

Net value: wealth creation (and destruction) during the internet boom

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Abstract

During the internet bubble, dot-com stocks rose by a factor of 35, creating what we now know were massively distorted price signals. This paper looks at net value creation in a sample of 441 venture-backed dot-coms that received over US\$21 billion from private and public equity investors. As of the end of 2001, this US\$21 billion corresponded to an estimated US\$39 billion of enterprise value, giving an annualized return-on-equity capital invested of 19%. These results suggest that, despite the distorted price signals and contrary to popular perception, wealth was created during the dot-com investment boom.

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1. Introduction

How the mighty have fallen. Internet companies, recently so important that they required a “new economy” differentiator and received an enormous valuation premium, are now the black sheep of Wall Street. High-profile closures have replaced hot IPOs. Venture capital returns have turned negative after peaking in the triple-digits. Leading venture capitalist John Doer has publicly apologized for his famous statement that characterized the internet as “the largest legal creation of wealth in the history of the planet”. And internet excesses are widely cited as a major cause of the US economy’s sharp slowdown in late 2000 and early 2001.

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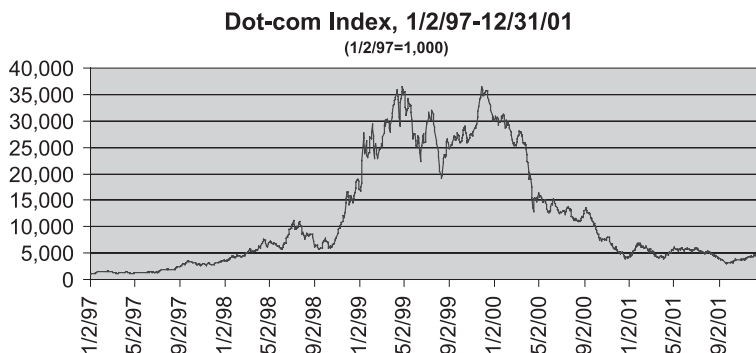


Fig. 1. Dot-com stock market performance, 1997–2001. The dot-com index is equally weighted, initially consisting of Excite, Lycos, Yahoo, and CNET plus, as they go public, OnSale, Amazon.com, Sportsline, CDnow, Beyond.com, Cyberian Outpost, FatBrain.com, Xoom.com, About.com, Cheap Tickets, Geocities, eBay, iVillage, Priceline.com, Launch Media, Alloy Online, eToys, TheStreet.com, Salon.com, Stamps.com, Ask Jeeves, Drugstore.com, MP3.com, Musicmaker.com, Quokka Sports, 1-800-Flowers.com, HomeStore.com, Ashford.com, Garden.com, e-Stamp, iGo.com, PlanetRx, VitaminShoppe.com, Women.com, GetThere.com, SmarterKids.com, Tickets.com, Webvan, eGreetings, Fogdog.com, HealthCentral.com, MotherNature.com, and TheKnot.com.

The year 2000 marked the beginning of the end of what is now commonly referred to as the internet bubble. Between 1995 and 2000, internet stock prices soared and thousands of newly founded companies raised tens of billions of dollars from venture capitalists and others to pursue internet-related opportunities. Hundreds of these start-ups subsequently went public, raising additional billions. As public market values soared, enormous wealth was created. Beginning in early 2000, however, internet valuations began to fall rapidly, with many public internet companies, particularly consumer-destination companies (online retailers and information portals—often referred to as “business-to-consumer companies” or “B2C” companies), experiencing stock price drops in excess of 90% by the end of the year.

Fig. 1 presents the public market evolution of venture-backed consumer-destination internet companies, using an index of what I subsequently call “dot-coms”.¹ The dot-com index, normalized to 1000 as of 1/2/97, rises to over 35,000 at multiple times during 1999, and drops below 4000 by the end of 2000. As Fig. 1 shows, the bulk of the wealth represented by dot-com companies evaporated as quickly as it was created. Within 18 months of the public market peak, many high-profile dot-coms—both public and private—closed despite having raised billions of dollars of investment capital.

¹ The dot-com index is equally weighted, initially consisting of Excite, Lycos, Yahoo, and CNET plus, as they go public, OnSale, Amazon.com, Sportsline, CDnow, Beyond.com, Cyberian Outpost, FatBrain.com, Xoom.com, About.com, Cheap Tickets, Geocities, eBay, iVillage, Priceline.com, Launch Media, Alloy Online, eToys, TheStreet.com, Salon.com, Stamps.com, Ask Jeeves, Drugstore.com, MP3.com, Musicmaker.com, Quokka Sports, 1-800-Flowers.com, HomeStore.com, Ashford.com, Garden.com, e-Stamp, iGo.com, PlanetRx, VitaminShoppe.com, Women.com, GetThere.com, SmarterKids.com, Tickets.com, Webvan, eGreetings, Fogdog.com, HealthCentral.com, MotherNature.com, and TheKnot.com.

Although before 2000 there was disagreement over whether internet valuations were excessive, the sharp decline in internet stocks certainly came as no surprise to many (see, for example, Perkins and Perkins, 1999 and Higson and Briginshaw, 2000). After the bubble deflated, researchers turned their attention toward explaining how internet company valuation evolved as the boom turned to bust (see, for example, Demers and Lev, 2000 and Keating et al., 2000).

This paper pursues a different direction. Using a sample of 441 venture-backed dot-coms, I explore the extent to which *long-term* value was created/destroyed during the internet boom/bust. Stock prices provide signals that are generally believed to influence capital allocation within the economy. To the extent that internet stocks experienced a bubble, it is possible, even likely, that capital was misallocated during the internet boom. The extent to which resource misallocation resulted in wealth destruction is, however, an empirical question. We can observe both the capital raised and value created by internet companies. For the internet bubble to have destroyed wealth, dot-coms, as a group, would have to have created less value than the amount of capital that they consume (or at least earn a below-market return on the capital that they absorb).

I choose dot-coms for four reasons. First, dot-coms are commonly cited as an example (if not *the* example) of internet excesses. Second, large numbers of dot-coms absorbed significant resources (our sample raised over US\$21 billion of equity capital in the private and public markets between 1995 and 2001). This both highlights the relevance of understanding dot-com wealth creation/destruction and conveniently provides a large sample of homogenous firms for study. Third, venture-backed dot-coms began to appear in 1995. Consequently, a substantial number of dot-coms went public early in the internet boom, providing an observable public market price index.

Finally, because dot-coms have come full circle—moving from extreme investor optimism to extreme investor pessimism (or, one might argue, realism) accompanied by a severe weeding out of unsustainable businesses—these companies provide an early opportunity to evaluate long-term wealth creation during the internet boom. Many dot-com business models appear to have been fatally flawed and, as is shown in Fig. 1, the broad sector rapidly lost its luster with investors during 2000. I am not interested in the huge amounts wealth that temporarily appears during the height of internet stocks' popularity; my goal is to explore how much *sustained* value dot-coms create relative to the amount of capital that these companies consume. That is, if you take out the bubble, have these internet investments created or destroyed wealth?

The results indicate that dot-coms are funded at relatively low rates during the beginning of the internet boom, and these early entrants exhibit high success rates and create substantial long-term value. However, the majority of venture-backed dot-coms are funded well *after* public market values rise sharply, and these dot-com investments perform far worse. High levels of private investment continue in the face of stagnant (albeit very high) public market valuations, but venture investors respond quickly to the sharp public market downturn in 2000. By the fourth quarter of 2000, fewer dot-com companies receive initial venture backing than were funded in the second quarter of 1996.

Although accurate, this dismal picture of hundreds of worthless dot-coms consuming vast amounts of risk capital is somewhat misleading. Virtually all venture portfolios contain many failures that “waste” valuable risk capital. These failures, however, are part

of the price that investors pay for their relatively few successful investments. Consequently, focusing on the failures invariably produces a very bleak portrait. Despite the internet bubble's bursting, the sample of 441 venture-backed dot-coms *create* an estimated US\$17.7 billion of aggregate net value as of the end of 2001, yielding a roughly 19% annualized return-on-equity investment (both private and public). As is typical in venture investing, the few winners in the sample "portfolio" more than offset the many losers.

The remainder of the paper is organized as follows. In Section 2, I discuss the existing literature on venture capital, wealth creation, and innovation. Section 3 presents the dot-com sample and the methods I use to estimate wealth creation. The fourth section presents the dot-com results. Section 5 discusses the results, and Section 6 concludes.

2. Venture capital, wealth creation, and innovation

It is widely believed that venture-backed start-ups are one of the primary engines of US innovation and economic growth. Mark Heesen, president of the National Venture Capital Association, was recently quoted as saying "The venture capital industry is fundamentally linked to U.S. innovation and growth. . ." (Mosquera, 2001). In its 1996 report "Venture Capital and Innovation", the [Organization for Economic Co-Operation and Development \(1996\)](#) (OECD) does not even discuss whether increasing the supply of venture capital is an efficient way to spur innovation and growth—the report simply focuses on how countries can spur venture investment, presuming that more is better.

The notion that venture capital spurs innovation has empirical support. Using monthly data from 1965 to 1992, [Kortum and Lerner \(2000\)](#) find a relationship between venture investment and the number of US patent applications filed. Using an exogenous shift in the venture capital market—the 1979 ERISA act—they show that this relationship does not appear to be the result of both venture investing and patent applications responding to a variable stream of technological innovations. Venture capital seems to lead to innovation (as measured by patent applications), which, in turn, is widely believed to drive economic growth (see, for example, [Scherer, 1999](#)).²

[Kortum and Lerner \(2000\)](#) estimate that venture investment leads to roughly three times as much innovation as an equal investment in corporate research and development (R&D). To the extent that venture capital's superior productivity has continued, venture investment has funded the majority of recent innovation in the US; Venture Economics reports that US venture funds invested over US\$100 billion during 2000 while the American Association for the Advancement of Science reports that private industry R&D expenditures totaled roughly US\$180 billion. Assuming venture capital and corporate R&D are the only sources of innovation, the 3:1 productivity ratio would imply that venture capital accounts for over 60% of the innovation funded in 2000.

The internet bubble, however, casts doubt on the venture industry's recent productivity. If market prices do not provide accurate, objective signals, capital may be misallocated.

² In a study of 21 countries, the [Global Entrepreneurship Monitor \(2000\)](#) finds some evidence that venture investing is correlated with entrepreneurial activity that is, in turn, correlated with economic growth.

When investors are overly enthusiastic about a firm's (or sector's) prospects, the company (or sector) will tend to receive more capital than there are profitable opportunities to fund.

Despite its importance, the private nature of venture capital investing limits our knowledge of its strengths, weaknesses, and potential flaws. Research on venture capital contract structure generally reaches favorable conclusions, but relatively little empirical evidence is available on the venture capitalists' ability to efficiently allocate capital.³ Although the venture industry's attractive realized return history suggests that venture capital has been invested wisely in the past, a greatly increased supply of venture capital—Venture Economics reports that venture funds raised over US\$100 billion in 2000, up from an average of around US\$6 billion in the late 1980s and early 1990s—could diminish returns. Venture investors have a phrase—"too much money chasing too few good deals"—to describe what happens when the supply of venture capital grows too rapidly. Gompers and Lerner (2000) show that increased capital availability is associated with higher company valuations (the prices at which venture capitalists invest). Of course, increased capital and high prices need not necessarily diminish value creation; it might only impair investors' ability to capture a large piece of the value created by successful new companies. That is, competition between investors might cause a venture capitalist to acquire 25% ownership of a company for a US\$5 million investment rather than a 30% ownership stake. To the extent that value creation remains constant, this would reduce the venture investor's return, but would have no impact on the wealth created by the US\$5 million equity investment.

3. Sample, data, and methods

3.1. Sample and data

Our sample consists of venture-backed consumer-destination internet companies, or dot-coms. For our purposes, dot-coms sell products through a web-based store (online retailers and auction sites) and/or generate revenue by selling marketing opportunities to merchants who want access to the dot-com's users (information portals and community sites). Although dot-coms are generally classified as either online retailers or information portals, the typical dot-com offers characteristics of both. For example, the leading online retailer, Amazon.com, builds community elements into its online stores and gives select partners (e.g., Drugstore.com) the ability to market to Amazon's customers in exchange for cash and stock payments. Similarly, the leading portal/community company, Yahoo, indirectly sells merchandise through its Yahoo Shops.

Our data come from the VentureXpert database compiled by Venture Economics, a division of Thomson Financial. The VentureXpert database contains information about the investments made by roughly 700 venture firms, including virtually all large US-based funds. Generally, the investors in a venture-backed company are identified along

³ Venture contracting studies include Admat and Pfleiderer (1994), Hellmann (1998), and Kaplan and Stromberg (2000), among others. Amit et al. (1990) is an example of the more limited research on venture investors' ability to allocate capital efficiently.

with the amount and timing of investments. Some information about the company being funded (line of business, top management, geographic location, valuation etc.) is also typically available. Finally, the database identifies many firms' exits (IPO, acquisition, bankruptcy).

While the VentureXpert database appears to provide close to fully inclusive coverage of start-ups backed by traditional institutional venture capitalists during the late 1990s, the database is not completely comprehensive. Although there is no complete data set to reference, it appears that the VentureXpert database captures an increasing fraction of venture-backed start-ups over time. This is likely due to Venture Economics gaining the cooperation of more venture firms over time. The funding information that is available in the database varies across firms. The date and size of investments are generally available, but the identity of investors and their participation in investment rounds is not always provided. Finally, the database is dynamic: because the database is back-filled, the historical data provided by the database expands over time. That is, historical information (e.g., additional details on early venture rounds) is added to the database as it becomes available (e.g., in a newly filed prospectus).

Our initial set of sample company candidates consists of the 762 US-based firms in the VentureXpert database that (1) are categorized as being an "internet specific" company and have "consumers" as the firm's primary customer and (2) receive their initial venture backing during the 1995–2000 period. Seventy of these companies lack the data necessary to be used in the study (primarily funding details) and 251—mainly software companies and service providers—do not meet our definition of a dot-com. This leaves us with a sample of 441 venture-backed dot-coms, 244 that are primarily online retailers and 197 that are primarily information portals.

Although these 441 companies represent only a fraction of the dot-coms that were founded during the 1995–2000 period, as venture-backed firms they likely consume a disproportionate share of the risk capital that was invested in dot-coms. The Venture Economics database provides the private financing data for each company—the 441 sample dot-coms raise over US\$12 billion from private investors in 874 separate financing rounds. One sample company raises six separate private investment rounds; 14 raise five; 33 raise four; 59 raise three; 155 raise two; and 179 sample companies raise a single round of private investment (all as of year-end 2001).

Sixty sample dot-coms subsequently go public, raising an additional US\$4.9 billion in their IPOs. Sample companies also raise US\$3.8 billion in 14 secondary offerings. Public financing data are taken from the relevant firms' SEC filings. In all, sample companies absorb a total of over US\$21 billion of private and public equity capital.

Dot-com funding follows a pattern very similar to what [Sahlman and Stevenson \(1985\)](#) document in the Winchester disk drive industry between 1977 and 1984. [Fig. 2](#) presents, on a monthly basis, the number of sample firms that receive their initial venture backing. The upward trend is dramatic. Dot-coms become venture-backed at a relatively low rate ($<5/\text{month}$) during the early part of the sample period. In mid-1998, the number of initial dot-com fundings begins to rise before exploding in mid-1999. Two hundred and ninety-two initial financings (two-thirds of the sample) were announced between May 1999 and June 2000, an average of over 20 new dot-coms per month. One-third of the entire sample receives its initial financing during the 6-month period ending in February 2000.

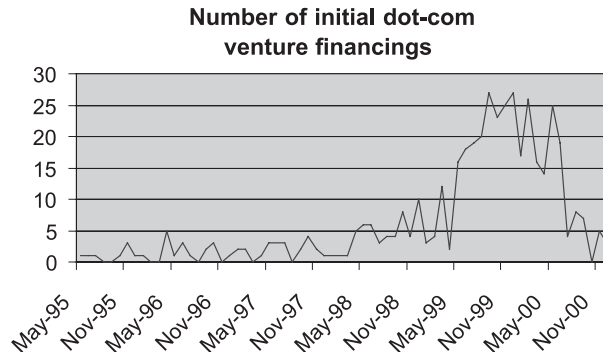


Fig. 2. Initial dot-com venture backings, 1995–2000. The sample consists of 441 venture-backed dot-com companies identified from the Venture Economics VentureXpert database. Number of dot-coms receiving their initial venture backing is reported on a monthly basis.

As internet stocks began to fall sharply in 2000, venture financing activity also slowed. The dot-com index presented in Fig. 1 drops from 35,000 in January 2000 to 15,000 by the end of April, and continues to drift downward for the rest of the year (finishing around 4000). Initial venture financings follow: roughly six new dot-coms are funded each month during the third quarter of 2000 and less than three per month are funded in the fourth quarter.

As shown in Fig. 3, investment dollars (both private and public) exhibit a similar pattern. On average, sample dot-coms receive a total of less than US\$25 million of investment capital per month through March 1998. Dot-com investment activity ramps up rapidly, however, with a total of almost US\$16 billion being invested in sample dot-coms between March 1999 and March 2000—over US\$1.2 billion per month. This increase reflects both more new dot-coms being funded and an increasingly larger pool of existing venture-backed dot-coms raising additional money in both the private and public markets. Higher funding levels do not, however, maintain in the face of a falling dot-com stock prices. By the fourth quarter of 2000, despite the large number of dot-coms needing additional capital, sample firms are receiving less than US\$100 million/month.

3.2. Methods

To estimate the net value created by our sample of 441 dot-coms, we compare the external equity capital invested in sample firms through 12/31/01 with the liquid value the companies create as of 12/31/01. Total equity capital absorbed includes private equity investments (venture money), proceeds from initial public offerings (IPOs), secondary offerings, private placements by public firms, and money raised from convertible debt offerings that are converted into equity by 12/31/01. That is, equity capital invested in the total dollars the company receives from investors in exchange (eventually) for equity securities.⁴

⁴ For example, Amazon.com's early convertible debt issues, subsequently converted into equity, are counted as equity capital absorbed. The proceeds from Amazon's unconverted issues are not counted.

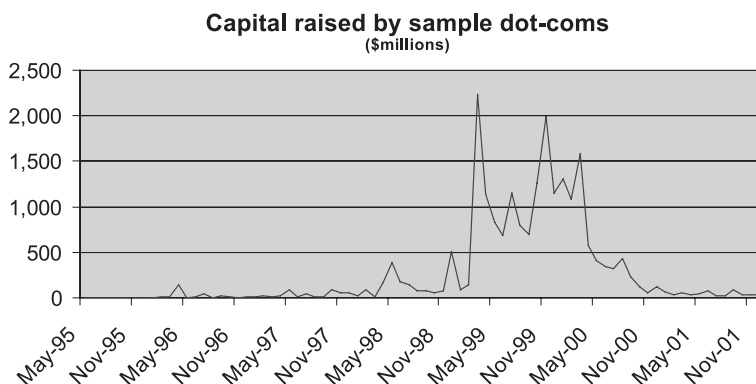


Fig. 3. Monthly capital received by sample dot-coms, 1995–2001. The sample consists of 441 venture-backed dot-com companies identified from the Venture Economics VentureXpert database. Capital raised includes all equity capital—both private and public—invested in sample firms on a monthly basis.

Liquid value measures the amount of observable equity value each sample firm creates with the equity capital it receives. The fact that many publicly traded dot-coms temporarily received very high valuations during the late 1990s makes it important to use a suitably later date to estimate long-term value created. We measure liquid value as of 12/31/01. Although this year-end date is ad hoc, as the dot-com index in Fig. 1 shows, it is a time when it appears that most, if not all, of the dot-com bubble had deflated.

For our purposes, sample companies that neither go public nor are acquired by the end of 2001 are deemed to create no liquid value—all of our value estimates are based on the 60 IPOs and 24 major acquisitions that occur in our sample. The 46 sample dot-coms that go public and remain independent (or are liquidated) create liquid value equal to the companies' market capitalizations as of 12/31/01, adjusted for acquisitions and cash distributions.⁵ The 12/31/01 market capitalizations of the publicly traded sample firms are adjusted to exclude any shares that are issued in acquisitions after the company went public. This is to prevent double counting value creation when a sample dot-com acquires another sample company and to avoid including value implicit in acquired companies that are not also included in our calculation of the capital received by sample dot-coms.

Consider an illustrative example. In early 1999, Yahoo first announced that it would acquire Geocities for over US\$3 billion worth of stock, and then announced that it would acquire Broadcast.com for over US\$4 billion worth of stock (stock values are at the time of announcement). Geocities is part of our dot-com sample; Broadcast.com is not. The over 43 million (split-adjusted) Yahoo shares issued to Geocities stockholders must be eliminated from our calculation of *Yahoo's* liquid value to avoid double counting—they represent Geocities' liquid value. Likewise, we exclude the over 57

⁵ Although dot-coms do not pay regular dividends, a small number have paid liquidating dividends (e.g., MotherNature.com).

million shares issued in the Broadcast.com merger from Yahoo's liquid value because we are not including the corresponding equity investments that funded the Broadcast.com assets.⁶

Obviously, Geocities' pre-acquisition public market value cannot enter into the liquid value calculation—these shares no longer exist. Instead, the liquid value of sample dot-coms that go public and are subsequently acquired are estimated based on the acquisition using the approach described below. Otherwise, the same methods apply—the capital raised by these firms (e.g., Geocities' IPO proceeds) is included as part of the total capital absorbed by sample dot-coms, and their liquid values' are adjusted for post-IPO acquisitions (e.g., Geocities' late 1998 WebRing purchase).

It is more difficult to accurately estimate the value of the 24 sample dot-coms (14 public and 10 private) that are acquired. For example, although dot-coms acquired for cash create liquid value equal to the purchase price for their owners, the inflated valuations during the internet boom make it doubtful that this price accurately measures sustained value. Even when dot-coms are acquired for stock, it is an open question whether the acquirer's post-acquisition performance accurately reflects the ongoing value of the acquired assets.

Because I focus on net wealth creation in dot-com portfolios, rather than in individual dot-coms, I treat acquisitions as if the consideration received (stock and/or cash) is immediately invested in the dot-com index. That is, I assume that, *on average*, the post-acquisition value of acquired dot-coms tracks the portfolio of public dot-coms. This allows cash acquisitions (e.g., Bertelsmann' purchase of CDnow), acquisitions by non-internet entities (e.g., Getty Images' acquisition of Art.com), and acquisitions by relatively strong internet companies (e.g., AOL's acquisition of Spinner.com) to reflect deteriorating dot-com valuations. Consequently, Geocities is assigned a long-term liquid value of US\$580 million based the purchase price at the merger's close (appropriately adjusted for Geocities' post-IPO acquisitions) and the dot-com index's roughly 82% drop between May 28, 1999 and December 31, 2001.

I use two standardized measures of the net value created by sample dot-coms. The "value ratio" is the ratio of estimated total liquid value created to the total capital absorbed (similar to a profitability index). The "return-on-equity capital" is the discount rate that equates the present value of all of the equity investments with the present value of the end-of-2001 liquid value (similar to an internal rate of return). A value ratio above 1.0 indicates positive wealth creation. The return-on-equity capital gives a better picture of whether sample dot-coms earn a market return on the capital that they absorbed, although the required "value return" on the blend of private and public equity investments represented by our sample dot-coms is unknown.

⁶ This adjustment is not perfect. We do not adjust for acquisitions that occur before a sample firm goes public. And completely excluding acquisitions of non-sample companies (like Broadcast.com) is only appropriate if the acquiring firm invests none of its resources in those assets between the acquisition and the end of 2001. If the acquirer does invest in the acquired business, we are missing part of the value created from the sample dot-com's capital.

4. Results

4.1. Net value

In this section, we describe the outcomes realized by sample dot-coms and analyze the net value created. [Table 1](#) presents the success rates (IPOs and major acquisitions) in our dot-com sample, by vintage year. An investment “vintage” represents all companies that received their initial venture backing in that particular year. For example, seven sample dot-coms were initially funded during 1995. Therefore, the set of vintage 1995 dot-coms consists of these seven companies. Five of these subsequently produce “short-term wins” and three produce “long-term wins”. A short-term win indicates that the dot-com experienced a significant value-creating liquidity event (an IPO or acquisition for at least three times the total amount of equity capital that the company received). A long-term win indicates that end-of-2001 liquid value is at least 1.5 times the total amount of equity-public and private-capital invested in the firm.

Vintage 1995–1997 dot-coms have fairly good success rates—71% short-term and 27% long-term (a typical high-quality venture portfolio might offer a 30% success rate). Of course, the stellar early-vintage success rates apply to a small number of sample firms (48 out of a total of 441). In later years, the number of dot-coms funded grows rapidly, particularly in 1999. At the same time success rates fall sharply. Of the 196 vintage 1999 dot-coms, only 10 (5%) are short-term wins and there are only four (2%) long-term wins. For the entire sample, there are 70 short-term wins (16%) and 22 long-term wins (5%).

[Table 2](#) provides the lifetime capital raised by each vintage of sample dot-coms. Lifetime capital captures all equity investments, both private and public, received by a sample company between its first venture round and 12/31/01. [Table 2](#) also presents the long-term (12/31/01) value created by sample dot-coms. Early dot-com investments are a phenomenal success. The seven vintage 1995 firms create US\$7.7 billion of liquid value from the total of US\$591 million of equity capital that they receive from investors through the end of 2001. This gives vintage 1995 dot-coms a value ratio of 13 and an annualized

Table 1
Success rates for venture-backed dot-com sample

Vintage year	Initial financings	Short-term wins (%)	Long-term wins (%)
1995	7	5 (71%)	3 (43%)
1996	17	14 (82%)	6 (29%)
1997	24	15 (62%)	4 (17%)
1998	53	24 (45%)	6 (11%)
1999	196	10 (5%)	4 (2%)
2000	144	2 (1%)	0 (0%)
Full sample	441	70 (16%)	22 (5%)

The sample consists of 441 venture-backed dot-com companies identified from the Venture Economics VentureXpert database. Investments are organized based on the year that the sample company receives its initial venture investment (the “vintage”). An investment is classified as a short-term win if the company either has a public offering or sells (as valued at the time of the sale) for least three times the amount of equity capital invested in the company. An investment is classified as a long-term win if the company’s liquid value as of 12/31/01 is at least 1.5 times the total amount of equity capital (both private and public) invested in the company.

Table 2
Net value creation in venture-backed dot-coms

Vintage year	Initial financings	Lifetime capital absorbed by vintage (US\$ millions)	Liquid value of vintage as of 12/31/01 (US\$ millions)	Value multiple	Return-on-equity capital (%)	Market-adjusted ROEC using	
						S&P500 (%)	Nasdaq (%)
1995	7	591	7676	13.0	82.7	78.4	80.4
1996	17	3771	9250	2.45	34.8	36.5	41.1
1997	24	3397	17,553	5.17	84.6	89.1	94.7
1998	53	4980	2738	0.55	–23.6	–17.2	–7.8
1999	196	6528	1461	0.22	–56.1	–47.0	–23.5
2000	144	2090	50	0.02	–98.4	–86.1	–64.0
Full sample	441	21,358	38,728	1.81	18.8	25.5	35.3
1995–1997	48	7759	34,480	4.44	64.0	78.7	91.8
1998–2000	393	13,598	4249	0.31	–46.3	–37.8	–24.4

The sample consists of 441 venture-backed dot-com companies identified from the Venture Economics VentureXpert database. Investments are organized based on the year that the sample company receives its initial venture investment (the “vintage”). Lifetime capital absorbed represents the total equity capital invested in each vintage group of sample companies through 12/31/01 by both private and public market investors. The value multiple is measured in aggregate as the ratio of total liquid value to total capital raised. Return-on-equity capital (ROEC) is the aggregate annualized internal rate of return on capital invested by both private and public equity market investors into sample company vintage based on liquid value as of 12/31/01 and using monthly compounding. The market-adjusted ROEC is the difference between ROEC and the corresponding annualized return earned by investing identical amounts at the same time in either the S&P500 Index or the Nasdaq Composite.

return-on-equity capital of over 80%. Vintage-1996 and 1997 dot-coms also perform well; together, the 48 sample dot-coms initially funded in 1995–1997 create US\$26.7 billion of net value. Dot-coms funded in later years perform far worse. Vintage years 1998–2000 have an aggregate value ratio of 0.3 and a return-on-equity capital approaching negative 25%. Having absorbed US\$13.6 billion, these 393 dot-coms destroy over US\$9 billion of net value.

Despite the abysmal performance of later vintage-year investments, the full sample performs reasonably well: year-end 2001 liquid value of US\$38.7 billion is created from US\$21.4 billion of capital.⁷ The 441 sample dot-coms’ 1.8 value ratio translates into a 19% return-on-equity capital invested.⁸ Sample dot-coms create substantial net value despite the large number of losing investments made toward the end of the internet boom.

One way to put the performance of dot-com equity investments in perspective is to look at contemporaneous opportunities. Investing the US\$21.4 billion of equity capital received by our sample of 441 dot-coms in the S&P500 index (same amounts and timing) would produce a portfolio worth US\$18.5 billion at year-end 2001. This corresponds to a value ratio of 0.85 and a return-on-equity capital of negative 6.7%. Investing in the Nasdaq Composite would produce a portfolio worth US\$14.5 billion, giving a value ratio of 0.67

⁷ Sample dot-coms’ liquid value peaks at over US\$240 billion in early 2000.

⁸ Equity investments into sample firms are concentrated in later years—over 87% of the US\$21.7 billion raised by sample dot-coms was invested after February 1999. Consequently, despite our 7-year sample period the capital weighted-average investment holding period (to year-end 2001) is only 27.5 months.

and a return-on-equity capital of negative 16.6%. In both cases, the index analogs perform poorly because the bulk of the capital invested in sample dot-coms occurs during later years when the indices are relatively high.

The last two columns of [Table 2](#) present market-adjusted return-on-equity capital as the difference between each dot-com vintage's return-on-equity capital and the corresponding return from both investing in the S&P500 and investing in the Nasdaq Composite. Market adjusting does not change the stark difference between dot-coms funded early and later in the sample period. The market-adjusted return-on-equity invested ranges from 36.5% to 94.7% for vintage 1995–1997 dot-coms and from negative 7.8% to negative 86.1% for vintage 1998–2000 dot-coms. Adjusted for movements in the S&P, the full sample's annualized return-on-equity capital is 25.5%; adjusted for movements in the Nasdaq, the return-on-equity capital is 35.3%.

These results suggest that dot-coms have received an excessively bad rap. Although there is no doubt that many investors lost money buying dot-com stocks, particularly in the public market, our sample of venture-backed dot-coms contains long-term successes that represent substantially more liquid value than the total capital the group absorbs. For every US\$1 of capital invested in sample dot-coms, US\$1.80 of aggregate value was created as of the end of 2001.

A combination of many losers but impressive overall results often characterizes venture-backed portfolios—the losers are part of the price investors pay to find the winners.⁹ However, the pattern that seems to characterize the internet boom—a small number of early investments generating many successes and a large number of later investments yielding almost no significant winners—is not normal. Losing investments are presumably part of the cost of finding current, not past, successes.

4.2. *What characterizes success?*

In this section, I explore the characteristics of the dot-coms that create value. The goal is not to use hindsight to critique internet companies' business models. By construction, sample companies have very homogeneous business models—some combination of selling products over the internet and/or selling marketing access to their internet users.¹⁰ Consequently, we focus on fundraising differences: when a dot-com raises money, how much the company raises, and the investors that provide the funds.

[Table 3](#) provides the success rates for a variety of divisions across the dot-com sample, and tests for differences in these success rates using a Chi-squared frequency test.¹¹ Consistent with our previous results, dot-coms that receive their initial venture funding during 1995–1997 have dramatically higher success rates (both short- and long-term) than

⁹ Of course, by limiting our sample to the dot-com sector, we are not creating a normal venture portfolio.

¹⁰ The limited business model variability within our sample does clearly speak to which dot-com business models work. Auction sites and broad information portals create the most wealth while online specialty retailers destroy the most.

¹¹ A multivariate analysis using logistic regressions would be our preferred method for exploring what characterizes success. However, the small number of dot-com successes makes doing so statistically inappropriate.

Table 3

The characteristics associated with dot-com success

Characteristic	Success rates		Chi-squared frequency tests	
	Short-term (%)	Long-term (%)	Short-term	Long-term
Funded 1995–1997 ($n=48$)	70.8	25.0	121.1***	45.5***
Funded 1998–1999 ($n=393$)	9.2	2.5		
First-mover ($n=80$)	42.5	11.3	38.5***	7.3**
Later-mover ($n=236$)	11.0	3.4		
Large initial round ($n=116$)	22.4	5.2	5.0*	0.0
Small initial round ($n=325$)	13.5	4.9		
Top traditional VC ($n=52$)	36.5	11.5	18.9***	5.3*
No top traditional VC ($n=389$)	13.1	4.1		
Internet VC ($n=73$)	21.9	9.6	2.5	3.9
No internet VC ($n=368$)	14.7	4.1		

***, **, and * indicate that the success rates differ at better than the 0.01, 0.05, and 0.10 levels, respectively.

The sample consists of 441 venture-backed dot-com companies identified using the Venture Economics VentureXpert database. Seventy sample dot-coms are deemed short-term successes because the company either has a public offering or sells for an amount (as valued at the time of the sale) that exceeds US\$25 million and is at least three times the amount of capital invested in the company. Twenty-two sample dot-coms with year-end 2001 liquid value at least 1.5 times the amount of equity capital invested in the company (including capital raised in the public equity market) are deemed long-term successes. A company is deemed a first-mover if it is the first of multiple venture-backed dot-coms to receive funding in a particular space (e.g., online retailer selling jewelry). A company is deemed to have received a large initial round if its first round of financing provides it with more capital than the average raised by its cohort peers using an 11-month rolling average. Companies funded by Accel Partners, Kleiner Perkins Caufield & Byers, The Mayfield Fund, Menlo Ventures, Sequoia Capital, or U.S. Venture Partners are categorized as having a top traditional venture capitalist (VC). Companies funded by Benchmark Capital, CMGI, Softbank, eCompanies, or idealab! are categorized as having an internet VC.

dot-coms that are funded later. The over $7 \times$ differences in success rates—71% versus 9% (short-term) and 25% versus 3% (long-term)—are significant at better than the 0.01 level.

There are two obvious reasons why dot-coms that were funded earlier might be more successful. First, if entrepreneurs and investors naturally gravitate toward the most promising opportunities, the quality of new dot-coms falls over time. Second, the early internet entrants may gain a “first-mover” advantage (although questionable, a first-mover advantage was widely cited as justification for public dot-coms’ high valuations during the internet bubble). To explore the impact of a first-mover advantage, we categorize sample dot-coms based on what they sell (online retailers) or what they provide information about (information portals). For example, Drugstore.com and PlanetRx are both categorized as online drugstores. Three hundred and sixteen sample dot-coms can be assigned to 80 distinct categories that apply to multiple venture-backed dot-com in our sample.¹² Within each of these 80 categories, the first firm to receive venture backing (e.g., Drugstore.com) is deemed the first mover. All others (e.g., PlanetRx) are deemed later movers. Consistent with a first-mover advantage, the 80 first movers in the sample experience success rates that are roughly more than triple the 236 later movers’ success rates, differences that are significant at better than the 0.05 level.

¹² The rest of the sample, 125 dot-coms, falls into categories that contain only one firm, making them useless for evaluating first movers against later movers.

While this result appears to support an important first-mover advantage, early dot-coms are disproportionately represented in the first-mover subsample. Because we know early dot-coms were more successful and that first movers have to come early, it is difficult to say whether there truly was an important systematic first-mover advantage. To explore whether first movers are more successful in their own right, we repeat the analysis using only the 101 sample dot-coms that receive their initial funding early in the sample period (1995–1998). In this case, first movers prove to be no more successful than later movers: first movers have a short-term success rate of 66% versus 56% and long-term success rate of 18% versus 19%. Consequently, it would be premature to conclude that early dot-coms' higher success rates were the result of a first-mover advantage.

Exploring the impact that the amount of capital dot-coms raise has on success rates introduces a similar problem: we know that over time dot-coms raised more capital while success rates fell.¹³ To explore the impact of capital resources on success rates while controlling for the upward trend in investment size over time, the downward trend in success rates, and the tendency of successful start-ups to raise additional rounds, we focus on the how much a sample firm initially receives from its venture investors relative to other dot-coms funded around the same time.¹⁴ A sample dot-com is deemed to have a large initial round if the company raises more than the average first round among all sample firms in a rolling 11 month window that covers 5 months before and after the month in which the dot-com receives its initial venture backing. Using this criterion, 116 sample companies are categorized as having a large first round. These dot-coms are somewhat more successful than the firms that raise less money in their first round, but the difference is not consistently significant.

4.3. Venture investors

Exploring the impact that investors have on dot-com success requires that investors be classified into broad categories. We use two categorizations: top-tier traditional venture capitalists (VCs) and "internet VCs". We designate Accel Partners, Kleiner Perkins Caufield & Byers, The Mayfield Fund, Menlo Ventures, Sequoia Capital, and U.S. Venture Partners as the top traditional VCs. While this list clearly omits other prestigious, successful venture investors, we are unaware of any objective, widely accepted list of top VCs. Furthermore, any omissions from our limited list will bias our results *against* observing differences between the dot-coms deemed to have been funded by top traditional VCs and dot-coms that are not. Benchmark Capital, CMGI, Softbank, eCompanies, and idealab are categorized as internet VCs. Again, although this list may not be comprehensive, these five investors became internet specialists, helping fund well-known dot-coms like eBay, Yahoo, Geocities, Art.com, Buy.com, and eToys. Again,

¹³ The total capital raised is likely related to success, but success may initially be the cause rather than the result of more capital—successful start-ups generally raise multiple rounds of private and public capital to fund their growth while unsuccessful companies are generally unable to raise further capital. Of course, if capital is provided indiscriminately, successful dot-coms' better financial performance will lead them to absorb less total capital.

¹⁴ The average first round investment in a sample dot-com rose from US\$2 million in 1995 to over US\$10 million in 1999.

omissions will bias our results against observing differences. Of course, this relatively qualitative approach means that our investor results should be viewed as primarily descriptive. Top traditional VCs and internet VCs fund 52 and 73 sample dot-coms, respectively (12% and 17% of the sample, respectively).

We find that firms backed by top traditional VCs and internet VCs experience better than average success rates. However, the difference is only statistically meaningful among dot-coms backed by top traditional VCs. These firms have success rates that are two to three times higher than other dot-coms', with short- and long-term success rates being significantly different at better than 0.01 and 0.05 levels, respectively. Of course, because top traditional VCs are unusually active during the early part of the sample period, dot-coms backed by top VCs having higher success rates could be the result of investment timing. In fact, although top VCs experience higher success rates in the 1995–1998 period, the differences are not statistically significant.

Net value creation mimics success rates. The 118 sample dot-coms that are backed by either a top traditional VC or an internet VC create US\$34.7 billion of liquid value from US\$11.5 billion of equity investment. This corresponds to a value multiple of 3.0 and a return-on-equity invested of 46.9%. The other 323 sample dot-coms create US\$4 billion of liquid value from US\$9.8 billion of equity investment. This corresponds to a value multiple of 0.4 and a return-on-equity capital of negative 31.9%.

The fact that extremely high returns were drawing new investors into the venture market at the same time that dot-com investment was exploding clouds the question of whether VCs efficiently allocate private capital. It is possible that inexperienced venture investors failed where experienced investors would have succeeded. Dot-coms backed by top/internet VCs generally outperform other sample dot-coms, although even these firms destroy significant value during the later part of our sample period. Dot-coms initially backed by top VCs in 1995–1997 create almost US\$6 of value for each US\$1 of equity capital that they receive. Dot-coms backed by these investors in 1998–2000 create roughly US\$0.38 of value for each US\$1 of equity capital that they receive. It does not appear that top traditional VCs or internet VCs were somehow managing to fund the “right” dot-coms during the tail end of the internet boom.

Overall, our results suggest that venture investors, lacking the benefit of hindsight, respond enthusiastically to the very positive price signals of the internet boom by funding a large number of dot-coms during 1999 and early 2000. Venture investors' enthusiasm, however, does not appear to have matched that of public market investors. Internet stocks skyrocketed during the late 1990s: during 1997 our dot-com index more than triples, subsequently more than quadrupling during 1998, and then rising another 74% during 1999. Private company valuations also rose, but more slowly. Within our dot-com sample, the median value (price) at which venture investors provide their initial backing rises from US\$6 million during 1995–1998 to US\$19 million during 1999, peaking at US\$50 million during the last quarter of 1999 and first quarter of 2000.¹⁵ Because private valuations rise slower than public market valuations—which remain within 25% of their

¹⁵ Valuation data are relatively sparse in the Venture Expert database: the value at which venture investors initially fund a company is available for roughly 20% (85 of 441) of our dot-com sample. The firm values cited are pre-investment (pre-money).

peak through mid-March 2000—private dot-com investment opportunities continued to appear relatively attractive until the very end of the boom.

5. Discussion

5.1. *Overheated markets*

The roughly US\$21 billion invested by private and public equity investors into sample dot-coms yields a total of over US\$38 billion of liquid value as of the end of 2001. That is, venture-backed dot-coms, poster firms for internet excesses, create an estimated US\$17 billion of long-term net value. However, all net value creation (and then some) occurs within the dot-coms initially funded during the early part of the sample period; dot-coms started in 1999 and 2000 destroy an estimated US\$9 billion of value.

This pattern of early winners and late losers is consistent with an “overheated” market in which early success attracts more capital than can be profitably deployed. Similar, if less dramatic, periods have been documented outside of venture-backed start-ups. Using a sample of 124 management buyouts during the 1980s, [Kaplan and Stein \(1993\)](#) find that buyout activity, buyout “prices”, and buyout failure rates rise during the decade. Major new sources of capital—junk bonds and cram down debt—were associated with the increased activity, higher prices, and greater failure rates. The authors conclude that the flood of new capital attracted by the success of the early deals funded weaker buyout candidates, reducing returns. This interpretation parallels our evidence on the internet boom. In a similar parallel, [Kaplan \(1994\)](#) shows that the Federated Department Store buyout—which ended up in bankruptcy and was widely derided as a dismal failure—actually created substantial long-term wealth, although not enough to justify the buyout’s purchase price.

One should not, however, take these parallels too far. The problems with buyouts in the late 1980s seem to be primarily financial as investors overestimated the amount of debt that the buyout could support. The problems with dot-coms funded in the late 1990s seem to be more fundamental. In the 1990s, it was unknown whether the internet boom would create a handful or hundreds of wildly successful, profitable dot-coms. Although market prices in the late 1990s suggested that the answer would be hundreds, we now know that the reality is a handful.

5.2. *Estimating liquid value*

For a variety of reasons my estimates may significantly understate the total value created by dot-coms. First, I assign no liquid value to all sample dot-coms that lack an IPO or an observable acquisition. This likely understates sample firms’ value because the SEC filings and press releases used to capture acquisition activity will miss many, if not most, small transactions (e.g., a US\$1 million sale is unlikely to be widely announced). In fact, the smallest acquisition in the sample is for US\$28.5 million at the time of announcement. This means that a number of companies that actually create liquid value may have been assigned values of zero in our calculations. However, this downward bias is unlikely to be

material. Sample dot-coms have an aggregate liquid value of over US\$38 billion. If our approach omits even, say, 100 US\$25 million acquisitions, our US\$38.7 billion estimate of year-end 2001 liquid value would understate the true amount by roughly 6%.¹⁶ Small liquidity events are generally comparable to rounding error in a portfolio of venture-backed companies.

Of greater concern is the possibility that future large liquidity events in the sample make estimating value creation as of year-end 2001 misleading. For example, in May 2002 Netflix went public, creating additional liquid value in our dot-com sample. To the extent that further liquidity events occur, my estimates of net value creation are biased downward. Similarly, anecdotal evidence suggests that at least some of the capital promised to dot-coms in late 1999 and early 2000 was diverted to other uses (e.g., returned to investors). If so, I have overestimated the capital consumed by sample dot-coms.

Additionally, our methods miss the portion of value creation that is captured by holders of unexercised in-the-money (and to a lesser extent, out-of-the-money) options. While most dot-coms' falling stock prices limit the value of their options, at year-end 2001 eBay had roughly 35.1 million unexercised options outstanding with a weighted average exercise price of US\$46.24. Given eBay's end-of-year stock price (US\$66.90), these options had an as-exercised value of roughly US\$725 million. However, eBay is unique in this respect within our sample. For example, although Yahoo had 137 million options outstanding at year-end 2001, their weighted-average exercise price was more than twice Yahoo's year-end stock price (US\$39.22 versus US\$17.74). The collapse of dot-com stock prices means that, other than eBay, there is very little as-exercised option value in my sample companies.

Finally, from a social welfare perspective it is important to note that I estimate the value that accrues to equity holders only. During the internet boom, a significant part of dot-coms' capital was used to fund marketing strategies that often involved giving away valuable products and services. If a substantial part of the US\$21 billion of equity capital consumed by sample dot-coms financed free services or valuable promotions, my measure of liquid value understates the full value that sample dot-coms create. Under these circumstances at least part of the wealth that appears to be destroyed by sample dot-coms would simply be transferred from the dot-coms' investors to the dot-coms' customers.

It is also possible that I have overestimated sample dot-coms' liquid value. An alternative approach for estimating the value of acquisitions (used in a prior version of this paper) would be to base the long-term value of an acquired dot-com on the year-end 2001 value of the consideration received in the acquisition. Although this approach would almost certainly overvalue cash acquisitions, few cash acquisitions occur in our sample, and none while dot-coms sport their peak valuations. Similarly, there are few dot-com acquisitions using the stock of non-internet companies. However, the liquid values assigned to major portal acquisitions (Excite, Lycos, etc.)—in particular, the Excite-@Home merger—are sensitive to the approach used to value acquired dot-coms. For example, using the year-end 2001 value of the merger consideration (@Home stock) to

¹⁶ Given the downward trend in dot-com stocks, in all likelihood the actual understatement would be even lower.

estimate Excite's year-end 2001 liquid value results in Excite being assigned a liquid value of zero (due to @Home's bankruptcy). The liquid value estimate based on post-acquisition movements in the dot-com index is over US\$500 million. The liquid value estimate based on post-acquisition movements in the dot-com index is not, however, consistently higher for portal/community dot-coms: Geocities' liquid value is roughly one-quarter lower using the index method because Yahoo's stock price drops less (76%) than the index (82%) post-acquisition. Overall, valuing acquired dot-coms using the year-end 2001 value of the merger consideration reduces my estimate of sample dot-coms' total liquid value by almost 4%, but does not change my basic results.¹⁷

6. Conclusion

This paper estimates long-term wealth creation/destruction in a sample of 441 venture-backed consumer-destination internet companies (dot-coms). As a group, sample dot-coms create substantial wealth. The roughly US\$21 billion of risk capital that private and public equity investors provide these firms yields a total of US\$38.7 billion of liquid value as of year-end 2001. However, wealth creation within the dot-com sample is uniquely associated with a relatively small number of early dot-com investments: the 48 dot-coms initially funded in 1995–1997 create US\$34.5 billion of liquid value from the total of US\$7.8 billion of equity capital that these firms receive from investors. The 393 sample dot-coms initially funded after 1997 create only US\$4.2 billion of value from US\$13.6 billion of capital.

Despite the large number of late failures, our analysis of the funding activity and wealth creation during the internet boom can be viewed as cautiously encouraging. We estimate that the billions of dollars—both private and public—used to create hundreds of dot-coms created significant value despite the fact that only 5% of the 441 venture-backed dot-coms in our sample can be deemed long-term successes. The later failures only dilute the wealth creation in early dot-coms. Although venture investors were insufficiently skeptical of market price signals during the internet boom, they respond promptly to falling public market prices in 2000, rapidly reducing the amount of capital available to new dot-coms. This, of course, in no way minimizes the extent to which wealth was destroyed at the height of the boom—the US\$8 billion absorbed by the sample dot-coms that launched during 1999 and early 2000 represents almost 2 *years* worth of total venture capital investment at the levels typical to the early 1990s—but, in net, the dot-com investment boom created value.

Casual observation suggests that similar to how the internet stock market bubble evolved into a broad technology bubble, the dot-com funding pattern was repeated in other internet sectors. Perhaps once the internet's commercial development fully plays out a complete accounting of the net value created during the internet boom will mimic our conclusion for wealth creation in dot-coms: it was good, but it could have been better.

¹⁷ Valuing cash consideration using the index method and stock consideration using the 2001 value of the merger consideration reduces aggregate liquid value by another 1%.

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