The Incredible Shrinking Universe of Stocks
The Causes and Consequences of Fewer U.S. Equities

March 22, 2017

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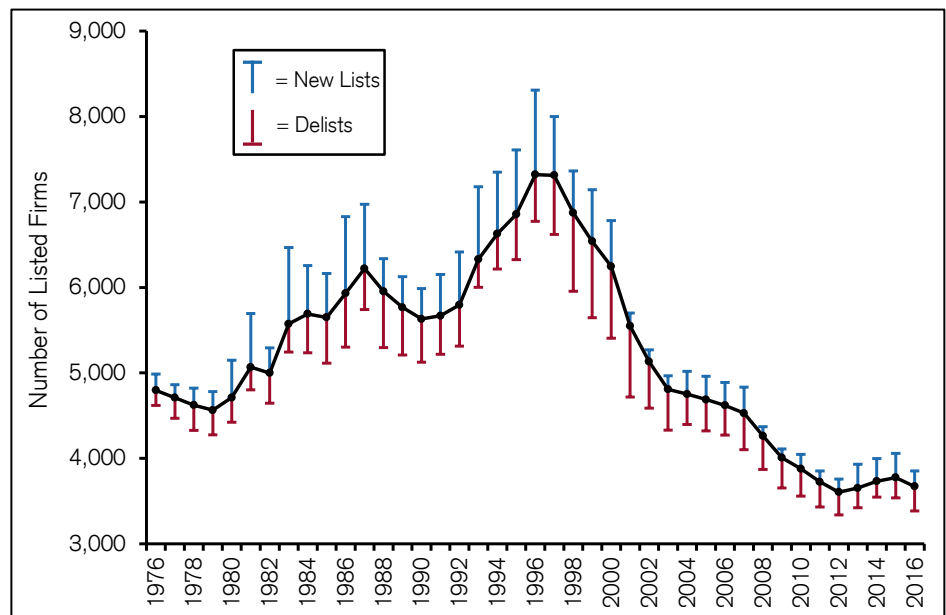michael.mauboussin@credit-suisse.com

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Source: Doidge, Karolyi, and Stulz, "The U.S. Listing Gap" and Credit Suisse estimates.

- There has been a sharp fall in the number of listed stocks in the U.S. since 1996.

- While listings fell by roughly 50 percent in the U.S. from 1996 through 2016, they rose about 50 percent in other developed countries. As a result, the U.S. now has a listing gap of more than 5,800 companies.

- The propensity to list is now roughly one-half of what it was 20 years ago. The net benefit of listing has declined.

- Mergers and acquisitions (M&A) are the leading reason for delisting, and initial public offerings (IPOs) are the primary source of new listings. In the last decade, M&A has flourished while IPOs have floundered.

- Regulation has increased the cost of listing and facilitated meaningful M&A.

- As a consequence of this trend, industries are more concentrated and the average company that has a listed stock is bigger, older, more profitable, and has a higher propensity to disburse cash to shareholders.

- Exchange-traded funds have filled part of the list gap.

Introduction

The U.S. public equity market has evolved dramatically over the past 40 years. This is important because the U.S. equity market is 53 percent of the global stock market as of December 31, 2016.[1] The main feature of this change is a sharp fall in the number of listed equities since 1996, which was preceded by a steady rise in listings in the prior two decades.

As a result of this drop, there are fewer listed companies today than there were in 1976, despite the fact that the gross domestic product (GDP) is three times larger now than it was then. The Wilshire 5000 Total Market Index, established in the mid-1970s to capture the 5,000 or so stocks with readily available price data, now has only 3,816 stocks. The phenomenon is unique to the U.S. and is not easy to explain. Exhibit 1 shows a snapshot of some pertinent statistics from 1976, 1996, and 2016.

Exhibit 1: Snapshots of the Investable Universe: 1976, 1996, and 2016

Characteristics of U.S. Stock Market	1976	1996	2016
Number of listed companies	4,796	7,322	3,671
Market capitalization (billions 2016 USD)	$2,975	$12,322	$25,303
Gross domestic product (billions 2016 USD)	$6,325	$11,769	$18,565
Market capitalization as a % of GDP	47.0%	104.7%	136.3%
Individual direct ownership	50.0%	27.2%	21.5%
Number of ETFs (U.S. domestic equity)	0	2	658
NYSE annual share volume (in millions)	5,360	104,636	316,495
Equity options traded (contracts in millions)	32	199	3,626
Characteristics of U.S. Companies	**1976**	**1996**	**2016**
Average market capitalization (millions 2016 USD)	$620	$1,683	$6,893
Corporate profit as a % of GDP	6.9%	6.2%	8.9%
Average age in years of a listed company	10.9	12.2	18.4
Herfindahl-Hirschman Index (HHI)	1,392	812	1,180
New establishments	697,749	711,716	669,917
Assets Under Management (in Billions USD)	**1976**	**1996**	**2016**
Mututal funds	$40	$1,725	$8,725
Index funds	<$1	$85	$1,990
Hedge funds (long/short equity)	<$1	$130	$850
Venture capital	$4	$48	$333
Buyout funds	<$1	$80	$827

Source: Craig Doidge, G. Andrew Karolyi, René M. Stulz, "The U.S. Listing Gap," Journal of Financial Economics, Vol. 123, No. 3, March 2017, 464-487; World Federation of Exchanges database; U.S. Bureau of Economic Analysis; Kenneth R. French; Strategic Insight; NYSE, see http://www.nyxdata.com/nysedata/asp/factbook/viewer_interactive.asp?hidCategory=3; Options Clearing Corporation; Kathleen Kahle and René M. Stulz, "Is the American Public Corporation in Trouble?" Fisher College of Business Working Paper 2016-03-023, November 2016; U.S. Census Bureau, Center for Economic Studies, Business Dynamics Statistics; Hedge Fund Research; National Venture Capital Association, NVCA Yearbooks; McKinsey, "The New Power Brokers: How Oil, Asia, Hedge Funds, and Private Equity Are Shaping Global Capital Markets," McKinsey Global Institute, October 2007, 129; "Assets under management in private equity sector grows to $2.5 trillion," Consultancy.uk, March 7, 2017; Credit Suisse.
Note: New establishments: first year is 1977 and latest year is 2014; Venture capital starts in 1980; Buyout funds in 2016 is for North America.

Economists commonly use the number of listed companies as a measure of financial development and have established a positive link between development and economic growth.[2] For example, there was a strong appetite to go public in the U.S. following World War II as companies needed capital to finance their "mass production and mass distribution."[3] There were about 1,000 listed companies in 1956 and nearly 5 times as many a couple of decades later. Over those 20 years, GDP grew at a healthy 3.6 percent compound annual growth rate (CAGR), adjusted for inflation.

In the past, economists considered frequent initial public offerings (IPOs) to be a strength of the U.S. and believed that they played an important role in encouraging entrepreneurship.[4] But the weak listings in the U.S and the strong listings around the world have created what is now a large gap.

This is important because it changes the nature of an investor's opportunity set. In 1976, an institutional investor who wanted exposure to U.S. equities had only to buy a diversified portfolio of public companies and a venture capital (VC) fund. In 2016, that investor would have to have access to a diversified portfolio of public companies, a private equity fund, and opportunities in late-stage as well as early-stage venture capital.

Individual investors today have a limited ability to access directly the complete U.S. equity market. The companies that are listed on exchanges are bigger, older, and in more concentrated sectors than two decades ago. This likely contributes to public markets that are more informationally efficient than ever before.

The change in the number of listed companies is a matter of simple addition and subtraction. Stocks that are newly listed expand the population and stocks that are delisted shrink it. Additions occur when there is an IPO or a spin-off. Subtractions are the result of mergers and acquisitions (M&A), bankruptcy, and voluntary delisting. M&A includes strategic deals, where one company buys another, and financial deals, where a leveraged-buyout or private equity fund acquires a company. Exhibit 18 in Appendix A provides a breakdown of the listings and how they change.

Craig Doidge, Andrew Karolyi, and René M. Stulz, professors of finance, estimate that just under one-half of the listing gap is the result of a rapid rate of subtractions since 1996 and that just over one-half is the result of a dearth of additions.[5] In this report, we document these changes and discuss the consequences for investors. In short, equity investors in the U.S. have to cast a much wider net than they did in the past to capture the return of U.S. equities.

The Shrinking Stock Universe in the U.S.

Exhibit 2 shows the rise and fall in listed companies in the U.S. from 1976 to 2016. Because new lists heavily outnumbered delists, especially in the late 1980s and 1990s, more than 2,500 companies were added from 1976 through 1996. The pattern reverses after 1996, as delists outstrip new lists and the population of listed companies falls by 3,650 companies. The pattern holds for stocks listed on the New York Stock Exchange and the Nasdaq Stock Market.

Exhibit 2: Additions and Subtractions to Listed Companies, 1976-2016
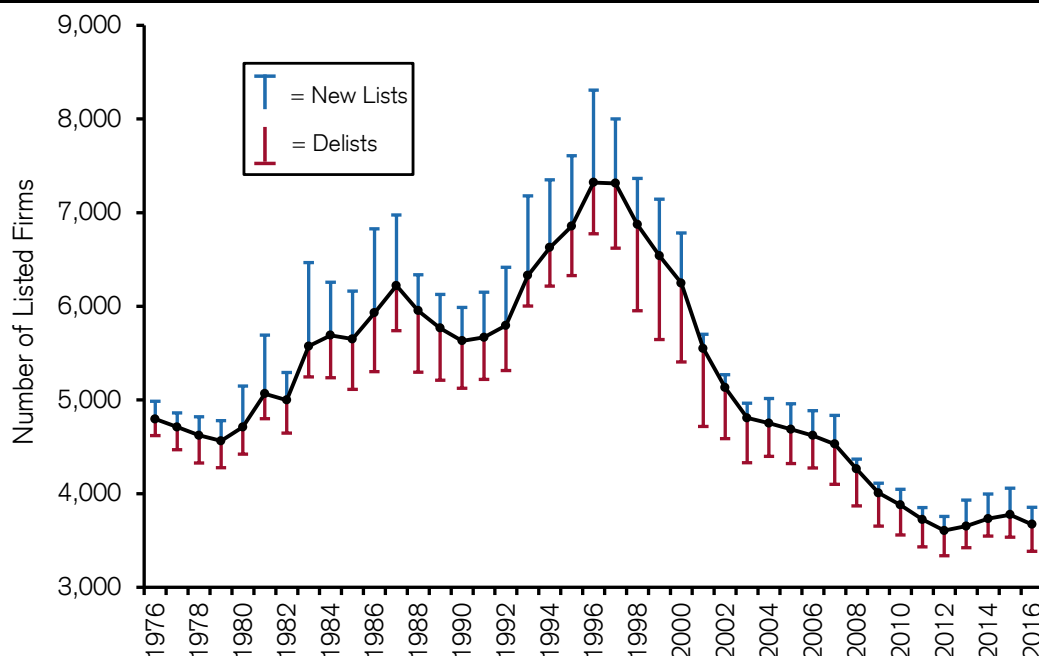
Source: Craig Doidge, G. Andrew Karolyi, René M. Stulz, "The U.S. Listing Gap," Journal of Financial Economics, Vol. 123, No. 3, March 2017, 464-487 and Credit Suisse estimates.

The size of the U.S. economy, as measured by GDP, expanded by almost 90 percent from 1976 to 1996. This growth provided a fertile backdrop for the net increase in new listings. Total listings were half again as many in 1996 as they were in 1976. The economy continued to chug along in the next 20 years, rising almost 60 percent, but the number of listings dropped by half.

This trend is more pronounced in the U.S. than in any other developed economy. For example, while the number of listings fell by roughly 50 percent in the U.S. from 1996 through 2016, it rose about 50 percent in 13 developed countries that have complete data. Over the same period, listings rose 30 percent for a larger population of 71 non-U.S. countries. Because the number of listings shrank in the U.S. and expanded in the rest of the world, the U.S. now has a listing gap of more than 5,800 companies. A model of how many companies should be listed, based on GDP, GDP growth, population growth, and measures of corporate governance, suggests that the U.S. should have more than 9,500 listings.[6]

There are two possible explanations for the gap. The first is a decline in the population of firms that are candidates for listing. This is not the case. The number of firms eligible to list has grown modestly in the past 20 years from about 550,000 to 590,000. While the rate of growth of firms that are eligible to list was higher from 1976 to 1996 than it was from 1996 to 2016, there is still a larger population of eligible companies today than there was 20 years ago.

The second explanation is a fall in the propensity to list. We can frame the propensity to list in terms of costs and benefits. If there is a decline in the net benefit to listing, fewer companies will seek to list and more will choose to delist. This appears to be the case over the past couple of decades. By one measure, the propensity to list in 2016 is half of what it was in 1996.

Costs of listing include a fee for listing on an exchange, expenses associated with mandatory disclosures, regulatory requirements, any competitive disadvantage from more expansive disclosure, and resources dedicated to communicating with current and prospective shareholders. Other potential costs include the perceived onus of quarterly earnings releases, the risk of being targeted by activist investors, and higher visibility that can result in political pressure. Many of these costs are fixed and have risen in recent decades, which means they are more readily borne only by larger firms.[7]

Regulation looks like an obvious culprit. For instance, the Sarbanes-Oxley Act of 2002 created new or expanded standards for boards, management teams, and accounting firms. But while regulation undoubtedly increased the cost of being public, the trend toward delisting was firmly in place prior to the implementation of Sarbanes-Oxley.[8]

Benefits of listing include the ability to raise funds through the public market, the option to use shares for compensation or M&A, and liquidity for shareholders. A listing also assures investors that the company has met the standards to be public. A firm must meet a size threshold to enjoy these benefits, which increase with the size of the firm.[9]

Financial economists who have studied this phenomenon point out that a declining propensity to list predicts a handful of outcomes, including delisting through mergers or going private via a private equity firm, fewer listings through IPOs, and an increase in the average size of the companies that are public. The empirical results since 1996 support all of these predictions.

We now examine the details of delisting and new listings, including the consequences for investors. Much of the data we present comes from multiple sources and some is inferred. That said, we are confident that the overall themes have solid backing.

Delists

There are three reasons a company delists from an exchange. The first and most common is the company is involved in a merger or an acquisition. This can involve one public company buying another (Microsoft buys LinkedIn), a private company buying a public company (Dell buys EMC), or a company going private with the sponsorship of a private equity firm (Silver Lake acquires Dell).

Second the exchange can force a company to delist for cause. This means the company failed to meet certain requirements, including maintaining a minimum stock price and market capitalization, or was not current with the filings required by the Securities and Exchange Commission. Bankruptcy is another trigger for delisting for cause (Enron).

Finally, a company may choose to delist voluntarily. Here, the firm judges that the cost of listing outstrips the benefit. The company may continue to trade but is no longer registered with an exchange.

Exhibit 3 shows that mergers are the leading reason for delisting. Note that M&A tends to come in waves, so delistings rise when overall M&A levels are up.[10] Exhibit 4 shows the dollar volume of U.S. M&A activity from 1976 to 2016. Dollar volume is indirectly related to delisting because the size of deals can vary, but both exhibits have a similar pattern.

Exhibit 3: Reasons for Delistings, 1976-2016
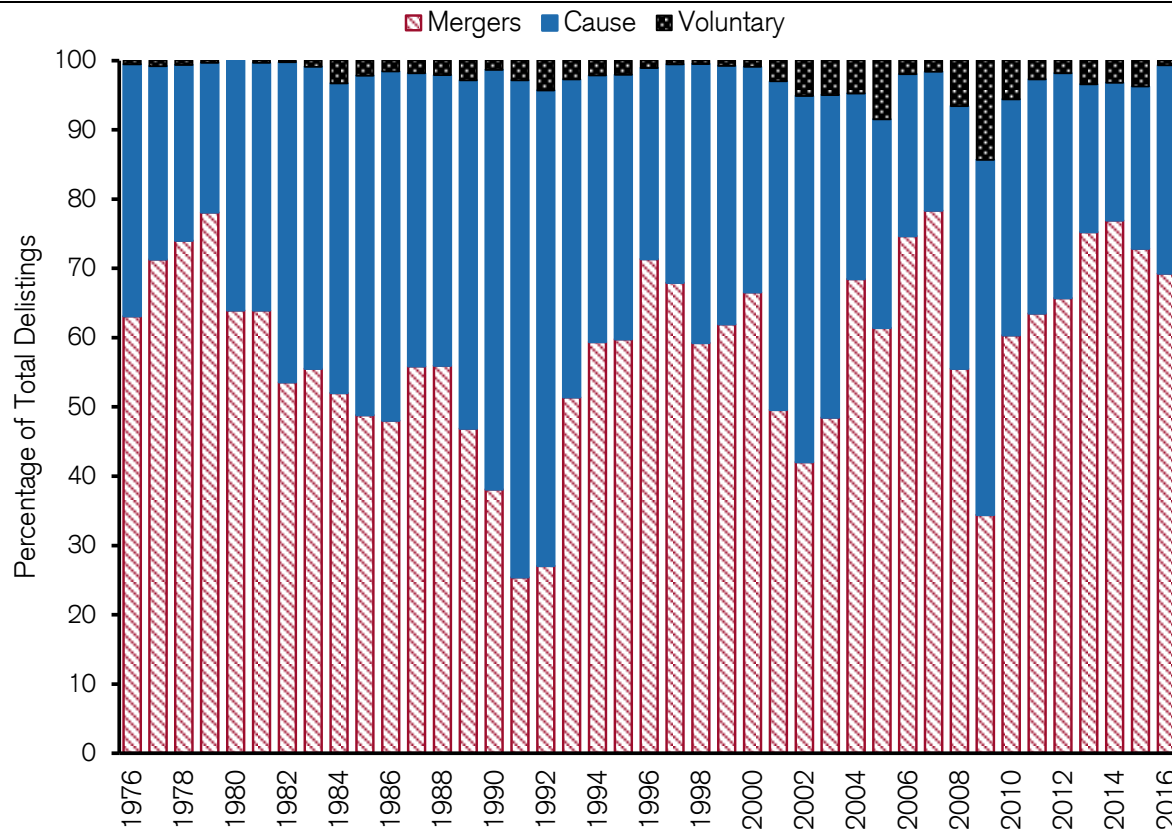
Source: Doidge, Karolyi, and Stulz, "The U.S. Listing Gap" and Credit Suisse estimates.

Exhibit 4: U.S. Mergers and Acquisitions, 1976-2016
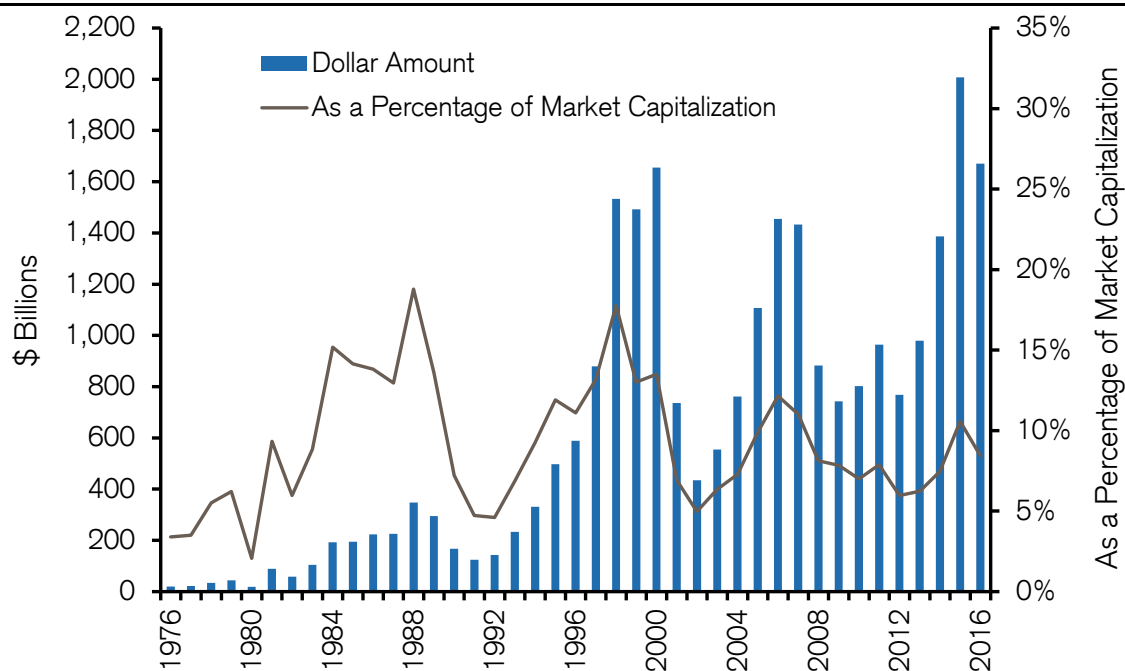
Source: Thomson Reuters and Tom Copeland, Tim Koller, and Jack Murrin, Valuation: Measuring and Managing the Value of Companies *(New York: John Wiley & Sons, 1990), 312.*
*Note: Dollar amounts are not inflated.*

We can separate M&A deals into those that are strategic, where one company buys another, and financial, where a company is acquired by a private equity firm.

The majority of merger delistings are the result of strategic deals. As a result, the public companies that remain are more profitable than they were in prior decades and there is now higher concentration within industries. We discuss these consequences in greater detail below.

A leveraged buyout (LBO) is a deal where a financial sponsor takes a company private using equity and substantial debt. Some LBOs occurred in the 1950s through 1970s, but the first LBO wave occurred in the late 1980s. High yield bonds helped fuel this burst in activity. The pinnacle of that era was the $25 billion acquisition of RJR Nabisco in 1989 by Kohlberg Kravis Roberts & Co. (now KKR & Co.).

Exhibit 5 shows that following the late 1980s wave, deals by financial sponsors were modest until the mid-1990s. The rejuvenation of these deals by private equity firms coincides with the highest sum of listed firms. Since 2000, private equity buyouts account for about 9 percent of delistings, and represented almost one-quarter of all delisting in private equity's peak year of 2006.[11]

Exhibit 5: Delistings as the Result of Private Equity Deals, 1976-2016
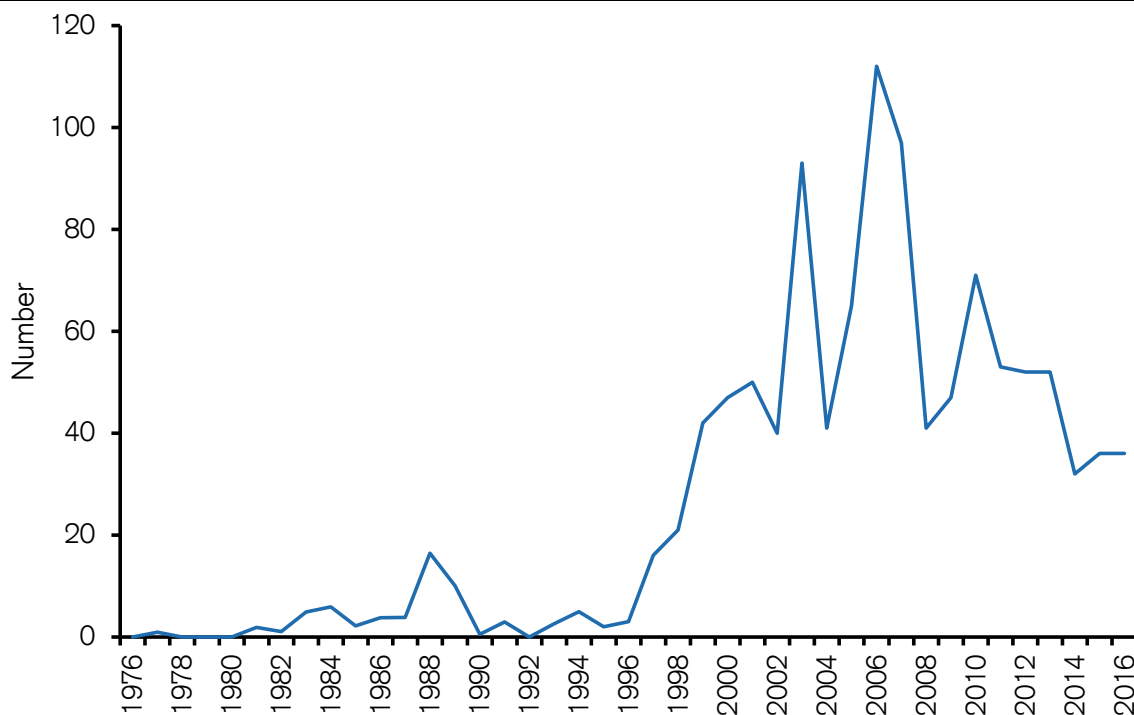
Source: Doidge, Karolyi, and Stulz, "The U.S. Listing Gap"; Alexander Ljungqvist, Lars Persson, and Joacim Tåg, "Private Equity's Unintended Dark Side: On the Economic Consequences of Excessive Delistings," IFN Working Paper No. 1115, November 23, 2016; Credit Suisse estimates.

In 1980, there were only 24 private equity firms and deal volume only modestly exceeded $1 billion. Today, there are more than 3,000 U.S. private equity firms and assets under management for buyout funds are roughly $825 billion, up from $80 billion in 1996 and less than $1 billion in 1976.[12] Two of the largest private equity firms, The Carlyle Group and KKR & Co, each have more than 720,000 employees in their portfolio companies, which means they both employ more people than any U.S. listed company except for Wal-Mart Stores, Inc.[13]

A company's decision to be listed comes down to an assessment of costs and benefits. If the benefits exceed the costs, the firm lists. But if the costs subsequently exceed the benefits, a company may choose to again go private. Research shows that companies go private 13 years after their IPOs, on average, and have a higher likelihood of going private if they have less analyst coverage, lower institutional ownership, and less liquidity than their peers.[14]

Private equity funds have a finite life and generally hold companies for three to seven years.[15] From 1970 through the mid-1990s, about one-quarter of all exits came through an IPO.[16] In 2016, there were only 30 IPOs of private-equity backed companies in the U.S., the lowest level since 2009. There has been an average of 46 IPOs per year by private equity firms in the past decade, less than 10 percent of all exits.[17]

A sale to another corporate buyer remains the most popular selling strategy, accounting for more than one-half of exits, followed by a sale to another buyout fund, which accounts for about 40 percent of exits in recent years. This is up from 10 percent in 1996.[18] Companies that are delisting are not returning to the ranks of the listed, contributing to the listing gap.

A failure to maintain a minimum level of assets or market capitalization is the leading reason for a delisting for cause. This is followed by a stock price that falls below a price threshold, usually $1.00. Bankruptcy also leads to delisting. There were bankruptcy waves in the early 1990s, early 2000s, and surrounding the financial crisis of 2008 and 2009.[19]

The fall in the number of listed companies has major consequences from an investor's point of view. Investors have less access to companies that are owned by private equity firms or that remain private. Further, those companies that remain public are older and more profitable than they were 20 years ago and compete in industries that are more concentrated.

Even as the investable universe has dwindled since 1996, the sophistication of investors has marched steadily higher in the past 40 years. While less than 20 percent of stocks were owned by institutions in 1976, a majority are today. Direct ownership by individuals shows the mirror image, dropping from 50 percent to 21 percent over the same period. There are fewer public companies in which to invest, those that are accessible are more mature, and the population of investors is vastly more informed than four decades ago.

The substantial M&A activity in the past 20 years has increased concentration in three-quarters of U.S. industries that create products.[20] The Herfindahl-Hirschman Index (HHI) is a popular method to estimate industry concentration. The HHI considers not only the number of firms but also the distribution of the sizes of firms. A dominant firm in an otherwise fragmented industry may be able to impose discipline on others. In industries with several firms of similar size, rivalry tends to be intense. [21] The higher the HHI, the higher the degree of concentration.

The HHI for public firms in the U.S. was more than 1,000 in 1976, dropped to about 800 in 1996, and rose to roughly 1,200 in 2016.[22] Forces behind the rise in the HHI include more lax antitrust enforcement and higher barriers to entry in some markets. The pattern is consistent even if you take into consideration private and foreign companies and is not solely the result of distressed industries consolidating.[23]

As a result of M&A, listed companies are now older and larger. The average age of a company measured from the time of listing is currently 18 years old, up from 12 years old in 1996. Today's mean market capitalization is almost $7 billion, more than 10 times the size of the typical company in 1976 measured in constant dollars. The minimum market capitalization to enter the S&P 500 Index is now $6.1 billion.

Because public companies are older and more established today, they have a higher proclivity to return capital to shareholders. The ratio of dividends and share repurchases divided by net income, or total payout ratio, is today 2.3 times what it was in 1996 and 1.7 times that of 1976.[24]

The reduction in the number of companies has also led to higher profitability.[25] Exhibit 6 shows the cash flow return on investment (CFROI®*), a measure of corporate return on investment that is adjusted for inflation, for a large sample of U.S. companies. The average CFROI from 1976 to 1996 was 5.5 percent and rose to 9.1 percent from 1997-2016. Much of this improvement is the result of higher operating profit margins.[26]

Exhibit 6: CFROI for U.S. Companies, 1976-2016
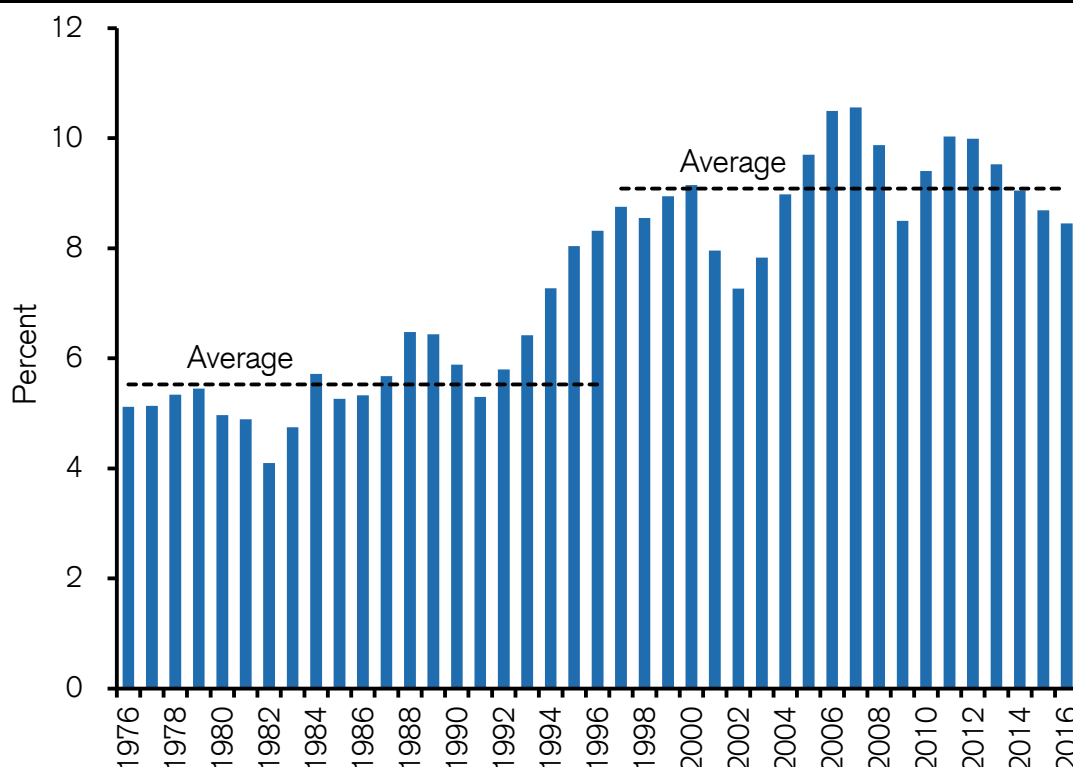
Source: Credit Suisse HOLT®.
Note: U.S. industrial firms, weighted by net assets.

As the result of this profitability, and in spite of the smaller population of companies, the equity market capitalization in the U.S. has risen from 47 percent of GDP in 1976 to 136 percent in 2016. Over the same time, profits went from 6.9 percent to 8.9 percent of GDP.

Overall, it appears that the benefit of listing has declined relative to the cost, and that only larger companies can bear the cost of being public. That said, there are distinct benefits to being public from the point of view of companies and investors.

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* CFROI® is a registered trademark in the United States and other countries (excluding the United Kingdom) of Credit Suisse Group AG or its affiliates.

New Listings

IPOs are the most important source of new listings. Exhibit 7 shows the pattern of IPOs from 1976 to 2016, with a general uptrend from 1976 to 1996 followed by a decline since that time. The average number of IPOs was 282 per year from 1976 through 2000. Since then, the average has been 114. Whereas the addition of new listings exceeded the subtraction of delistings from 1976 through 1996, the opposite has been true since the end of that period.

Exhibit 7: Number of Initial Public Offerings, 1976-2016
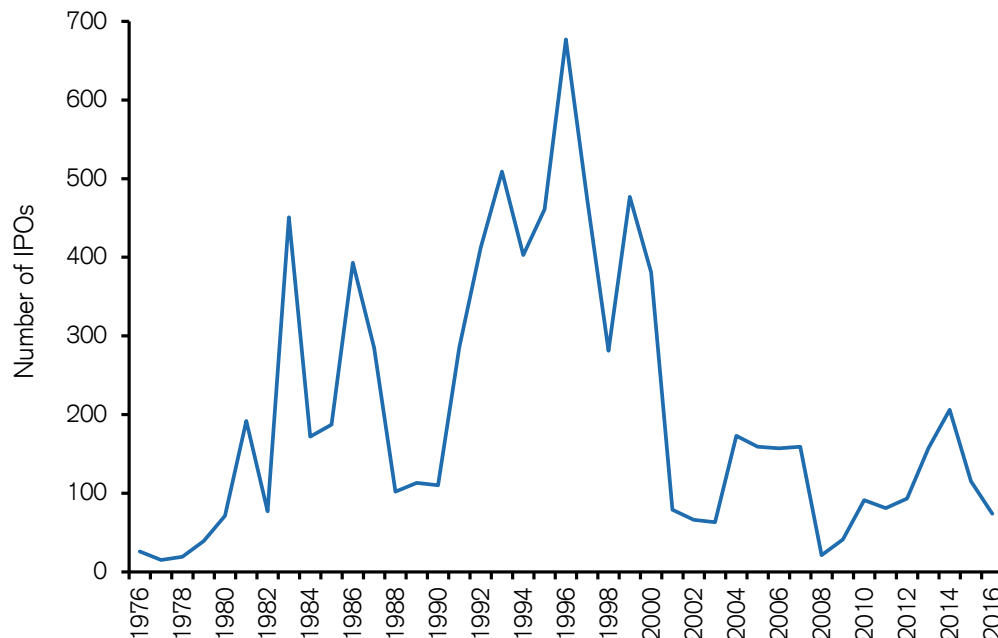
Source: Jay R. Ritter, see https://site.warrington.ufl.edu/ritter/ipo-data/.
Note: Data for all years exclude IPOs with an offer price below $5.00, ADRs, unit offers, closed-end funds, REITs, natural resource limited partnerships, small best efforts offers, and stocks not listed on the New York Stock Exchange, the Nasdaq Stock Market, or the American Stock Exchange (currently NYSE MKT); Data for 1980-2016 also exclude IPOs from banks and savings and loans.

Academics generally treat M&A and IPOs as separate topics, but they are interconnected.[27] For example, both tend to come in waves.[28] In the past, strong equity markets have encouraged both M&A and IPOs. Exhibit 8 shows the relationship between annual M&A volume and IPO proceeds from 1976 to 2016. The correlation coefficient, *r*, is 0.71 for the full period.

Exhibit 8: Relationship between IPO Proceeds and M&A Volume, 1976-2016
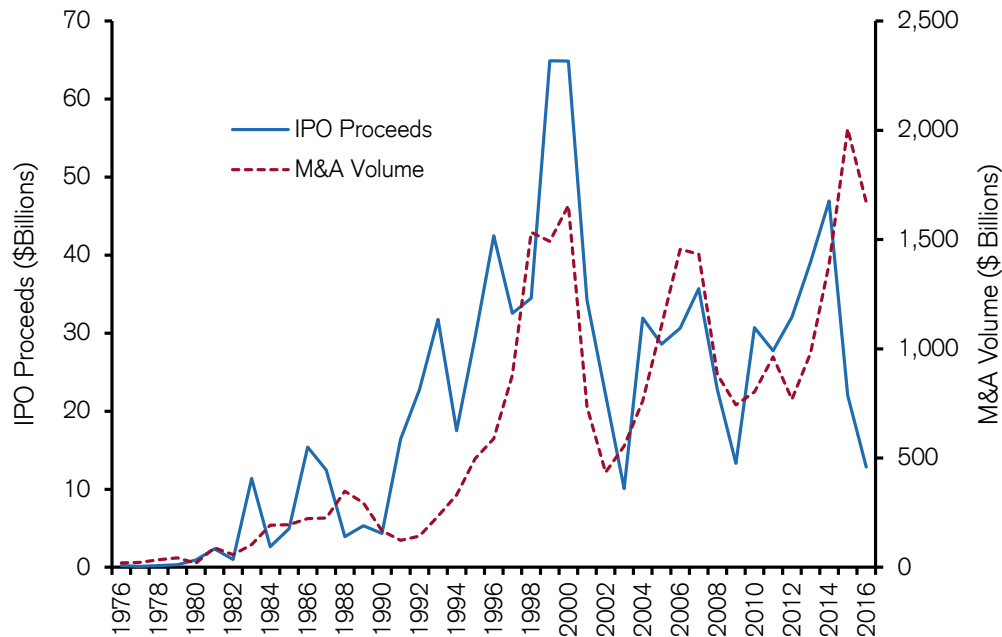

Source: Jay R. Ritter; Thomson Reuters; Copeland, Koller, and Murrin.

What is striking is a recent, and marked, divergence between M&A volume and IPO proceeds. Specifically, the correlation between the two was 0.87 from 1976 to 2000, but dropped to 0.12 from 2001 to 2016. Since the financial crisis, from 2007 to 2016, the correlation is -0.08. M&A is flourishing and IPOs are floundering.

One potential explanation for the drop in IPOs is simply that business dynamism has been on the decline in the U.S. For example, 712,000 new establishments launched in the U.S. in 1996 and only 670,000 did so in 2016, despite the fact that today the GDP is almost 60 percent larger and there are 20 percent more people. Indeed, fewer new establishments were started in 2016 than in 1976. Establishments less than 1 year old created 4.4 million jobs in 1996 and around 3 million in 2015.[29]

The data suggest that eligible companies do not see a net benefit in listing via an IPO. There are likely a few explanations for this.

First, the cost of being public has gone up, which means that it makes sense only for larger companies to list. The population of companies eligible to list falls as the size threshold rises. As a consequence, the median age of a company seeking to go public has risen. The magnitude of late-stage funding also contributes to this trend. Exhibit 9 shows the median age of companies doing an IPO was 7.8 years old from 1976 to 1996 and 10.7 years old from 1997-2016, a 37 percent increase. If we extend the prior period to include the dot-com boom, the median age of listings has risen 50 percent from 1976-2000 to 2001-2016.

Exhibit 9: Median Age of IPO, 1976-2016
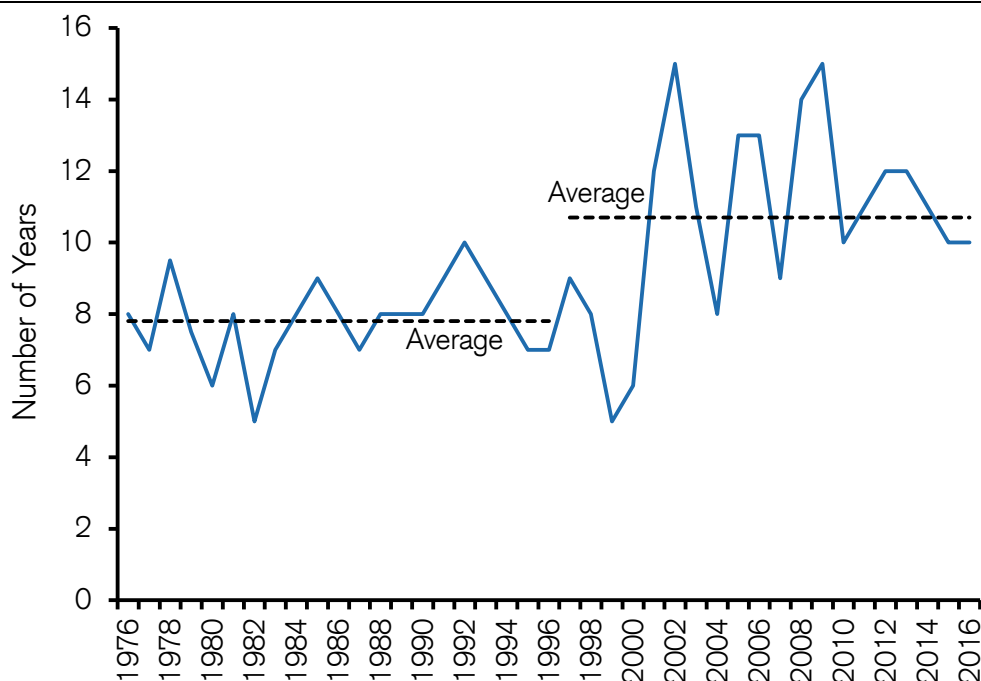
Source: Jay R. Ritter.

Second, companies today need less human and physical capital than they did in prior generations. For example, Facebook's sales per employee were $1.6 million in 2016 whereas Ford's were $755,000. In 2016, Amazon.com generated $136 billion of sales using invested capital of $19 billion, a capital velocity ratio of 7.1 times, while Wal-Mart's sales of $486 billion required $135 billion of invested capital, or capital velocity of 3.6 times.[30]

Third, private companies can now obtain ample later-stage venture capital funding. For example, the five startup companies with the highest implied valuations have raised a combined total exceeding $28 billion in the last few years. These companies need less capital than their predecessors did but have access to more of it.

Finally, access to liquidity allows the employees of private companies to sell shares. For instance, it was reported that Airbnb Inc.'s financing round in the fall of 2016, which raised $850 million and valued the company at $30 billion, allowed employees to sell $200 million of stock.[31] This liquidity is the result of the unprecedented ability to raise late-stage venture capital.

There are a couple of meaningful consequences to these trends. To begin, there are a lot of private companies that are valuable on paper but that are not yet public. According to *The Wall Street Journal*, as of March 2017 there are 155 companies with a value in excess of $1 billion. This is nearly triple the 54 such companies in March 2014.

Appendix B provides a list of these companies, commonly called "unicorns," and shows that they have a total value of $585 billion as of mid-March, 2017.[32] Most of the companies at this stage of development would have sought an IPO twenty years ago, encouraged by their venture capital backers.

Companies today are building a great deal of value pre-IPO versus post-IPO. This means that investors who do not have access to venture capital are missing substantial gains. Take three companies as an example: Amazon.com, Alphabet Inc. (Google), and Facebook (see exhibit 10).

Exhibit 10: Time to IPO and Market Capitalization Based on IPO for Amazon, Google, and Facebook
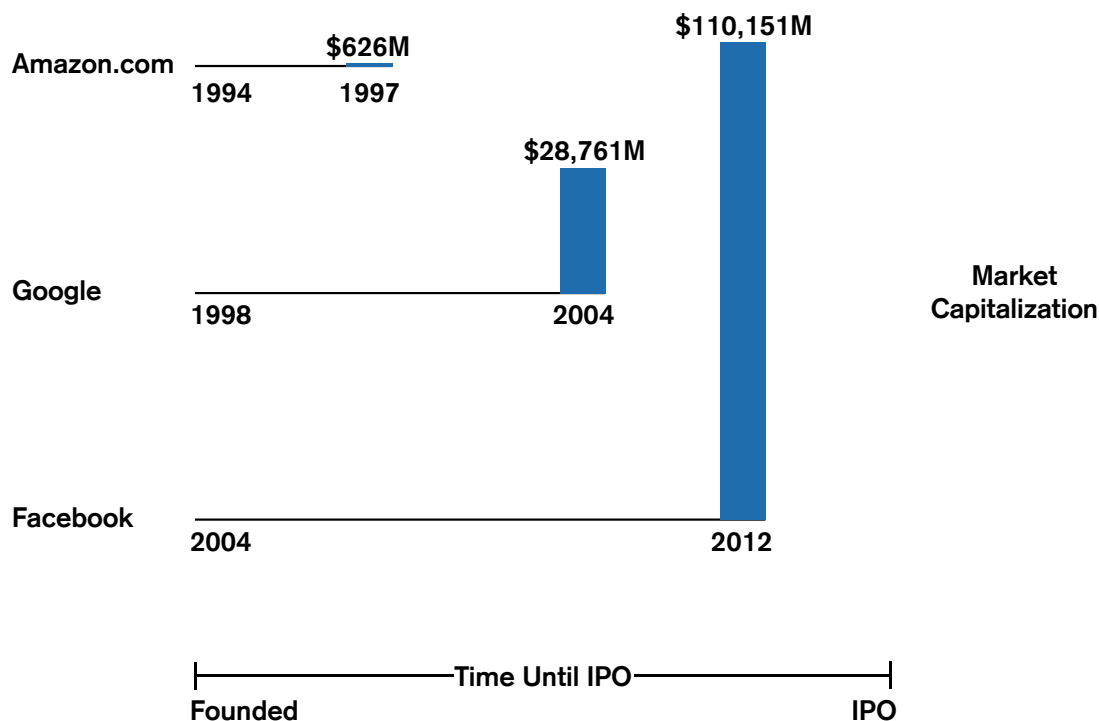
Source: Company reports and Credit Suisse.

Amazon.com went public 3 years after founding at a market capitalization of $625 million, in current dollars. Investors on the IPO have made 565 times their money. Google went public 6 years after founding at a value of $29 billion, and its investors have made 20 times their money. Facebook went public 8 years after its founding at a value of $110 billion, and investors have made 3.7 times their money. It is virtually impossible for Facebook investors to earn the same total shareholder return as Amazon.com shareholders did over 20 years.

Bill Gurley, a general partner at Benchmark Capital, urges caution when considering current events. He points out that venture capital funds are posting attractive returns even as IPOs are moribund (there were only 39 venture-backed IPOs in 2016). The venture capitalists fund entrepreneurs and then the companies raise funds from late-stage investors, allowing the VCs to mark up the company's value. Substantial capital is flowing to a relatively small number of relatively immature companies. He argues that the process of an IPO imposes a welcome discipline on a management team, including tightened operations and accounting rigor.[33]

As a result of this build in value pre-IPO, more mutual funds and hedge funds seek to participate in late-stage venture capital funding.[34] Exhibit 11 shows that 26 mutual fund families had $11.5 billion invested in late-stage venture companies as of mid-year 2016. The bulk of that investment, $8.1 billion of the $11.5 billion, comes from Fidelity, T. Rowe Price, and Wellington (which sub advises Hartford Mutual Funds).

Exhibit 11: Mutual Funds and Late-Stage Venture Capital

Firm Name	Market Value ($ Millions)	Number of Funds Invested
Fidelity Investments	5,190	59
T. Rowe Price	2,080	25
Hartford Mutual Funds	848	14
BlackRock	717	1
American Funds	609	2
Morgan Stanley	421	6
Vanguard	393	4
Putnam	302	15
Davis Funds	235	3
John Hancock	136	2
Alger	107	21
Oppenheimer Funds	102	6
Franklin Templeton Investments	64	4
Principal Funds	46	1
Janus	44	4
Wasatch	43	4
Voya	36	4
VALIC	23	4
Delaware Investments	17	2
Legg Mason	13	3
MassMutual	13	3
USAA	11	1
AB	3	3
Transamerica	3	1
Brown Advisory Funds	3	1
Tocqueville	1	1

Source: Katie Reichart, "Unicorn Hunting: Mutual Fund Ownership of Private Companies is a Relevant, but Minor, Concern for Most Investors," Morningstar Manager Research, December 2016.

For instance, $1.2 billion of the $107 billion in assets under management for the Fidelity Contrafund is in late-stage venture investments as of January 2017. The head of global equity capital markets at Fidelity has suggested that the pre-IPO market has become the IPO market of the past.[35]

Exhibit 12 shows the private companies with the largest investments from mutual fund companies. For example, $2.6 billion of the $12.9 billion of total funding for Uber, the online transportation network company, came from 52 different mutual funds. Snap Inc., the social media company, had received $326 million in mutual fund financing prior to its IPO in early 2017.

Exhibit 12: Private Firms with Largest Ownership by Fund Companies

Firm Name	Market Value ($ Millions)	Number of Funds Invested
Uber	2,556	52
Pinterest	857	15
WeWork	661	20
Airbnb	525	26
Didi Chuxing (Didi Kuaidi/Xiaoju Kuaizhi)	461	23
Dropbox	390	40
Flipkart	315	25
Cloudera	293	33
SpaceX	232	11
China Internet Plus	165	20

Source: Katie Reichart, "Unicorn Hunting."

Exhibit 13 shows the latest valuations for the largest companies that mutual funds have invested in, as well as how those values have changed in the short and long term. Most values dropped or were flat from the end of the third quarter to year-end in 2016. Morningstar calculates that only 3.6 percent of mutual funds in the U.S. have an allocation to venture capital, and that those investments are only 0.13 percent of aggregate assets under management.

Exhibit 13: Short- and Long-Term Changes in Unicorn Valuations

Company	Average Change from Previous Quarter (Percent)	Average Change from First Investment (Percent)	First Investment by a Mutual Fund	Latest Private Valuation ($ Billions)
Uber	0	215	Jun 2014	68.0
Airbnb	0	158	Apr 2014	30.0
Palantir	-7	118	Jul 2012	20.0
Meituan-Dianping	-18	0	Jan 2015	18.3
Snapchat	0	0	Mar 2015	17.8
WeWork	-2	180	Dec 2014	16.0
Flipkart	-2	236	Oct 2013	15.0
SpaceX	13	41	Jan 2015	12.0
Pinterest	-8	120	Oct 2013	11.0
Dropbox	-8	19	May 2012	10.0
Spotify	2	119	Nov 2012	8.5
Stemcentrx	20	20	Aug 2015	5.0
Cloudera	-7	34	Feb 2014	4.1
Social Finance	0	0	Sep 2015	4.0
Intarcia	0	340	Nov 2012	3.7
Tanium	0	-4	Aug 2015	3.5
Lending Club	-16	9	Apr 2014	3.1
Docusign	-9	279	Jun 2012	3.0
Legendary Entertainment	0	144	Sep 2010	3.0
Moderna	0	312	Nov 2013	3.0
Pure Storage	-4	122	Aug 2013	3.0
Oscar	0	-3	Jan 2016	2.7
Houzz	14	0	Jun 2014	2.3
Draftkings	9	16	Dec 2014	2.1
Blue Apron	-16	3	May 2015	2.0
Domo	-8	38	Jan 2014	2.0
Magic Leap	1	107	Oct 2014	2.0
Nutanix	16	1	Aug 2014	2.0
Zenefits	-45	-44	May 2015	2.0
Wayfair	36	82	Mar 2014	1.9
AppNexus	0	30	Aug 2014	1.8
Honest Co.	-9	26	Aug 2014	1.7
MongoDB	-3	-31	Oct 2013	1.6
Jawbone	NA	NA	Jun 2014	1.5
Mobileye	-7	21	Aug 2013	1.5
Deem	-96	-97	Sep 2013	1.4
Jet.com	75	75	Nov 2015	1.4
Klarna	-6	-4	Aug 2015	1.4
New Relic	-4	109	Jan 2013	1.2
OfferUp	0	35	Mar 2015	1.2
Warby Parker	-1	-18	Apr 2015	1.2
HortonWorks	0	-10	Mar 2014	1.1
23andMe	-2	-18	Jun 2015	1.0
Cloudflare	-28	-23	Nov 2014	1.0
Coupa Software	-15	-9	May 2015	1.0
Eventbrite	-18	24	Jun 2013	1.0
Evernote	-10	-55	Nov 2012	1.0
Forescout	-10	-4	Nov 2015	1.0
Lookout	-2	-37	Mar 2014	1.0
MarkLogic	-3	-12	Apr 2015	1.0
Twilio	9	18	Apr 2015	1.0

Source: Scott Austin, Rolfe Winkler, Renee Lightner, and Lakshmi Ketineni, "The Startup Stock Tracker," Wall Street Journal, see http://graphics.wsj.com/tech-startup-stocks-to-watch/.

Wealth transfers through interaction with companies can be a source of excess returns for investors.[36] This is the upside of late-stage investing. The downside is that it is hard to make these types of investments at scale and very few public market investors have experience investing in young companies. That said, there is evidence to show that large investment firms that have invested directly in private equity have fared relatively well.[37]

One final challenge for investment firms investing in startups is that valuations are hard to establish. For example, mutual fund companies commonly mark the same illiquid position at different values.[38] As a case in point, T. Rowe Price and Fidelity invested in Cloudera, a software company, at the same price in February 2014, and as of year-end 2016, T. Rowe Price marked the position at $19.50 while Fidelity valued it at $26.01.

Spin-offs are another source of new listings. In a spin-off, a company distributes shares of a wholly owned subsidiary to its shareholders on a pro-rata and tax-free basis. For example, Biogen Inc., spun off its hemophilia business into a new company, Bioverativ Inc., in February 2017. Following the spin-off, Biogen shareholders owned shares in Biogen and Bioverativ and a new company was listed. Exhibit 14 shows the number of completed spin-offs from 1976-2016.

Over the last 40 years, there has been approximately 1 spin-off for every 8 IPOs. There was a steady rise in spin-offs from 1976 through the dot-com boom in 2000, followed by a sharp collapse in the first decade of the 2000s. In recent years, spin-off activity has picked up again with a peak in 2014. There were 35 spin-offs in 2016 versus 60 in 2014. The all-time high was 66 in both 1999 and 2000.

Exhibit 14: U.S. Spin-Offs, 1976-2016
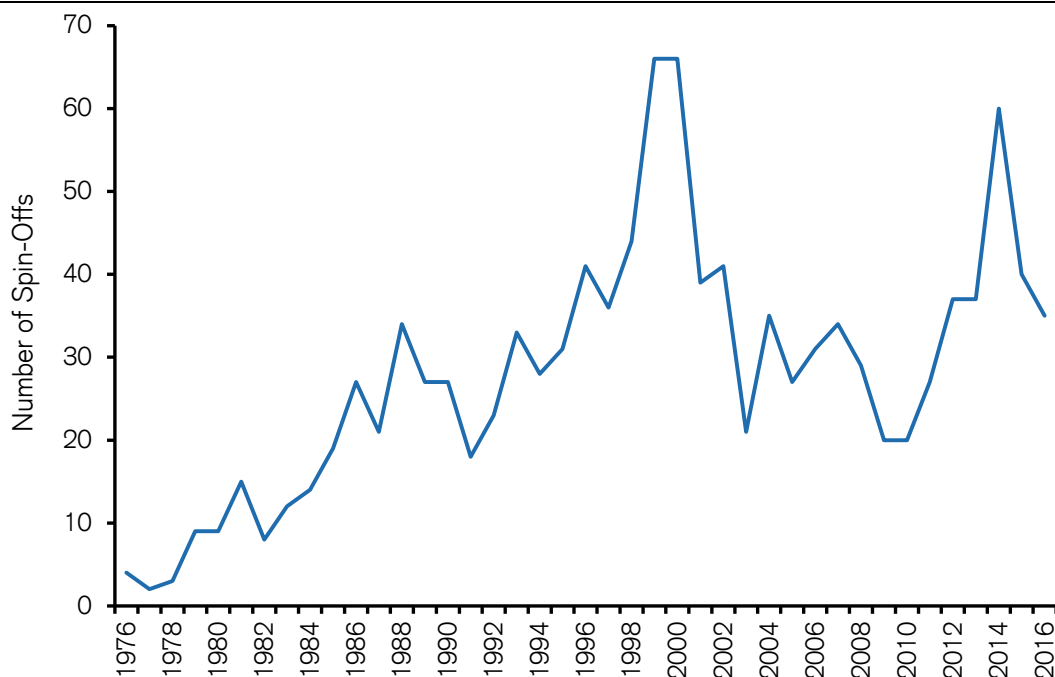
Source: Thomson Reuters; Spin-Off Research; Hemang Desai and Prem C. Jain, "Firm Performance and Focus: Long-Run Stock Market Performance Following Spinoffs," Journal of Financial Economics, Vol. 54, No. 1, October 1999, 81.

Filling the Void

Steven Crist, a well-known horse racing journalist and handicapper, points out that 90 percent of wagers on horse races in 1976 were based simply on win, place, or show. More than 70 percent of wagers today are known as exotics, which involve wagers on the extended order of finish in a particular race or the winners of consecutive races. For example, a handicapper may wager on which horses will finish 1-2, or 1-2-3. The outcomes from these wagers derive from more complex race results.[39]

Over that same period, there has been rapid growth in derivatives in the U.S. equity market. The Black-Scholes option pricing model was published in 1973, and 32.4 million equity options traded at the Chicago Board of Exchange in 1976. That volume was roughly 6 times higher in 1996, reaching 191 million options traded. But the real explosion happened in the last 20 years. In 2016, equity options volume was 3.6 billion, 19 times what it was 20 years before.

The growth in equity exchange-traded funds (ETFs), which derive their value from the basket of stocks they reflect, has also been explosive and has offset the listing gap in part.[40] Created in 1993, an ETF is an investment fund that trades on an exchange similar to a stock. The ETF holds assets that typically track an index, stocks within a sector, stocks that exhibit certain factors, bonds, or commodities. In principle, the ETF is supposed to trade close to the net asset value of the securities it is tracking. About one-fifth of the assets under management for ETFs track traditional indexes such as the S&P 500.

ETFs trade all day, unlike mutual funds which are priced once a day, can be bought and sold through a broker, and are more tax efficient than traditional mutual funds because they trigger fewer "tax events." In 1996, ETFs of U.S. domiciled equity funds had assets under management of just $2 billion. That sum has grown to $1.8 trillion in 2016.

Exhibit 15 shows that the number of equity ETFs in the U.S. went from 1 in 1993 to 658 in 2016. These are a net sum, as it is common for new ETFs to be listed and others delisted in a given year. ETFs started to gain in popularity right around the time that the population of listed stocks started dropping.

Exhibit 15: Number of Equity ETFs in the U.S.
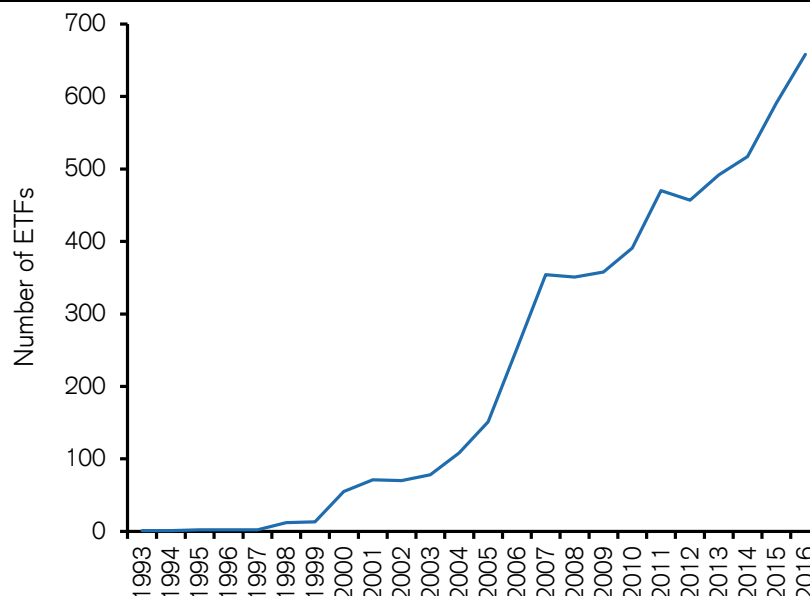
Source: Strategic Insight.

Exhibit 16 adds the U.S. equity ETF universe to the number of existing stocks. While ETFs offset a fraction of the listing gap, their inclusion does give investors an alternative to buying a specific stock. The most active traders of ETFs are institutional investors that use them to speculate, hedge, and arbitrage. Individuals who trade frequently are the next largest segment. Finally, individual investors use ETFs to build low-cost, diversified portfolios. They often do this with the guidance of financial advisers.[41]

Exhibit 16: Equity ETFs Help Offset the Listing Gap in the U.S.
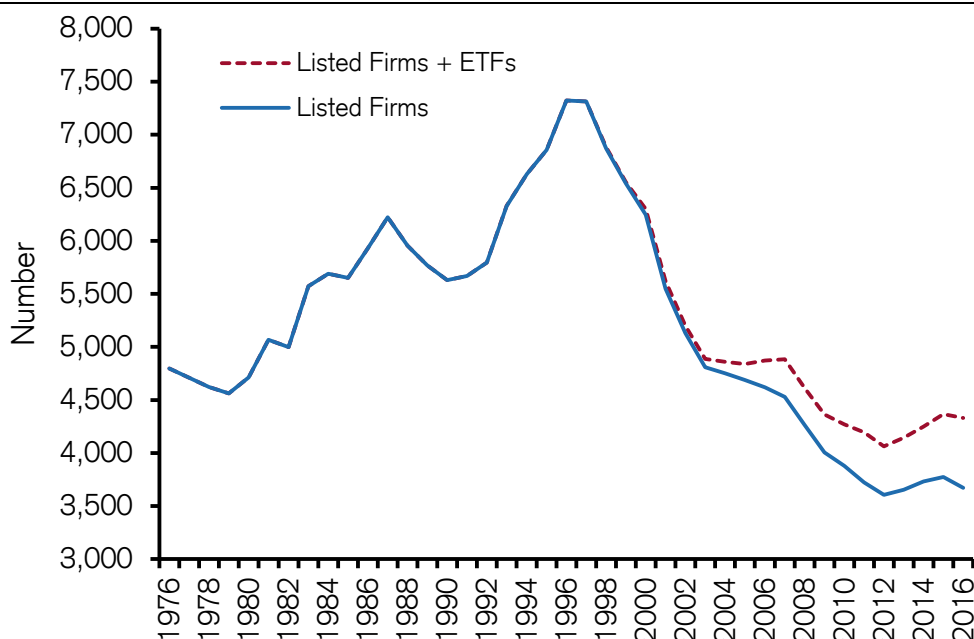
Source: Doidge, "The U.S. Listing Gap" and Strategic Insight.

ETFs are just 15 percent of total listings but are more than 30 percent of U.S. trading measured by value and 20 percent by volume (exhibit 17). Trading in ETFs is very concentrated. The SPDR S&P 500 ETF Trust alone has averaged about 9 percent of the volume on the New York Stock Exchange over the past five years, and 20 ETFs make up about 90 percent of ETF trading volume.

That ETFs are such a large part of the market likely represents both an opportunity and a risk. The opportunity is to use ETFs as an effective way to hedge or gain quick exposure to the market, a sector, or a factor. The risk is that ETFs may impede price discovery if they become too prominent.

Exhibit 17: ETFs as a Percentage of Equity Trading in the U.S.
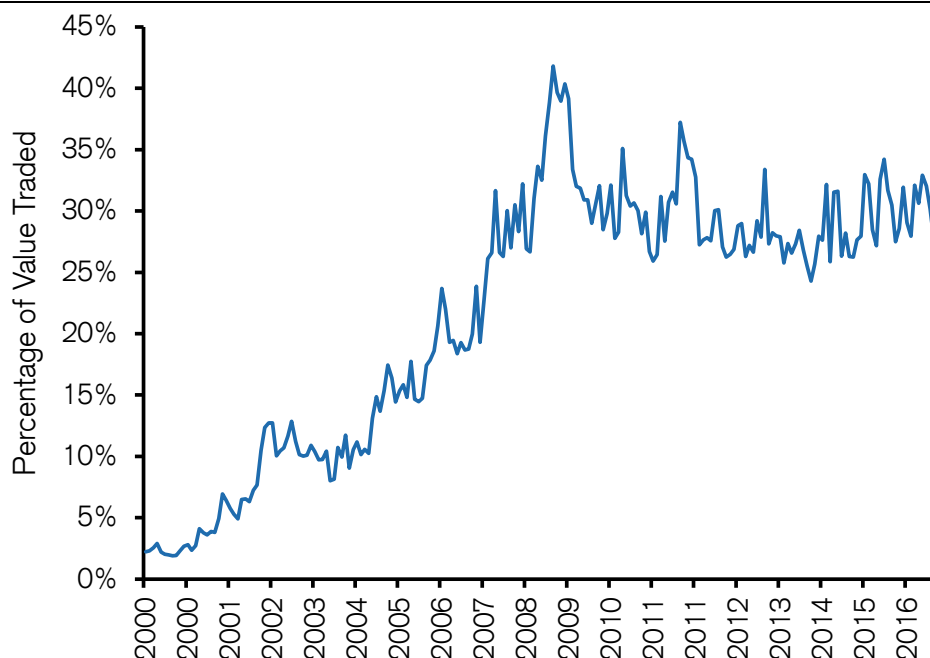
Source: Credit Suisse Trading Strategy.

Summary

The number of listed companies in the U.S. rose 50 percent from 1976 to 1996 and fell 50 percent from 1996 to 2016. This has not happened in other parts of the world, opening a U.S. listing gap. This is important because the U.S. comprises one-half of the value of the world's stock market.

A company's decision to list involves weighing costs and benefits. Net benefits appeared to be positive in the first 20 years of this period and have turned negative in the last 20 years. As a result, delistings have exceeded new listings by a large margin since 1996.

Regulation appears to have played a role in two ways. The cost of being public, especially after the implementation of the Sarbanes-Oxley Act in 2002, has risen in the past two decades. That said, the shrinkage in the population of listed companies started well before that law was implemented. Further, relatively accommodative anti-trust enforcement allowed for robust M&A activity.

As a result, listed companies today are on average larger, older, and more profitable than they were 20 years ago. Further, they operate in industries that are generally more concentrated. The overall size and maturity of listed companies means they are more likely to pay out cash to shareholders in the form of dividends and share buybacks than companies were in the past.

We speculate that the maturation of listed companies has also contributed to informational efficiency in the stock market. Gaining edge in older and well established businesses is likely more difficult than it is in young businesses with uncertain outlooks. In turn, the greater efficiency may be one of the catalysts for the shift that investors are making from active to indexed or rule-based strategies.[42]

The chief investment officer (CIO) of an institution in the mid-1970s could gain reasonable exposure to U.S. equities by investing in an early stage venture fund and a large market index such as the S&P 500 (itself not an easy thing to do at the time). Today, that CIO needs to participate in early- and late-stage venture capital, a private equity buyout fund, and the S&P 500. Only a few investors have access to all of these alternatives.

The universe of alternative investments, including venture capital, buyout funds, and hedge funds, has grown sharply in the past 20 years to provide some investors with access to more investment opportunities as well as to employ more sophisticated methods to generate excess returns. The growth of these asset classes has led to lower returns for investors.

Venture capital funds launched in the 1990s outperformed public markets. But funds started since 2000 have underperformed public markets, with an improvement in recent years. Buyout funds with vintage years before 2006 outperformed public markets, but those launched in the last decade have only equaled the returns of the market. Hedge funds have also seen diminishing excess returns in the past decade.[43] The difference between the top and bottom performers is larger in venture capital than in buyout funds.

Appendix A

Exhibit 18: Total Listings, New Lists, and Delists, 1976-2016

Year	Listed Firms	New Lists	Delists
1976	4,796	189	176
1977	4,710	151	240
1978	4,622	199	296
1979	4,563	217	287
1980	4,711	438	288
1981	5,067	627	266
1982	4,999	295	353
1983	5,573	895	328
1984	5,690	567	454
1985	5,650	513	537
1986	5,930	898	627
1987	6,221	753	480
1988	5,954	383	658
1989	5,767	359	557
1990	5,631	356	507
1991	5,668	484	449
1992	5,795	621	481
1993	6,329	850	327
1994	6,628	722	413
1995	6,856	753	529
1996	7,322	987	547
1997	7,313	687	692
1998	6,873	492	919
1999	6,540	603	895
2000	6,247	537	842
2001	5,550	152	834
2002	5,131	139	543
2003	4,808	158	477
2004	4,752	265	355
2005	4,687	274	365
2006	4,620	267	347
2007	4,529	305	429
2008	4,263	106	393
2009	4,007	103	355
2010	3,878	167	320
2011	3,724	128	293
2012	3,605	152	268
2013	3,653	278	230
2014	3,732	265	186
2015	3,775	282	239
2016	3,671	182	286

Source: Doidge, "The U.S. Listing Gap" and Credit Suisse estimates.

Appendix B

Exhibit 19: Valuation of Unicorns, March 2017

Company	Valuation ($ Billions)	Equity Funding ($ Billions)	Date of Most Recent Valuation
Uber	68.0	12.9	Jun 2016
Xiaomi	46.0	1.4	Dec 2014
Didi Chuxing	33.0	8.6	Sep 2016
Airbnb	31.0	3.3	Mar 2017
Palantir	20.0	1.9	Oct 2015
Lufax	18.5	1.7	Dec 2015
Meituan-Dianping	18.3	3.3	Jan 2016
WeWork	17.2	0.3	Mar 2017
Flipkart	15.0	3.0	Apr 2015
SpaceX	12.0	1.1	Jan 2015
Pinterest	11.0	1.3	Feb 2015
DJI	10.0	0.6	Sep 2016
Dropbox	10.0	0.6	Jan 2014
Stripe	9.2	0.5	Nov 2016
Theranos	9.0	0.8	Feb 2014
Spotify	8.5	1.0	Apr 2015
Zhong An Online	8.0	0.9	Jun 2015
Snapdeal	6.5	1.7	Feb 2016
Lyft	5.5	2.0	Jan 2016
Ola Cabs (ANI Technologies)	5.0	0.9	Sep 2015
One97 Communications	4.8	0.8	Aug 2016
Ele.me	4.5	2.3	Apr 2016
Magic Leap	4.5	1.4	Feb 2016
Cloudera	4.1	0.7	Mar 2014
SoFi (Social Finance)	4.0	1.4	Aug 2015
Slack	3.8	0.5	Apr 2016
Garena Online	3.8	0.5	Mar 2016
Intarcia Therapeutics	3.7	0.8	Sep 2016
Tanium	3.5	0.3	Sep 2015
Credit Karma	3.5	0.4	Jun 2015
Instacart	3.4	0.4	Mar 2017
LeSports	3.4	1.4	Mar 2016
Delivery Hero	3.1	1.3	Jun 2015
Grabtaxi	3.0	1.6	Sep 2016
Fanatics	3.0	0.6	Aug 2015
Wish (ContextLogic)	3.0	0.7	May 2015
DocuSign	3.0	0.5	Apr 2015
Moderna	3.0	0.7	Jan 2015
VANCL	3.0	0.5	Dec 2011
Bloom Energy	2.9	1.2	Sep 2011
Oscar Health Insurance	2.7	0.7	Feb 2016
OneWeb	2.5	1.7	Dec 2016
InMobi	2.5	0.2	Dec 2014
Mozido	2.4	0.3	Oct 2014
Adyen	2.3	0.3	Sep 2015
Houzz	2.3	0.2	Oct 2014
HelloFresh	2.2	0.4	Dec 2016
Uptake	2.0	0.1	Feb 2017
Zenefits (YourPeople)	2.0	0.6	Jun 2016

Company	Valuation ($ Billions)	Equity Funding ($ Billions)	Date of Most Recent Valuation
Domo	2.0	0.6	Mar 2016
Avant	2.0	0.7	Oct 2015
Github	2.0	0.4	Jul 2015
Blue Apron	2.0	0.2	Jun 2015
Coupang	2.0	1.4	Jun 2015
Trendy Group	2.0	0.2	Feb 2012
WePiao	1.9	0.8	Apr 2016
AppDynamics	1.9	0.3	Nov 2015
Prosper Marketplace	1.9	0.4	Apr 2015
Sprinklr	1.8	0.3	Jul 2016
ZocDoc	1.8	0.2	Aug 2015
AppNexus	1.8	0.3	Apr 2015
BuzzFeed	1.7	0.5	Nov 2016
Honest Co.	1.7	0.2	Aug 2015
CureVac	1.7	0.4	Oct 2015
Lakala.com	1.6	0.3	Jun 2015
JetSmarter	1.6	0.2	Dec 2016
MongoDB	1.6	0.3	Dec 2014
Quanergy	1.6	0.2	Aug 2016
Zoox	1.6	0.3	Nov 2016
Oxford Nanopore	1.5	0.3	Jul 2015
InsideSales.com	1.5	N/A	Jan 2017
Unity Technologies	1.5	0.2	Jul 2016
Razer	1.5	0.1	Mar 2016
Jawbone	1.5	0.7	Jan 2016
Guahao.com	1.5	0.5	Sep 2015
BlaBlaCar	1.5	0.3	Jul 2015
MuleSoft	1.5	0.3	May 2015
Koudai Shopping	1.5	0.4	Oct 2014
Mu Sigma	1.5	0.2	Feb 2013
C3 IoT	1.4	0.1	Mar 2017
Hike	1.4	0.3	Aug 2016
Klarna	1.4	0.3	Mar 2014
Deem	1.4	0.5	Sep 2011
Apttus	1.3	0.3	Sep 2016
Thumbtack	1.3	0.3	Sep 2015
FanDuel	1.3	0.4	Jul 2015
Medallia	1.3	0.3	Jul 2015
Okta	1.2	0.2	Sep 2015
Warby Parker	1.2	0.2	Apr 2015
Infinidat	1.2	0.2	Apr 2015
Auto1 Group	1.2	0.2	Apr 2015
Automattic	1.2	0.2	May 2014
Global Fashion Group	1.1	1.5	Apr 2016
View	1.1	0.7	Feb 2017
OpenDoor	1.1	0.3	Nov 2016
Cylance	1.1	0.2	Jun 2016
TransferWise	1.1	0.1	May 2016
Farfetch	1.1	0.3	May 2016
Shopclues.com	1.1	0.5	Jan 2016
Nextdoor	1.1	0.2	Mar 2015
IronSource	1.1	0.1	Aug 2014
Proteus Digital Health	1.1	0.4	Jun 2014
Actifio	1.1	0.2	Mar 2014

Company	Valuation ($ Billions)	Equity Funding ($ Billions)	Date of Most Recent Valuation
Anaplan	1.1	0.2	Jan 2016
Deliveroo	1.1	0.5	Aug 2016
Gusto (ZenPayroll)	1.1	0.1	Dec 2015
Aiwujiwu	1.1	0.3	Nov 2015
Jiuxian	1.1	0.3	Jul 2015
AppDirect	1.0	0.2	Oct 2015
China Rapid Finance	1.0	0.1	Jul 2015
23andMe	1.0	0.2	Jun 2015
Yello Mobile	1.0	0.1	Dec 2014
DraftKings	1.0	0.5	Mar 2017
Zoom Video	1.0	0.1	Jan 2017
Huochebang	1.0	0.2	Dec 2016
Careem	1.0	0.4	Dec 2016
Procore	1.0	0.1	Dec 2016
Compass	1.0	0.2	Aug 2016
SMS Assist	1.0	0.3	Jun 2016
Liepin.com	1.0	0.2	Jun 2016
Mofang Apartments	1.0	0.5	Apr 2016
Africa Internet Group	1.0	0.5	Mar 2016
ForeScout	1.0	0.2	Jan 2016
TutorGroup	1.0	0.3	Nov 2015
Datto	1.0	0.1	Nov 2015
Udacity	1.0	0.2	Nov 2015
Kabbage	1.0	0.2	Oct 2015
Mia.com	1.0	0.2	Sep 2015
Kik Interactive	1.0	0.1	Aug 2015
Vox Media	1.0	0.1	Aug 2015
Tujia	1.0	0.5	Aug 2015
Zscaler	1.0	0.1	Jul 2015
Adaptive Biotechnologies	1.0	0.4	May 2015
MarkLogic	1.0	0.2	Apr 2015
Funding Circle	1.0	0.3	Apr 2015
Docker	1.0	0.2	Apr 2015
Panshi	1.0	0.2	Apr 2015
Fanli	1.0	0.0	Apr 2015
Wifimaster	1.0	0.1	Mar 2015
Zomato Media	1.0	0.2	Mar 2015
Lamabang	1.0	0.1	Mar 2015
Shazam	1.0	0.2	Jan 2015
Beibei	1.0	0.1	Jan 2015
APUS Group	1.0	0.1	Jan 2015
Qualtrics	1.0	0.2	Sep 2014
Quikr	1.0	0.4	Sep 2014
Lookout	1.0	0.3	Aug 2014
JustFab	1.0	0.3	Aug 2014
Pluralsight	1.0	0.2	Aug 2014
Mogujie	1.0	0.2	Jun 2014
Eventbrite	1.0	0.2	Mar 2014
Tango	1.0	0.4	Mar 2014
Avast Software	1.0	0.1	Feb 2014
CloudFlare	1.0	0.1	Dec 2012
Evernote	1.0	0.3	May 2012

Source: Scott Austin, Chris Canipe, and Sarah Slobin, "The Billion Dollar Startup Club," Wall Street Journal, see http://graphics.wsj.com/billion-dollar-club/.

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[32] See http://graphics.wsj.com/billion-dollar-club/.

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