, 20	20, 21, 27, 31, 39	311, 312, 316, 323, 339
2. Textile and apparel	2	22, 23	313-315
3. Lumber and furniture	3	24, 25	321, 337
4. Paper	4	26	322
5. Industrial chemicals, drugs, and other chemicals	5-7	28	325
6. Petroleum products	8	29	324
7. Rubber products	9	30	326
8. Stone, clay, and glass products	10	32	327
9. Primary metals	11	33	331
10. Fabricated metal products	12	34	332
11. Office and computing machines, other non-electrical machinery, communication and electronics, other electrical equipment, professional and scientific instruments	13-16, 19	35, 36, 38	333-335
12. Transportation equipment, aircraft, and missiles	17-18	37	336

Note: This table reports the conversion key used in the paper to match SIC, NAICS, and “Kortum-Lerner” industrial specifications. “Kortum-Lerner industry” refers to the industrial specification employed in Kortum and Lerner (2000).

Table 2. Summary Statistics by Year

Year	Per 1000 capita establishments	Mean firm size	Median firm size	Total venture capital disbursements ($Ms)	Total state pension funds assets ($Bs)	Total state pension disbursements ($Bs)
1980	0.10	79.06	21.68	217.83	---	---
1981	0.10	76.29	20.27	376.62	---	---
1982	0.10	70.95	18.92	496.88	---	---
1983	0.11	62.71	16.22	825.45	---	---
1984	0.11	66.49	17.28	789.45	---	---
1985	0.11	65.26	17.23	543.98	---	---
1986	0.11	64.70	17.00	672.53	---	---
1987	0.12	61.47	15.58	590.41	---	---
1988	0.11	63.54	16.90	783.73	---	---
1989	0.11	64.77	17.69	944.99	---	---
1990	0.12	61.54	16.52	438.66	---	---
1991	0.12	60.12	15.00	216.17	---	---
1992	0.12	60.74	15.51	384.34	646.45	88.42
1993	0.12	59.08	15.64	257.23	687.52	91.05
1994	0.13	58.65	15.30	354.61	744.44	99.07
1995	0.13	59.26	15.84	560.12	826.51	123.63
1996	0.13	59.06	15.40	941.23	929.14	142.65
1997	0.13	59.38	15.34	1308.66	1061.73	161.44
1998	0.12	61.13	15.74	2933.72	1158.22	159.97
1999	0.12	60.30	15.38	6282.93	1283.68	175.90
2000	0.12	59.55	15.14	12736.12	1235.23	70.55
2001	0.12	57.86	14.56	6358.82	1216.03	-4.21
Total	0.12	63.32	16.62	1773.26	978.90	110.85

Note: This table reports summary statistics of the main regression variables. Data are averaged by year, for all states and industries. All tabulations refer to the SIC-NAICS industrial classification employed throughout the paper (see Table 1 for details). Data on total number of establishments and mean and median size are calculated from the County Business Patterns, 1980-2001. Data on VC investment come from VentureXpert, 1980-2001, and are in constant 1980 dollars. Data on state pension fund assets and contributions come from the US Census Bureau, 1992-2001, and are in constant 1980 dollars. All annual characteristics are calculated using un-weighted means.

Table 3. Summary Statistics by State

State	Total number of establishments	Mean firm size	Median firm size	Venture capital disbursements ($Ms)	State pension funds assets ($Bs)	State pension disbursements ($Bs)
Alabama	0.12	90.31	22.49	4.86	9.69	1.04
Alaska	0.07	16.74	4.93	0.01	4.55	0.50
Arizona	0.10	50.87	9.78	15.7	11.41	0.70
Arkansas	0.12	81.15	29.09	0.79	4.83	0.55
California	0.13	50.25	13.43	723.57	140.64	14.69
Colorado	0.12	41.06	9.88	50.21	11.29	1.30
Connecticut	0.15	71.90	14.11	32.74	8.7	0.91
Delaware	0.08	75.04	18.38	1.04	2.11	0.26
D. of Columbia	0.05	21.45	6.13	2.34	1.88	0.19
Florida	0.10	36.62	9.53	33.2	33.89	4.12
Georgia	0.11	78.30	21.76	25.26	18.81	1.91
Hawaii	0.07	19.07	6.47	0.06	3.75	0.42
Idaho	0.13	47.85	6.72	11.46	2.47	0.31
Illinois	0.13	65.34	17.98	31.3	34.08	4.46
Indiana	0.13	87.53	22.17	6.07	6.61	0.81
Iowa	0.11	66.95	18.63	2.06	7.15	0.43
Kansas	0.11	74.94	17.4	3.94	3.87	0.42
Kentucky	0.09	96.81	31.89	4.7	8.81	1.27
Louisiana	0.07	79.89	20.28	9.34	10.17	1.45
Maine	0.14	82.53	22.51	1.52	2.41	0.35
Maryland	0.07	74.96	13.92	28.19	16.16	1.82
Massachusetts	0.14	53.08	16.47	189.43	15.15	1.62
Michigan	0.14	76.45	16.64	15.36	27.72	3.27
Minnesota	0.14	52.39	14.26	25.08	16.91	2.14
Mississippi	0.11	91.95	31.2	1.22	5.57	0.60
Missouri	0.12	73.65	16.37	9.45	14.15	1.66
Montana	0.13	25.53	4.79	0.56	1.79	0.21
Nebraska	0.10	59.46	13.37	5.16	2.84	0.28
Nevada	0.08	30.50	8.62	1.15	4.73	0.59
New Hampshire	0.16	55.17	16.31	13	1.47	0.19
New Jersey	0.14	50.71	17.72	64.91	22.01	2.73
New Mexico	0.08	38.33	7.3	1.25	5.09	0.64
New York	0.12	52.28	12.94	66.84	95.71	10.55

North Carolina	0.14	76.34	22.47	30.51	20.41	2.45
North Dakota	0.09	30.26	6.39	0.06	1.03	0.12
Ohio	0.13	79.09	18.7	24.19	46.61	5.52
Oklahoma	0.10	54.85	13.04	2.17	5.84	0.84
Oregon	0.18	45.53	12.91	21.32	8.63	1.46
Pennsylvania	0.12	73.98	18.74	63.5	34.61	3.60
Rhode Island	0.22	40.46	12.43	2.25	2.59	0.30
South Carolina	0.11	96.09	28.51	4.45	8.63	0.95
South Dakota	0.10	42.43	10.08	0.37	2.01	0.23
Tennessee	0.12	88.06	24.85	10.91	11.41	1.13
Texas	0.10	66.79	14.04	140.62	49.41	5.70
Utah	0.11	61.90	13.03	8.91	4.77	0.52
Vermont	0.18	52.50	12.57	0.67	0.89	0.08
Virginia	0.08	102.06	23.02	34.05	17.04	1.95
Washington	0.13	67.61	13.22	39.17	17.98	2.12
West Virginia	0.08	90.51	20.64	0.17	1.56	0.29
Wisconsin	0.16	70.85	19.97	7.97	24.88	2.46
Wyoming	0.10	24.72	6.53	0.06	1.57	0.29
Total	0.12	63.32	16.62	34.92	16.01	1.81

Note: This table reports summary statistics of the main regression variables. Data are averaged by state, for all industries and years. All tabulations refer to the SIC-NAICS industrial classification employed throughout the paper (see Table 1 for details). Data on total number of establishments and mean and median size are calculated from the County Business Patterns, 1980-2001. Data on VC investment come from VentureXpert, 1980-2001, and are in constant 1980 dollars. Data on state pension fund assets and contributions come from the US Census Bureau, 1992-2001, and are in constant 1980 dollars. All state characteristics are calculated using un-weighted means.

Table 4. Summary Statistics by Industry

Panel A. Total number of establishments

SIC NAICS industry	1980-83	1984-87	1988-90	1991-94	1995-98	1999-01
1. Food and kindred products, tobacco, and other machinery	0.36	0.40	0.42	0.44	0.45	0.42
2. Textile and apparel	0.08	0.09	0.09	0.09	0.09	0.09
3. Lumber and furniture	0.19	0.21	0.22	0.24	0.23	0.17
4. Paper	0.02	0.02	0.02	0.02	0.02	0.02
5. Industrial chemicals, drugs, and other chemicals	0.04	0.04	0.04	0.04	0.05	0.05
6. Petroleum products	0.01	0.01	0.01	0.01	0.01	0.01
7. Rubber products	0.04	0.05	0.05	0.06	0.06	0.06
8. Stone, clay, and glass products	0.07	0.07	0.07	0.07	0.07	0.08
9. Primary metals	0.03	0.02	0.02	0.02	0.02	0.02
10. Fabricated metal products	0.11	0.12	0.13	0.13	0.16	0.23
11. Office and computing machines, other non-electrical machinery, communication and electronics, other electrical equipment, professional and scientific instruments	0.23	0.26	0.27	0.29	0.28	0.19
12. Transportation equipment, aircraft, and missiles	0.03	0.03	0.04	0.04	0.05	0.05

Panel B. Mean firm size

SIC NAICS industry	1980-83	1984-87	1988-90	1991-94	1995-98	1999-01
1. Food and kindred products, tobacco, and other machinery	39.90	34.69	35.39	34.09	34.25	33.60
2. Textile and apparel	73.01	63.49	58.01	51.85	45.85	34.44
3. Lumber and furniture	24.70	23.36	24.63	21.74	24.20	29.57
4. Paper	109.78	107.27	105.55	111.35	109.08	104.56
5. Industrial chemicals, drugs, and other chemicals	76.12	68.13	67.36	68.17	65.22	63.39
6. Petroleum products	56.36	48.35	49.25	52.20	52.25	48.96
7. Rubber products	61.27	57.40	59.46	57.54	58.33	60.64
8. Stone, clay, and glass products	31.91	29.99	28.40	26.05	27.23	28.27
9. Primary metals	139.38	110.18	109.61	98.10	102.88	89.07
10. Fabricated metal products	44.59	38.47	37.45	35.32	34.60	27.52
11. Office and computing machines, other non-electrical machinery, communication and electronics, other electrical equipment, professional and scientific instruments	65.80	56.08	54.33	48.17	54.77	70.45
12. Transportation equipment, aircraft, and missiles	160.75	149.82	144.08	124.3	120.23	138.86

Panel C. Median firm size

SIC NAICS industry	1980-83	1984-87	1988-90	1991-94	1995-98	1999-01
1. Food and kindred products, tobacco, and other machinery	9.00	6.36	5.84	5.92	5.96	5.21
2. Textile and apparel	38.07	29.62	23.44	15.60	12.52	7.12
3. Lumber and furniture	7.13	6.07	6.15	5.33	5.85	6.86
4. Paper	48.19	47.03	50.02	49.37	48.72	47.89
5. Industrial chemicals, drugs, and other chemicals	15.59	14.14	14.61	15.06	14.68	14.88
6. Petroleum products	12.66	11.76	9.84	12.02	12.11	9.21
7. Rubber products	21.37	21.51	24.65	24.52	24.26	25.63
8. Stone, clay, and glass products	10.90	10.78	10.87	10.25	10.16	10.58
9. Primary metals	35.06	29.35	31.71	28.78	32.28	25.90
10. Fabricated metal products	14.26	12.41	12.80	12.05	11.70	9.39
11. Office and computing machines, other non-electrical machinery, communication and electronics, other electrical equipment, professional and scientific instruments	11.00	9.44	9.34	7.68	8.63	10.78
12. Transportation equipment, aircraft, and missiles	16.87	14.27	16.06	12.21	13.27	18.60

Panel D. Total venture capital disbursements ($Ms)

SIC NAICS industry	1980-83	1984-87	1988-90	1991-94	1995-98	1999-01
1. Food and kindred products, tobacco, and other machinery	21.38	66.30	62.46	31.04	160.03	464.03
2. Textile and apparel	5.48	10.98	17.39	4.73	14.84	32.09
3. Lumber and furniture	2.05	11.18	8.71	1.95	14.60	32.35
4. Paper	1.71	2.98	5.83	4.98	21.30	287.04
5. Industrial chemicals, drugs, and other chemicals	18.73	47.66	144.53	50.38	164.09	691.51
6. Petroleum products	24.51	6.75	2.64	2.42	26.30	161.44
7. Rubber products	4.46	4.85	9.64	4.63	28.42	43.97
8. Stone, clay, and glass products	4.21	7.86	10.60	1.76	15.00	40.91
9. Primary metals	2.22	6.79	9.55	1.37	9.49	47.36
10. Fabricated metal products	4.06	8.31	12.14	5.78	25.20	125.73
11. Office and computing machines, other non-electrical machinery, communication and electronics, other electrical equipment, professional and scientific instruments	386.79	466.20	426.99	180.83	934.58	6497.01
12. Transportation equipment, aircraft, and missiles	3.61	9.20	11.91	13.20	22.15	36.12

Note: This table reports summary statistics of the main regression variables. Data are averaged by industry, for all states and periods. All tabulations refer to the SIC-NAICS industrial classification employed throughout the paper (see Table 1 for details). Data on total number of establishments and mean and median size are calculated from the County Business Patterns, 1980-2001. Data on VC investment come from VentureXpert, 1980-2001, and are in constant 1980 dollars.

Table 5. Effect of Venture Capital Investment on Industry Structure

	(1)	(2)	(3)	(4)	(5)	(6)
	Number	Mean	Median	Number	Mean	Median
Log VC	0.005 (0.001)***	0.003 (0.001)***	-0.001 (0.001)			
VC dummy				0.041 (0.009)***	0.030 (0.011)***	-0.011 (0.017)
Industry share of employment	3.758 (0.068)***	3.696 (0.093)***	2.612 (0.100)***	3.764 (0.069)***	3.699 (0.093)***	2.612 (0.100)***
Observations	12,482	12,482	10,433	12,482	12,482	10,433
Fixed effects	State × Year Industry × Year					
R^2	0.92	0.75	0.70	0.92	0.75	0.70

Note: This table reports coefficients from a fixed effects OLS regression, where the dependent variable is the logarithm of the total number of establishments (columns labeled "Number"), the logarithm of the average number of workers per establishment (columns labeled "Mean"), and the logarithm of the median number of workers per establishment (columns labeled "Median"). Median employment per establishment is calculated by dividing the total number of employees by the total number of establishments in the bin which contains the median establishment by employment size. Data on establishments come from the Country Business Patterns, 1980-2001. Data coded in SIC for the 1980-1997 period and in NAICS for the 1998-2001; all data are therefore converted into a SIC-NAICS industrial classification (see Table 1 for details). Data withheld for confidentiality purposes are reported as "0" in the original file, and are consequently treated as missing observations. "Log VC" is the logarithm of venture capital investment in a particular state-industry-year. "VC dummy" is an indicator variable equal to 1 if there has been any venture capital investment in a particular state-industry-year. Data on VC investment come from VentureXpert, 1980-2001, and are in constant 1980 dollars. Industry share of employment equals the total employment in a given industry-state-year divided by total employment in the corresponding state-year. Standard errors, clustered by country-year, appear below each coefficient in parentheses, where *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level.

Table 6. Instrumental Variable Estimates of Venture Capital Investment: First and Second Stage

Panel A. First stage regression of VC on pension funds size

	Log VC	VC dummy	Log VC	VC dummy	Log VC	VC dummy
Log PF assets * Pre-1979 VC	0.007	0.003			0.054	0.047
	(0.001)***	(0.001)***			(0.022)**	(0.022)**
Log PF contributions * Pre-1979 VC			0.008	0.004	0.067	0.056
			(0.001)***	(0.001)***	(0.024)***	(0.025)**
Observations	6,088	6,088	5,683	5,683	5,683	5,683
F-statistics	78.41	52.96	77.46	53.22	77.45	52.93
Fixed effects	State × Year Industry × Year					
R^2	0.70	0.62	0.70	0.62	0.70	0.62

Note: Panel A reports coefficients from a fixed effects OLS regression, where the dependent variable is, alternatively, the logarithm of venture capital investment in a particular state-industry-year (columns labeled "Log VC"), and an indicator variable equal to 1 if there has been any venture capital investment in a particular state-industry-year (columns labeled "VC dummy"). Data on VC investment come from VentureXpert, 1980-2001, and are in constant 1980 dollars. "Log PF assets" is the logarithm of pension fund assets in a particular state in a particular year. "Log PF contributions" is the logarithm of pension fund contributions in a particular state in a particular year. "Pre-1979 VC" is, alternatively, the average of the log of VC investment in a particular industry-state prior between 1975 and 1979 (columns labeled "Log VC"), and a dummy equal to 1 if there has been any venture capital investment in a particular industry-state between 1975 and 1979 (columns labeled "VC dummy"). Data on pension funds assets come from the US Census Bureau, 1992-2001, and are in constant 1980 dollars. Standard errors, clustered by country-year, appear below each coefficient in parentheses, where *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level.

Panel B. Second stage regression: Effect of venture capital investment on industry structure, log VC

	(1) Number	(2) Mean	(3) Median	(4) Number	(5) Mean	(6) Median	(7) Number	(8) Mean	(9) Median
Log VC	0.256	0.137	0.553	0.130	0.075	0.226	0.070	0.045	0.084
	(0.111)**	(0.064)**	(0.340)	(0.034)***	(0.026)***	(0.067)***	(0.021)***	(0.019)**	(0.030)***
Industry share of employment	3.794	3.775	3.387	3.677	3.717	3.081	3.622	3.69	2.948
	(0.243)***	(0.175)***	(0.641)***	(0.145)***	(0.147)***	(0.273)***	(0.123)***	(0.143)***	(0.183)***
Hansen *J*							1.42	1.89	1.81
Hansen *J* (*p*-val)							0.23	0.17	0.18
Observations	5,603	5,603	4,602	5,603	5,603	4,602	5,603	5,603	4,602
R^2	0.26	0.36	0.40	0.76	0.65	0.58	0.88	0.73	0.60

Panel C. Second stage regression: Effect of venture capital investment on industry structure, dummy VC

	(1) Number	(2) Mean	(3) Median	(4) Number	(5) Mean	(6) Median	(7) Number	(8) Mean	(9) Median
VC dummy	2.669	1.945	2.661	2.434	1.844	2.469	2.430	1.797	2.323
	(0.912)***	(0.712)***	(1.028)**	(0.801)***	(0.651)***	(0.885)***	(0.798)***	(0.636)***	(0.837)***
Industry share of employment	4.071	3.921	3.281	4.142	3.967	3.306	4.141	3.958	3.278
	(0.288)***	(0.246)***	(0.359)***	(0.285)***	(0.249)***	(0.345)***	(0.281)***	(0.244)***	(0.332)***
Hansen *J*							0.01	1.71	2.07
Hansen *J* (*p*-val)							0.91	0.19	0.15
Observations	5,603	5,603	4,602	5,603	5,603	4,602	5,603	5,603	4,602
R^2	0.60	0.55	0.47	0.83	0.67	0.52	0.85	0.73	0.55

Note: Panels B and C reports coefficients from a fixed effects instrumental variable regression where the dependent variable is the logarithm of the total number of establishments (columns labeled "Number"), the logarithm of the average number of workers per establishment (columns labeled "Mean"), and the logarithm of the median number of workers per establishment (columns labeled "Median"). Median employment per establishment is calculated by dividing the total number of employees by the total number of establishments in the bin which contains the median establishment by employment size. Data on establishments come from the Country Business Patterns, 1980-2001. Data coded in SIC for the 1980-1997 period and in NAICS for the 1998-2001; all data are therefore converted into a SIC-NAICS industrial classification (see Table 1 for details). "Log VC" is the logarithm of venture capital investment in a particular state-industry-year. "VC dummy" is an indicator variable equal to 1 if there has been any venture capital investment in a particular state-industry-year. Industry share of employment equals the total employment in a given industry-state-year divided by total employment in the corresponding state-year. The VC variables are instrumented using the interaction of the logarithm of pension fund assets (Columns (1)-(3)), contributions (Columns (4)-(6)), or assets and contributions (Columns (7)-(9)) in a particular state in a particular year with the average of the logarithm of VC investment in a particular industry-state prior between 1975 and 1979 (Panel B), and a dummy equal to 1 if there has been any venture capital investment in a particular industry-state prior between 1975 and 1979 (Panel C). Standard errors, clustered by country-year, appear below each coefficient in parentheses, where *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level.

Table 7. Effect of Venture Capital Investment on Industry Structure: Accounting for Branching and Interstate Deregulation

	(1) Number	(2) Mean	(3) Median	(4) Number	(5) Mean	(6) Median
Log VC	0.005 (0.001)***	0.003 (0.001)***	0.001 (0.002)			
VC dummy				0.040 (0.009)***	0.030 (0.011)***	-0.011 (0.017)
Post-branching × bank sensitivity	-0.049 (0.018)***	0.059 (0.022)***	0.005 (0.030)	-0.050 (0.018)***	0.058 (0.022)***	0.004 (0.030)
Post-interstate × bank sensitivity	0.007 (0.027)	-0.029 (0.035)	-0.032 (0.047)	0.007 (0.027)	-0.029 (0.035)	-0.032 (0.047)
Industry share of employment	3.755 (0.068)***	3.7 (0.093)***	2.614 (0.100)***	3.761 (0.069)***	3.703 (0.093)***	2.614 (0.100)***
Observations	12,482	12,482	10,433	12,482	12,482	10,433
Fixed effects	State × Year Industry × Year					
R^2	0.92	0.75	0.70	0.92	0.75	0.70

Note: This table reports coefficients from a fixed effects OLS regression, where the dependent variable is the logarithm of the total number of establishments (columns labeled "Number"), the logarithm of the average number of workers per establishment (columns labeled "Mean"), and the logarithm of the median number of workers per establishment (columns labeled "Median"). Median employment per establishment is calculated by dividing the total number of employees by the total number of establishments in the bin which contains the median establishment by employment size. Data on establishments come from the Country Business Patterns, 1980-2001. Data coded in SIC for the 1980-1997 period and in NAICS for the 1998-2001; all data are therefore converted into a SIC-NAICS industrial classification (see Table 1 for details). Data withheld for confidentiality purposes are reported as "0" in the original file, and are consequently treated as missing observations. "Log VC" is the logarithm of venture capital investment in a particular state-industry-year. "VC dummy" is an indicator variable equal to 1 if there has been any venture capital investment in a particular state-industry-year. Data on VC investment come from VentureXpert, 1980-2001, and are in constant 1980 dollars. The terms of interaction are based on a measure of sensitivity to bank finance, calculated for each SIC-NAICS industry class using data from Cetorelli and Strahan (2006). The bank deregulation variables are dummies equal to 1 in the year after the lifting of intrastate/interstate branching restrictions and on; data from Amel (1993). Industry share of employment equals the total employment in a given industry-state-year divided by total employment in the corresponding state-year. Standard errors, clustered by country-year, appear below each coefficient in parentheses, where *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level.

Table 8. Effect of Venture Capital Investment on Industry Structure: Timing Issues

	(1) Number	(2) Mean	(3) Median	(4) Number	(5) Mean	(6) Median
Log VC	0.003	0.002	0.001			
	(0.001)***	(0.001)*	(0.002)			
Log VC, lag 1	0.002	0.001	0.001			
	(0.001)*	(0.001)	(0.002)			
Log VC, lag 2	0.003	0.001	0.001			
	(0.001)***	(0.001)	(0.002)			
Log VC, lag 3	0.004	0.002	0.000			
	(0.001)***	(0.001)*	(0.002)			
Log VC, lag 4	0.005	0.002	0.000			
	(0.001)***	(0.001)*	(0.002)			
VC dummy				0.026	0.021	-0.010
				(0.010)***	(0.012)*	(0.017)
VC dummy, lag 1				0.019	0.015	-0.003
				(0.010)*	(0.012)	(0.018)
VC dummy, lag 2				0.026	0.017	0.006
				(0.011)**	(0.012)	(0.019)
VC dummy, lag 3				0.036	0.020	-0.021
				(0.011)***	(0.013)	(0.020)
VC dummy, lag 4				0.041	0.022	0.010
				(0.011)***	(0.012)*	(0.019)
Industry share of employment	3.696 (0.076)***	3.698 (0.104)***	2.700 (0.116)***	3.769 (0.068)***	3.703 (0.093)***	2.612 (0.100)***
Observations	10,174	10,174	8,380	12,482	12,482	10,433
Fixed effects	State × Year Industry × Year					
R^2	0.92	0.76	0.70	0.92	0.75	0.70

Note: This table reports coefficients from a fixed effects OLS regression, where the dependent variable is the logarithm of the total number of establishments (columns labeled "Number"), the logarithm of the average number of workers per establishment (columns labeled "Mean"), and the logarithm of the median number of workers per establishment (columns labeled "Median"). Median employment per establishment is calculated by dividing the total number of employees by the total number of establishments in the bin which contains the median establishment by employment size. Data on establishments come from the Country Business Patterns, 1980-2001. Data coded in SIC for the 1980-1997 period and in NAICS for the 1998-2001; all data are therefore converted into a SIC-NAICS industrial classification (see Table 1 for details). Data withheld for confidentiality purposes are reported as "0" in the original file, and are consequently treated as missing observations. "Log VC" is the logarithm of venture capital investment in a particular state-industry in the current year. "Log VC, lag X" is the logarithm of venture capital investment in a particular state-industry X years ago, X={1,…,4}. "VC dummy" is an indicator variable equal to 1 if there has been any venture capital investment in a particular state-industry in the current year. "VC dummy, lag X" is an indicator variable equal to 1 if there was any venture capital investment in a particular state-industry X years ago, X={1,…,4}. Data on VC investment come from VentureXpert, 1980-2001, and are in constant 1980 dollars. Industry share of employment equals the total employment in a given industry-state-year divided by total employment in the corresponding state-year. Standard errors, clustered by country-year, appear below each coefficient in parentheses, where *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level.

Table 9. Data Issues: Excluding Industries and States with Too High VC Investment

Panel A. Excluding industry 11

	(1) Number	(2) Mean	(3) Median	(4) Number	(5) Mean	(6) Median
Log VC	0.006 (0.001)***	0.003 (0.001)***	0.001 (0.002)			
VC dummy				0.049 (0.010)***	0.020 (0.012)*	0.002 (0.018)
Industry share of employment	-8.871 (0.112)***	3.274 (0.125)***	2.128 (0.147)***	-8.867 (0.112)***	3.278 (0.124)***	2.132 (0.147)***
Observations	11,379	11,379	9,393	11,379	11,379	9,393
Fixed effects	State × Year Industry × Year					
R^2	0.91	0.75	0.71	0.91	0.75	0.71

Panel B. Excluding California and Massachusetts

	(1) Number	(2) Mean	(3) Median	(4) Number	(5) Mean	(6) Median
Log VC	0.005 (0.001)***	0.003 (0.001)***	0.001 (0.001)			
VC dummy				0.041 (0.010)***	0.027 (0.011)**	-0.010 (0.017)
Industry share of employment	3.753 (0.069)***	3.727 (0.095)***	2.637 (0.103)***	3.758 (0.070)***	3.73 (0.095)***	2.638 (0.103)***
Observations	11,972	11,972	9,948	11,972	11,972	9,948
Fixed effects	State × Year Industry × Year					
R^2	0.92	0.75	0.70	0.92	0.75	0.70

Note: This table reports coefficients from a fixed effects OLS regression, where the dependent variable is the logarithm of the total number of establishments (columns labeled "Number"), the logarithm of the average number of workers per establishment (columns labeled "Mean"), and the logarithm of the median number of workers per establishment (columns labeled "Median"). Median employment per establishment is calculated by dividing the total number of employees by the total number of establishments in the bin which contains the median establishment by employment size. Data on establishments come from the Country Business Patterns, 1980-2001. Data coded in SIC for the 1980-1997 period and in NAICS for the 1998-2001; all data are therefore converted into a SIC-NAICS industrial classification (see Table 1 for details). Data withheld for confidentiality purposes are reported as "0" in the original file, and are consequently treated as missing observations. "Log VC" is the logarithm of venture capital investment in a particular state-industry-year. "VC dummy" is an indicator variable equal to 1 if there has been any venture capital investment in a particular state-industry-year. Data on VC investment come from VentureXpert, 1980-2001, and are in constant 1980 dollars. Industry share of employment equals the total employment in a given industry-state-year divided by total employment in the corresponding state-year. In the first panel, industry 11 is excluded from the regressions. In the second panel, California and Massachusetts are excluded from the regressions. Standard errors, clustered by country-year, appear below each coefficient in parentheses, where *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level.

Table 10. Data Issues: SIC Industries, 1980-1997 Period

Panel A. OLS estimates

	(1) Number	(2) Mean	(3) Median	(4) Number	(5) Mean	(6) Median
Log VC	0.008	0.012	-0.003			
	(0.001)***	(0.007)*	(0.002)*			
VC dummy				0.048	0.013	-0.039
				(0.012)***	(0.008)*	(0.020)**
Industry share of employment	4.830	4.410	2.811	4.835	4.422	2.808
	(0.107)***	(0.142)***	(0.112)***	(0.108)***	(0.145)***	(0.120)***
Observations	12,838	12,838	10,752	12,838	12,838	10,752
Fixed effects	State × Year Industry × Year					
R^2	0.91	0.76	0.68	0.90	0.76	0.68

Panel B. 2SLS estimates

	(1) Number	(2) Mean	(3) Median	(4) Number	(5) Mean	(6) Median
Log VC	0.101	0.036	0.059			
	(0.013)***	(0.0013)***	(0.022)***			
VC dummy				1.003	0.473	0.803
				(0.284)***	(0.222)**	(0.372)**
Industry share of employment	4.675	4.189	2.567	4.771	4.233	2.650
	(0.182)***	(0.224)***	(0.221)***	(0.188)***	(0.226)***	(0.229)***
Observations	4,249	4,249	3,564	4,249	4,249	3,564
Fixed effects	State × Year Industry × Year					
R^2	0.84	0.76	0.68	0.90	0.76	0.68

Note: This table reports coefficients from a fixed effects OLS regression, where the dependent variable is the logarithm of the total number of establishments (columns labeled "Number"), the logarithm of the average number of workers per establishment (columns labeled "Mean"), and the logarithm of the median number of workers per establishment (columns labeled "Median"). Median employment per establishment is calculated by dividing the total number of employees by the total number of establishments in the bin which contains the median establishment by employment size. Data on establishments come from the Country Business Patterns, 1980-1997, and are coded in SIC. Data withheld for confidentiality purposes are reported as "0" in the original file, and are consequently treated as missing observations. "Log VC" is the logarithm of venture capital investment in a particular state-industry-year. "VC dummy" is an indicator variable equal to 1 if there has been any venture capital investment in a particular state-industry-year. OLS regressions in Panel A. In Panel B, The VC variables are instrumented using the interaction of the logarithm of pension fund assets or assets and contributions in a particular state in a particular year with the average of the logarithm of VC investment in a particular industry-state prior between 1975 and 1979 (Columns (1)-(3)) and a dummy equal to 1 if there has been any venture capital investment in a particular industry-state prior between 1975 and 1979 (Columns (4)-(6)). Data on VC investment come from VentureXpert, 1980-2001, and are in constant 1980 dollars. Data on pension funds assets come from the US Census Bureau, 1992-2001, and are in constant 1980 dollars. Industry share of employment equals the total employment in a given industry-state-year divided by total employment in the corresponding state-year. Standard errors, clustered by country-year, appear below each coefficient in parentheses, where *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level.

Table 11. Errors-in-Variables

	(1) Number	(2) Mean	(3) Median	(4) Number	(5) Mean	(6) Median
Log VC	0.010 (0.003)***	0.005 (0.003)*	0.007 (0.004)*			
VC dummy				0.079 (0.029)***	0.055 (0.033)*	0.035 (0.043)
Industry share of employment	3.768 (0.152)***	3.713 (0.220)***	2.775 (0.195)***	3.778 (0.154)***	3.719 (0.221)***	2.78 (0.196)***
Observations	2,926	2,926	2,756	2,926	2,926	2,756
Fixed effects	State × 4 Year Industry × 4 Year					
R^2	0.93	0.75	0.73	0.93	0.75	0.73

Note: This table reports coefficients from a fixed effects OLS regression, where the dependent variable is the logarithm of the total number of establishments (columns labeled "Number"), the logarithm of the average number of workers per establishment (columns labeled "Mean"), and the logarithm of the median number of workers per establishment (columns labeled "Median"). Median employment per establishment is calculated by dividing the total number of employees by the total number of establishments in the bin which contains the median establishment by employment size. Data on establishments come from the Country Business Patterns, 1980-2001. Data coded in SIC for the 1980-1997 period and in NAICS for the 1998-2001; all data are therefore converted into a SIC-NAICS industrial classification (see Table 1 for details). Data withheld for confidentiality purposes are reported as "0" in the original file, and are consequently treated as missing observations. "Log VC" is the logarithm of venture capital investment in a particular state-industry-year. "VC dummy" is an indicator variable equal to 1 if there has been any venture capital investment in a particular state-industry-year. Data on VC investment come from VentureXpert, 1980-2001, and are in constant 1980 dollars. Industry share of employment equals the total employment in a given state-industry-period divided by total employment in the corresponding state-period. All observations have been averaged over the periods 1980-1983, 1984-1987, 1988-1990, 1991-1994, 1995-1998, 1999-2001. Standard errors, clustered by country-period, appear below each coefficient in parentheses, where *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level.

Table 12. Venture Capital and the Number of Large Firms

	(1)	(2)	(3)	(4)
	Number, 100 employees +		Number, 250 employees +	
Log VC	0.003 (0.001)***		0.004 (0.001)***	
VC dummy		0.019 (0.012)*		0.015 (0.017)
Industry share of employment	6.089 (0.094)***	6.099 (0.094)***	6.721 (0.105)***	6.732 (0.105)***
Observations	6,078	6,078	6,080	6,080
Fixed effects	State × Year Industry × Year			
R^2	0.90	0.90	0.88	0.88

Note: This table reports coefficients from a fixed effects OLS regression, where the dependent variable is the logarithm of the total number of establishments with more than 100 employees (columns labeled "Number, 100 employees +") and the logarithm of the total number of establishment with more than 250 employees (columns labeled "Number, 250 employees +"). Data on establishments come from the Country Business Patterns, 1980-2001. Data coded in SIC for the 1980-1997 period and in NAICS for the 1998-2001; all data are therefore converted into a SIC-NAICS industrial classification (see Table 1 for details). Data withheld for confidentiality purposes are reported as "0" in the original file, and are consequently treated as missing observations. "Log VC" is the logarithm of venture capital investment in a particular state-industry-year. "VC dummy" is an indicator variable equal to 1 if there has been any venture capital investment in a particular state-industry-year. Data on VC investment come from VentureXpert, 1980-2001, and are in constant 1980 dollars. Industry share of employment equals the total employment in a given industry-state-year divided by total employment in the corresponding state-year. Standard errors, clustered by country-year, appear below each coefficient in parentheses, where *** indicates significance at the 1% level, ** at the 5% level, and * at the 10% level.