The Economic Impact of Venture Capital: Evidence from Public Companies

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Executive Summary

Over the past 30 years, venture capital has become a dominant force in the financing of innovative American companies. From Google to Intel to FedEx, companies supported by venture capital have profoundly changed the U.S. economy. Despite the young age of the venture capital industry, public companies with venture capital backing employ four million people and account for one-fifth of the market capitalization and 44% of the research and development spending of U.S. public companies. From research and development to employment to shear revenue, the companies funded by venture capital are a major part of the U.S. economy.

Introduction

Venture capital (VC) is a high-touch form of financing used primarily by young, innovative, and risky companies. VC funds invest in these companies on behalf of large institutional investors. Venture capitalists provide not only financing, but also nonfinancial support such as mentorship, strategic guidance, and network access. VC investments are typically highly

[1] We would like to thank Jay Ritter for sharing his IPO dataset with us and Shai Bernstein and John Taylor for useful comments.

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speculative. While most VC-funded companies fail, some become runaway successes. A look at the largest companies in the world shows just how large those successes can be. Apple, Google, and Microsoft are three of the five biggest companies and they all received most of their early external financing from VC (Table 1). The rise of just these three companies generated hundreds of thousands of high-skilled jobs, billions of dollars for investors, and trillions of dollars of benefit for the U.S. economy, and immeasurable positive spillovers.

Table 1: Five Largest Public Companies by Market Capitalization
This table shows the five largest public companies by market capitalization. Market capitalization and number of employees are from Thomson One as of August 28, 2015.

Rank	Company	VC-backed?	Market Capitalization $b	Employees
1	**Apple**	**Yes**	**646**	**93,000**
2	**Google**	**Yes**	**449**	**54,000**
3	Berkshire Hathaway		356	316,000
4	**Microsoft**	**Yes**	**351**	**128,000**
5	Exxon Mobil		314	75,000

Clearly, Apple, Google, and Microsoft are among the most innovative and most important companies in a generation. But how important are these and other VC-backed companies to the U.S. economy? How do they compare to industrial behemoths such as General Motors or massive financial institutions such as Bank of America in terms of job creation and overall economic impact? In this white paper, we measure the long-term impact of VC by quantifying the contribution of VC-backed companies to the U.S. economy.

How Many Companies Does VC Financing Support?

To quantify the impact of VC on the U.S. economy, we start by classifying companies as either VC-backed or non-VC-backed. We consider only public companies that are traded on AMEX, NASDAQ, or the NYSE. While most successful VC investments end with the company being acquired, high-quality information is presently available only on those companies that become

publicly listed.[2] Thus, by excluding private companies and acquisitions, our results underestimate the impact of VC on the U.S. economy.

We consider a company to be VC-backed if it was financed in its early stage by a VC fund.[3] Our classification process has three stages. First, we link VC investments from Thomson One to public companies and classify all public companies based on whether or not they received VC funding. Second, we cross-check our classification with IPO data and VC classifications compiled by Jay Ritter. Third, we then manually check the classification more than 200 companies that together represent 87% of the market capitalization of the VC-backed companies.

We perform this classification for all independent U.S. companies listed on a U.S. stock exchange. We exclude trusts and investment offices, but retain banks and insurance companies. The Appendix provides a detailed discussion of our procedure and the limitations of our analysis. As the Appendix shows, our classification procedure, if anything, likely underestimates the number of VC-backed companies.

Table 2 presents the summary statistics for the portion of public U.S. companies that are VC-backed, as of 2014. Our sample had 3,832 firms with a total market capitalization of $23.1 trillion. Of those, 665 (17%) companies are VC-backed, with a total market capitalization of $4.8 trillion (21%). Together, these young and fast-growing companies employ 4.1 million people. They invest heavily in research, accounting for $131 billion (44%) of the total research and development (R&D) spending of U.S public companies. In fact, the R&D spending of VC-backed public companies is greater than a quarter of the total government, academic, and private U.S. R&D spending.[4]

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[2] We restrict our analysis to U.S. public companies. Future work should incorporate mergers and acquisitions, private companies, and other possibly international data.

[3] In particular, we exclude companies that received funding from VC funds only at later stages, as well as companies that received funding only from private equity funds. For example, we exclude Home Depot, which received a PIPE (private investment in public equity) from a VC fund, and we exclude Hyatt Hotels, which received private equity funding.

[4] Data from the OECD Science, Technology and Industry Outlook 2014 (available at http://dx.doi.org/10.1787/sti_outlook-2014-en). We use the 2013 R&D number of $454 billion as the 2014 number is not available; the $115 billion 2013 R&D spending of VC-backed firms is greater than a quarter of total U.S. 2013 R&D spending. Note that the definitions of R&D as measured by Compustat and OECD are different. For example, Compustat includes foreign R&D by U.S. multinational companies, while OECD does not.

Table 2: VC-backed Companies as a Percentage of U.S. Public Companies
This table provides summary statistics on the number and impact of VC-backed companies as a fraction of the total universe of independent U.S. public companies, as of 2014.

	VC-backed	%	Total
Number	665	17%	3,832
Enterprise Value $b	4,647	18%	26,111
Market Capitalization $b	4,824	21%	23,140
Employees	4,111,000	11%	38,070,000
Revenue $b	1,461	10%	14,628
Net Income $b	168	16%	1,062
Research and Development $b	131	44%	298
Total Taxes $b	66	11%	589

Looking at the contribution of VC-backed public companies both overstates and understates the importance of VC. We overstate the importance of VC to the extent that successful VC-backed companies may well have been successful even without VC financing. Of course, the fact that so many successful entrepreneurs choose VC financing suggests that this financing plays an important role in the entrepreneurial ecosystem.

On the other hand, we understate the importance of VC financing because we ignore the positive spillovers these firms create. From Microsoft's Windows to FedEx's overnight deliveries, the technologies developed by VC-backed firms have changed the world. The R&D activities of these companies produce benefits not only for the company's owners and employees, but also for consumers in general and companies in other industries and countries.

Financing for New Companies

Another way we understate the importance of VC is by comparing young VC-backed companies to companies founded before the advent of the VC industry. For example, Ford Motor Company and General Electric were founded more than 100 years ago, when VC financing simply was not an option. While a number of well-known companies were funded by the first generation of the

venture capitalists in the 1950s, 1960s, and 1970s, the U.S. VC industry came into its own only after a regulatory change. When the Prudent Man Rule was relaxed in 1979, pension funds were able to invest in VC funds. The rule change led to a greater than tenfold increase in the money entrusted to VC funds: VC funds raised $4.5 billion annually from 1982 to 1987, up from just $0.1 billion ten years earlier.[5]

To level the playing field, we repeat our analysis using only those companies founded after 1974 (Table 3). The idea here is to see what portion of the companies that could have received VC financing, choose to use VC financing. To get at the companies who could have used VC financing, we limit our sample to those companies that came of age after the Prudent Man Rule.[6] By excluding firms like Ford Motor Company and General Electric, we can better estimate the importance of VC to young companies.

Approximately 1,339 currently public U.S. companies were founded after 1974.[7] Of those, 556 (42%) are VC-backed. Focusing on these companies dramatically increases our measures of VC impact. VC-backed companies comprise 63% of the market cap of these "new" public companies, versus 21% for the full sample. Employment share increases similarly, from 11% to 38%. The most impressive figure is arguably R&D spending, with VC-backed firms making up an overwhelming 85% of the total R&D of the post-1974 public companies. Given that the VC industry has been in large part spurred by the relaxation of the Prudent Man Rule, these results provide an illustration of the importance of government regulation.

5 Data from the Venture Economics 1988 Venture Capital Yearbook via Poterba (1989) (available at http://www.nber.org/papers/w2832.pdf).

[6] We chose 1974 as the cutoff to include companies such as Apple and Microsoft, who received early stage VC financing after the rule change despite being founded before the rule change. Table 3 is reproduced using 1978 as the cutoff year in the Appendix as Table A.3. This increases the fraction to 43% and reduces the market capitalization to 58%.

[7] We use founding dates from Professor Jay Ritter, which are available at http://bear.warrington.ufl.edu/ritter/foundingdates.htm. We assume companies with no founding date information were founded before 1975.

Table 3: VC-backed Companies Among Public Companies Founded After 1974
This table provides summary statistics on the number and impact of VC-backed companies as a fraction of independent U.S. public companies founded after 1974. All measures are as of 2014.

	VC-backed	%	Total
Number	556	42%	1,339
Enterprise Value $b	4,136	58%	7,200
Market Capitalization $b	4,369	63%	6,938
Employees	3,083,000	38%	8,121,000
Revenue $b	1,222	38%	3,224
Net Income $b	151	61%	247
Research and Development $b	115	85%	135
Total Taxes $b	57	59%	98

Despite the fact that almost half of recently founded public companies received money from VC funds, the VC industry is relatively small. For example, the U.S. VC industry has raised and invested $0.6 trillion over the past fifty years, which is only a quarter of the amount raised by the private equity industry. This shows that the VC industry has leveraged a small amount of capital into a large number of important investments. In fact, only 0.31% of new U.S. businesses are backed by VC firms.[8]

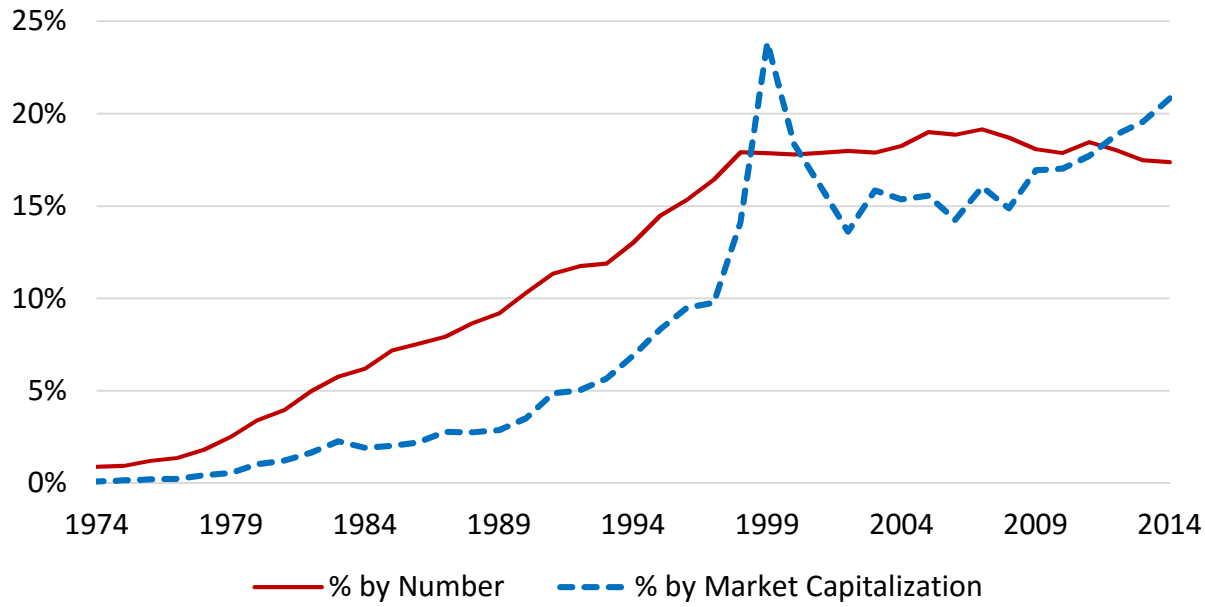
The Rise of VC-backed Companies

Before 1975, VC-backed companies were only a small part of the stock market. Today, 665 U.S. public companies are VC-backed and together they make up a fifth of the market capitalization of public companies. Figure 1 shows the percentage of public companies that are VC-backed since 1974. The role of VC-backed companies in the economy expanded dramatically in the

[8]From Thomson One data, 1,389 firms received their first VC funding in 2012. From the U.S. Longitudinal Business Database, there were 442,700 new businesses in 2012.

1970s-1990s. The spike in market capitalization in the late 1990s corresponds to the dot-com bubble.

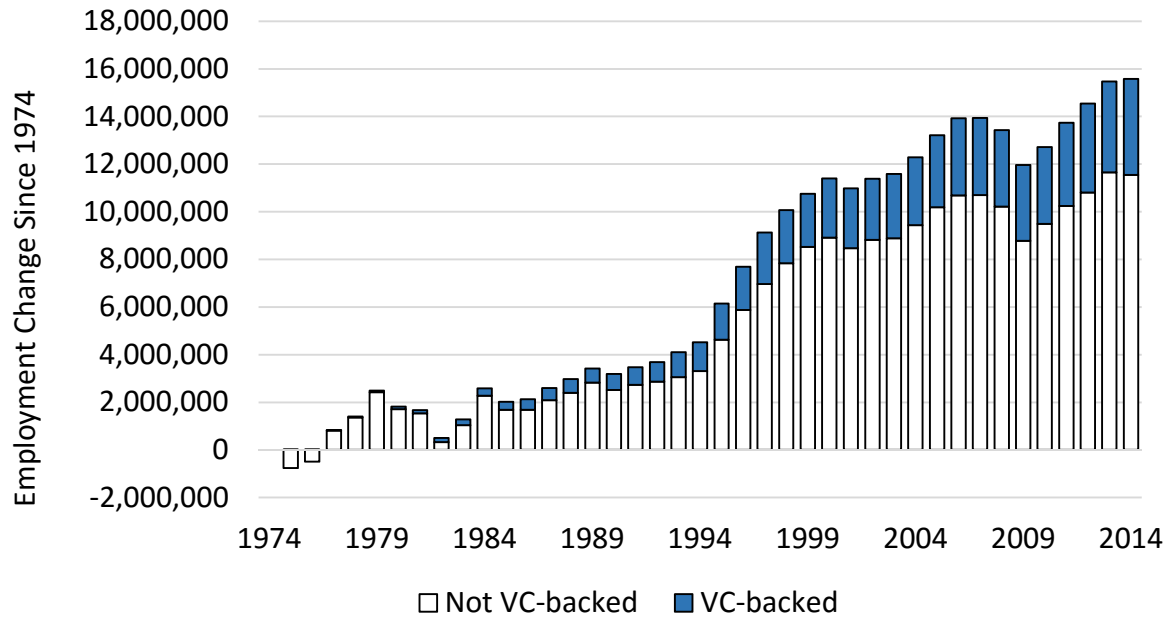
Figure 1: Percentage of Public Companies with VC Backing by Year
This figure shows the percentage of independent U.S. public companies active in each year that were VC-backed. The solid red line is the percentage of VC-backed companies among those that were active in each year. The dashed blue line is the percentage on a market capitalization weighted basis.



VC-backed companies have become major employers. Since 1974, a quarter of net job growth for publicly listed corporations has come from VC-backed companies. Figure 2 shows how the number of people employed by VC-backed and non-VC-backed public companies has changed since 1974. For each year, the size of the blue bar denotes the difference between the number employed by VC-backed public companies in that year and the number employed in 1974. The white bar shows the same for non-VC-backed companies.

Figure 2: Employees at VC-backed Public Companies Relative to 1974

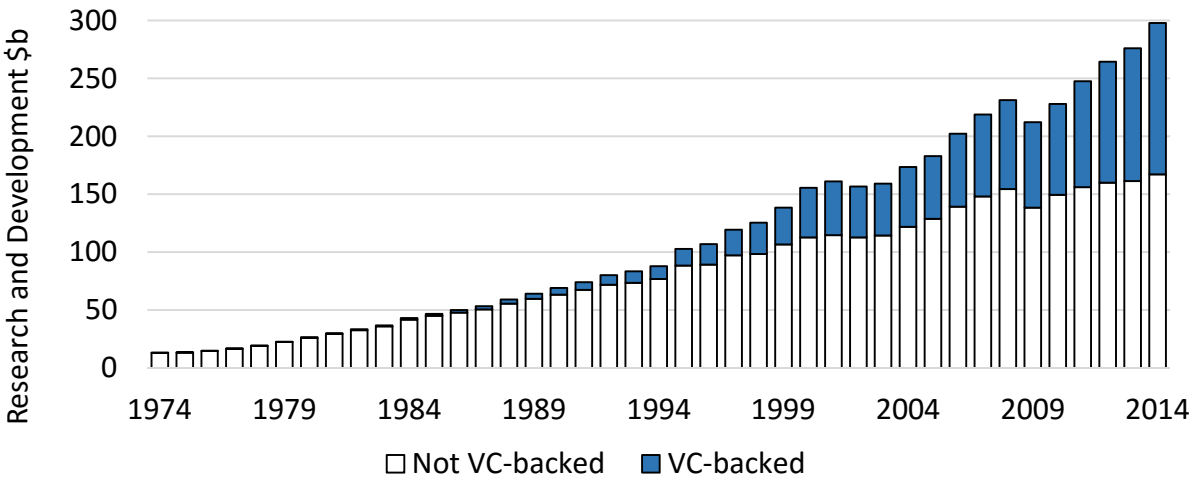
This figure shows the change in the total number of people employed by VC-backed and non-VC-backed U.S. public companies. For each year, the blue bar denotes the difference between the number employed by VC-backed public companies in that year and the number employed in 1974. The white bar shows the same for non-VC-backed companies. For example, in 2003 there were 2.7 million people employed by VC-backed public companies and in 1974 there were 0.1 million people employed by VC-backed companies, so the blue bar for 2003 has height 2.6 million (=2.7-0.1) to denote that employment by VC-backed public companies increased 2.6 million between 1974 and 2003.



VC-backed companies include some of the most innovative companies in the world. To get an idea of their relative importance, it is instructive to look at R&D. Figure 3 shows the R&D expenses of VC-backed and non-VC-backed companies. In 2014, VC-backed U.S. public companies spent $131 billion on R&D; up from essentially zero in 1974. These VC-backed companies now account for 44% of the R&D spending by U.S. public companies. This R&D spending produces value for those companies, as well as providing positive spillover benefits that traverse across the globe.

Figure 3: R&D Spending by VC-backed Public Companies

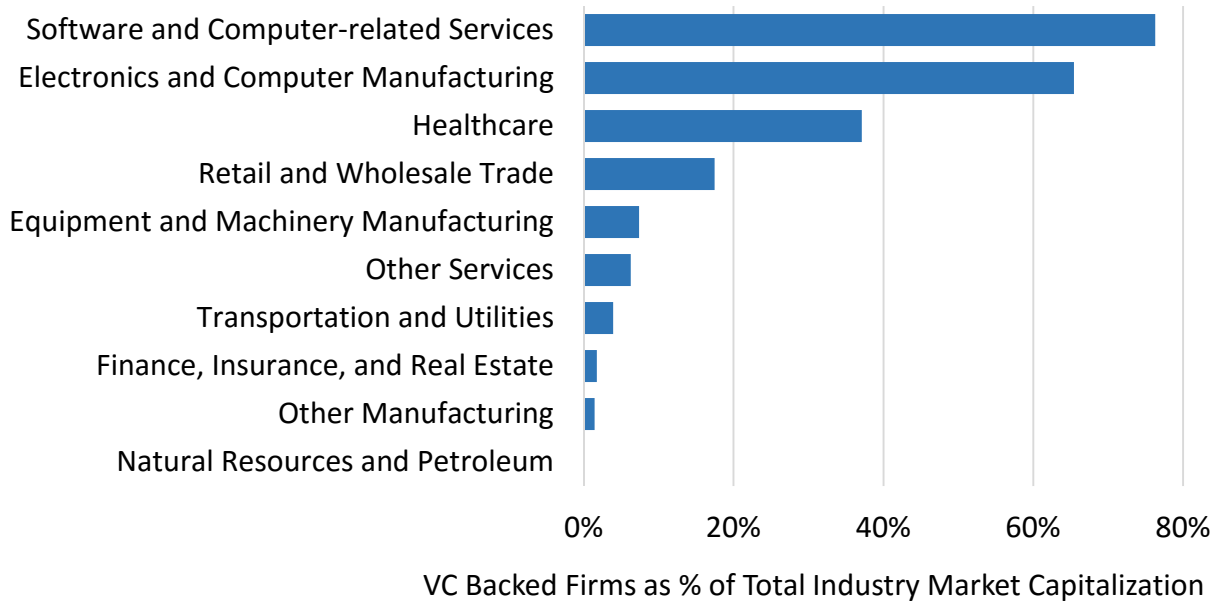
This figure shows total R&D spending by VC-backed and non-VC-backed U.S. public companies. See the Appendix for data sources, definitions, and all other details.



Results by Sector

The VC industry specializes in investing in innovative companies with growth potential. Because these investments are risky and most of these companies fail, venture capitalists seek to invest in companies where a small investment can generate huge returns. That naturally leads to a focus on certain industries. In Figure 4, we break the market capitalization of VC-backed firms into broad industry groups. The industries most impacted by investment are technology (e.g., Apply, Google, or Cisco), retail trade (Amazon, Starbucks, or Costco), and biotechnology (Amgen, Celgene, or Genentech). Industries with higher capital needs, such as banking, real estate development, petroleum, or mining. While the technologies that VC-backed companies have developed have transformed many of those industries as well, we do not examine that indirect impact here.

Figure 4: Sector-by-Sector Market Capitalization of VC-backed Firms
This figure shows the market capitalization of VC-backed companies as a percentage of each industry. All measures are as of 2014.



Conclusion

VC-backed companies play an increasingly important role in the U.S. economy. Over the past 20 years, these companies have been a prime driver of both economic growth and private sector employment.

VC-style financing is not the sole reason these companies succeeded. In fact, VC was not even the sole source of financing for many of these companies. However, large and growing fractions of entrepreneurs are choosing VC financing. These entrepreneurs think VC financing is the best way to grow their companies. That makes it clear that VC is an important part of the innovation ecosystem and has helped some of the world's most successful companies to develop and grow.

Appendix: Data Sources and Caveats

CRSP/Compustat Merged Database of Public Companies

We compile our statistics using data on public companies from the Center for Research in Security Prices/Compustat Merged Database, provided by Wharton Research Data Services. Our analysis considers only U.S. public companies. We export annual accounting records for all North American companies and remove companies with a non-U.S. headquarters location (the LOC field) or traded in a non-U.S. currency (curcd). We also filter out holding and investment offices, such as unit trusts and real estate investment trusts (companies with SIC codes starting with 67). At the same time, we keep banks and other financial institutions in the sample. Finally, we remove subsidiaries and companies that are not traded on a major exchange (only companies with stko of 0 that are listed on AMEX, NASDAQ, or NYSE are retained).

This filtered dataset contains a wide array of financial, accounting, and other data. We use many of these fields directly and calculate others. Market capitalization is calculated as common shares outstanding (csho) multiplied by closing price at the end of 2014 (prcc_c). Enterprise value is calculated as the sum of long-term debt (DLTT), short-term debt (DLC), market capitalization, and the book value of preferred stock (PSTKRV), less cash and short-term investments (CHE). For financial institutions, enterprise value is not well defined and therefore we use market capitalization as a proxy for enterprise value. Research and development is calculated as research and development expense (XRD), excluding purchased research and development written off during acquisitions (RDIP). A small portion of software company R&D is capitalized, as such expenditure will be missed in the period the spending occurs and instead counted in a later period, reducing the R&D of software companies. Some data fields are missing. We do not correct for this and simply exclude missing data. These missing data are for smaller companies and older data and are not material.

Procedure for Classifying Companies as VC-backed

To classify companies as VC-backed or non-VC-backed, we use a combination of hand matching and commercial VC datasets.

Thomson One Data

We start with VC transactions from the Thomson One database. This provides data on more than 300,000 investments made by venture capital and private equity funds. We remove investments that were made by firms or funds not coded as "VC". In particular, this removes deals done by private equity funds. We also remove all investments that took place after the target company's IPO. Finally, we exclude VC financing for acquisitions, PIPE, bridge loans, and some other pre-IPO later stage investments using Thomson's investment stage classification:

Table A.1: Classification of Thomson One's Investment Stages

Stages Counted as VC

10|Early Stage
11|Seed
20|Expansion
22|Later Stage

Stages Not Counted as VC

30|Acquisition	36|Secondary Buyout	54|Open Market Purchase
31|Acq. for Expansion	37|Mezzanine	55|PIPE
32|LBO	38|Pending Acq	59|Other
33|Recap or Turnaround	39|Other Acquisition	60|Bridge Loan
34|MBO	45|Real Estate	70|VC Partnership
35|MBI	53|Secondary Purchase	

The next step is to match the Thomson One transactions to Compustat information. We match companies by linking the company names in Thomson to the historical company names in Compustat. We reconcile those links using manual checks and reconciliation of tickers, IPO dates, and Thomson PERMIDs.

Manual Checks

We complement the Thomson One data with manual checks. We target those checks at large companies, companies likely to be misclassified, and companies we say are VC-backed. First, we check the largest 100 companies classified as VC-backed and the largest 100 companies classified as non-VC-backed. In an effort to be transparent, the last pages of this Appendix include a list of the 100 largest companies we count as VC-backed. Because we check these

largest companies by hand, we are relatively more confident about the value-weighted than equal-weighted results; the checked companies account for 80% of the market capitalization of the VC-backed companies. We focus our check on firms we say are VC-backed, to avoid overstating the impact of venture capital.

Second, and in addition, we check those companies that are likely to be misclassified. We find such companies by comparing our classification with a similar classification created by Jay Ritter and generously shared with us. His data include a list of IPOs and his classification of those IPOs as VC-backed or not. Although the purpose of his analysis and therefore his criteria differ from ours, the differences between his classification and the results of our classification provide a useful error check and so we manually check 100 of the companies where our classification differs from Ritter's classification.

The manual checks are performed using Thomson One data, Venture Source data, and public data sources on company history. For each company, we look for that company in the Thomson One and Venture Source datasets. If the company is not there, we check the company's history to see if it is a spinoff of another company, underwent a name change, or is the product of a merger. In those cases, we search for the company's previous incarnations.

After compiling a list of deals related to the company, we determine whether any of those deals meet our criteria for VC deals. If so, we count the company as VC-backed. If not, we count the company as not VC-backed. Some companies defy categorization. In the next section, we outline some of these edge cases. In general, we strive to be conservative and count borderline cases as not VC-backed.

In Table A.2 we show the results of our algorithm with Jay Ritter's classification.

Table A.2: Reconciliation with Jay Ritter's Classification

	We Say No	We Say Yes
Jay Ritter Says No	52%	4%
Jay Ritter Says Early Stage	8%	29%
Jay Ritter Says Growth Stage	3%	4%

Each cell in Table A.2 shows the portion of the entries in Ritter's dataset with different patterns of agreement. For example, for 52% of those entries, we say the company is not VC-backed and Ritter agrees. As Ritter includes only IPOs since 1975, his sample has a higher portion of VC-backed IPOs than our full sample.

Overall, the two classification systems are in agreement 85% of the time. The cases where we disagree arise primarily because we use, conservatively, a more restrictive definition of a VC-backed company. Three quarters of the cases where we disagree are due to our more conservative definition of VC-backed, which excludes later stage deals. The cases where Ritter says no and we say yes appear to be due to corporate VC, which he excludes and we include, and potentially data differences. As mentioned above, we manually checked the largest 100 cases where there is a disagreement.

Difficulties in Classifying Companies

One important challenge is the definition of a VC-backed company. Even though we adopted a relatively conservative definition, in a number of cases it is inevitably a matter of judgment. This section lists examples of the problems that arose and how we handled those problems.

Non-VC Investments by VC firms

We exclude non-VC style investments, even if they are made by VC firms. We defer to Thomson One here for the stage classifications, as described in the previous section.

Domino's Pizza received $330 million in acquisition financing in 1998 from the VC firm JK&B Capital. However, we do not count Domino's as VC-backed because the financing was not early stage.

Private Equity Firms

We exclude private equity deals. Our classification relies on both fund and firm level descriptors. If we have data on the fund that made the investment, we use that and count investments by a VC fund as VC-backed. This means that early-stage investments made by a VC fund under a PE firm are counted as VC-backed. If we do not have the fund information, we use the firm's type. The line between private equity financing and VC financing is not always clear, and it is made even less so by the passage of time and data limitations. Some investments are by unknown investors and we assume those are not venture capital. If firms bill themselves as both private equity and venture capital investors, we use the Thomson One classification. Large deals are manually classified based on the deal characteristics, with small early stage deals made by combined PE/VC firms being classified as VC-backed.

Bed Bath & Beyond was funded by 3i, which is a "multinational private equity and VC company." We count this company as VC-backed because the transaction was early stage and appears to be a VC-style deal.

Staples received funding from a variety of VC funds; however, it also received early stage funding of $4.8 million from Bain Capital. We count see this as a venture capital transaction made by a fund that does both private equity and VC deals, and so this investment alone would be sufficient for this company to be counted as VC-backed.

Corporate VC, Joint Ventures, and Other Corporate Investment

The line between corporate VC and other forms of corporate investment is similarly blurry. In many cases, it is not obvious whether an investment was made through corporate VC, as part of a joint venture, or even as an investment by a corporate pension plan. We attempt to exclude the latter two types and be conservative in our classification.

Intercontinental Exchange was formed by investment from a group of seven large banks. This investment could be called corporate VC or a joint venture. We view this as a joint venture due to the nature of the investment, and do not classify it as VC-backed.

Flexion Therapeutics was funded partially by Pfizer's corporate VC arm, and we count it as VC-backed because the funding was early stage and by a VC fund.

Missing or Incorrect Data in Thomson One

Although Thomson One is one of the largest VC databases, it is certainly not complete. Our analysis focuses on successful, public companies, which is where Thomson One will have the best accuracy. Nevertheless, some rounds are doubtless missing and some are misreported. Missing rounds tend to bias our estimates downward, as we count some companies that received VC financing as not being VC-backed. Misreported rounds could lead to either higher or lower estimates, although these rounds appear to be rare.

Oracle's VC rounds are from Thomson One. As a result, our algorithm initially classifies Oracle as not VC-backed. In fact, Oracle did receive VC funding from Sequoia in 1984, which we were able to confirm using another commercial VC database, VentureSource, as well as other public sources. Therefore, we correctly classify Oracle as VC-backed.

Sun Microsystems was initially counted as not VC-backed by our algorithm, because its VC rounds were attributed by Thomson to Oracle, its acquirer. This is the only instance of this error type that we identified; however, missing and miscoded data might be difficult to detect. Missing data will lead the impact of VC to be understated. Misattributed rounds have an ambiguous effect. They will lead to understatement if they are attributed to a firm that is VC-backed and overstatement if they are attributed to a firm that is not.

Mergers between VC-backed and Non-VC-backed Companies

Mergers and acquisitions create another problem. If a company that is VC-backed mergers with a company that is not VC-backed, is the resulting company VC-backed? We use CRSP PERMNOs, a form of company identifier, to track companies, which means that the byproduct of a merger is counted as VC-backed if the acquiring company was VC-backed.

Compaq illustrates the concept. When the VC-backed Compaq merged with HP, the new company was not VC-backed as the deal was structured as HP acquiring Compaq.

T-Mobile USA was not VC-backed but merged with the VC-backed MetroPCS. Although T-Mobile was the larger company, the merger was structured as a reverse takeover with MetroPCS acquiring T-Mobile and MetroPCS changing its name to T-Mobile. As such, the VC-backed company bought the non-VC-backed company. Our algorithm counted this as VC-

backed, as after all T-Mobile is the byproduct of a VC-backed company acquiring a non-VC-backed company. However, we manually corrected this and count T-Mobile as not VC-backed.

Spinoffs

If a company spins off a subsidiary, we generally count the subsidiary as VC-backed if the parent was. We track companies using CRSP PERMNOs, which allows us to capture some spinoffs. Others are missed, some of which are caught with manual checks and some of which are not.

Avis is counted as VC-backed because it is a spinoff of the VC-backed CUC International.

Time Warner was acquired by the VC-backed AOL and later split off. Our algorithm calls Time Warner VC-backed, as it is a spinoff of a VC-backed company. We manually override this and count Time Warner as not being VC-backed.

Links between Databases

Our analysis merges Thomson One data with Compustat and CRSP data. As with any analysis that includes merging large datasets, the link between datasets is not perfect. In some cases, we have not been able to find a match (i.e., there are companies that Thomson One identifies as having gone public but we could not match with Compustat and thus do not include). One of the reasons for a lack of match is that the companies that went public later failed, merged, or changed their names. While our manual matching aims at improving the quality of the match, a match was not found for some companies. This will bias against VC-backed companies, as a company that is not matched will be counted as not VC-backed.

Caveats to Interpretation

Beyond methodological issues, there are a few important factors to keep in mind when interpreting our results. First, we consider only public companies. Obviously, this understates the full impact of VC as it misses large, private VC-backed companies such as Uber. However, it may balance out in proportional terms as it also misses large private companies that were not VC-backed. Future work can include these private companies and information on their employment and accounting variables.

We have no way of seeing most types of non-VC funding, and so we ignore it and count companies as VC-backed if they received any early-stage VC funding. Most companies were financed at least in part from other sources, such as family, friends, or banks. For example, a hypothetical company that received 90% of its funding from the founder's savings and 10% from a VC fund would be counted as VC-backed.

Second, we analyze only U.S.-based companies and the U.S. VC industry. The U.S. VC industry is the most developed in the world. Foreign VC industries are much younger but would be interesting to analyze in their own right or as a comparison.

Finally, we look only at financial proxies, when the ultimate goal is really to measure the contribution of VC-backed companies to the U.S. economy and to society more generally. Ideally, we would measure not just the amount of money companies made or the number of people they employed, but also the lives saved by the drugs a biotechnology startup created, the value that the Apple iPhone brought to consumers, or the amount by which Microsoft Office increased the productivity of businesses. However, we have only imperfect financial proxies. We use enterprise value, market capitalization, employees, revenue, net income, research and development, and total taxes to proxy for those deeper values.

Alternative Cut-off Dates

In Table A.3 we report the impact of VC-backed companies founded after 1978 as a fraction of the total impact of companies founded after 1978. We redid the calculations used to generate the results in Table 3 using a different cutoff. Although the numbers change slightly, the overall magnitude is the same. The largest differences appear in net income and total taxes. This difference arises because Apple and Microsoft were founded in 1975 and 1976, respectively, and so the 1978 date excludes them and the 1974 date includes them. As these two companies are very profitable and VC-backed, they have a large impact on the profit and tax numbers. We choose 1974 as our primary cutoff because these companies were funded by VC funds after the Prudent Man Rule change, and so setting a date that excludes them seems against the spirit of the exercise.

Table A.3: VC-backed Companies Among Public Companies Founded After 1978

This table provides summary statistics on the number, value, and impact of VC-backed companies as a fraction of those independent U.S. public companies founded after 1978.

	VC-backed	%	Total
Number	536	43%	1,253
Enterprise Value $b	2,889	52%	5,529
Market Capitalization $b	3,062	58%	5,242
Employees	2,483,000	38%	6,529,000
Revenue $b	869	34%	2,545
Net Income $b	75	49%	152
Research and Development $b	89	83%	108
Total Taxes $b	34	53%	65

Industry Groups

In Figure 4, we group publicly traded companies into industries. We use SIC codes for our classification. Although SIC codes are grouped into divisions, we use our own industry groups as the SIC divisions do not reflect the current state of the U.S. economy. We merge small divisions (e.g., mining and construction) and split large divisions (e.g., manufacturing). This allows us to paint a more representative picture of the economy and to determine the impact of VC.

Explicitly, the industry groups are set up as follows. The Transportation and Utilities; Finance, Insurance, and Real Estate industry groups are set up based on their corresponding SIC divisions. Retail and Wholesale Trade is the combination of the retail trade and wholesale trade divisions. Natural Resources and Petroleum is composed of agriculture, forestry, and fishing; mining; construction; and petroleum refining and related industries.

Software and Computer-related Services is computer programming, data processing, and other computer-related services. Healthcare is drugs; surgical, medical, and dental instruments and supplies; health services; and ophthalmic goods. Electronics and Computer Manufacturing is computer and office equipment and electronic and other electrical equipment and components, except computer. Equipment and Machinery Manufacturing includes all of the following except where otherwise classified as Healthcare or as Electronics and Computer Manufacturing: industrial and commercial machinery and computer equipment; transportation equipment; measuring, analyzing, and controlling instruments; photographic, medical and optical goods; watches and clocks. Other Manufacturing and Other Services include everything in their respective divisions that is not elsewhere classified.

100 Highest Market Capitalization U.S. VC-backed Companies

Table A.4 lists the 100 VC-backed companies with the largest ever market capitalization. We provide this list for transparency and to give insight into our classification. These 100 companies have all been manually check. Together, the currently public companies on this list make up 83% of the market capitalization of all the firms we say are VC-backed.

Table A.4: 100 Highest Market Capitalization U.S. VC-backed Companies

This table lists the 100 VC-backed companies with the largest all-time market capitalizations.

3Com Corp	Ciena Corp
Actua Corp	Cisco Systems Inc
Adobe Systems Inc	Citrix Systems Inc
Advanced Micro Devices Inc	Compaq Computer Corp
Affiliated Managers Group Inc	Concord EFS Inc
Akamai Technologies Inc	Costco Wholesale Corp
Alexion Pharmaceuticals Inc	Dell Inc
Alphabet Inc	DoubleClick Inc
Altera Corp	eBay Inc
Amazon.com Inc	Electronic Arts Inc
Amgen Inc	EMC Corp
Apple Inc	Facebook Inc
Applied Micro Circuits Corp	FedEx Corp
Ariba Inc	Fiserv Inc
Ascend Communications Inc	FleetCor Technologies Inc
Avis Budget Group Inc	Foundry Networks Inc
Bed Bath & Beyond Inc	FreeMarkets Inc
Biogen Inc	Genentech Inc
Biomarin Pharmaceutical Inc	Genzyme Corp
BMC Software Inc	Gilead Sciences Inc
Broadvision Inc	Groupon Inc
Caremark Rx Inc	HCA Holdings Inc
Celgene Corp	Illumina Inc
Cerner Corp	Immunex Corp
Chipotle Mexican Grill Inc	Incyte

(Table A.4 continued)

CorpIntel Corp
Internap Corp
Intuit Inc
Intuitive Surgical Inc
Juniper Networks Inc
KLA-Tencor Corp
Lam Research Corp
Level 3 Communications Inc
Linear Technology Corp
LinkedIn Corp
Maxim Integrated Products Inc
Micron Technology Inc
Microsoft Corp
Millennium Pharmaceuticals Inc
ModusLink Global Solutions Inc
NetApp Inc
Netflix Inc
NVIDIA Corp
Oracle Corp
Palm Inc
Paychex Inc
Peoplesoft Inc
PMC-Sierra Inc
Red Hat Inc
Regeneron Pharmaceuticals Inc
Ross Stores Inc
salesforce.com Inc
SanDisk Corp
Sanmina Corp
SBA Communications Corp
Siebel Systems Inc
Solectron Corp
Staples Inc
Starbucks Corp
Stryker Corp
Sun Microsystems Inc
Symantec Corp
Tellabs Inc
Tesla Motors Inc
TripAdvisor Inc
Twitter Inc
Under Armour Inc
Verisign Inc
VERITAS Software Co
Vertex Pharmaceuticals Inc
VMware Inc
Whole Foods Market Inc
Workday Inc
Xilinx Inc
Yahoo Inc