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Blitzscale and Hope:
Unicorns, IPOs and the Fear of Repeating the Late 1990s

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- The current hype about two-sided digital platforms, blitzscaling and winner-takes-most markets has fueled a surge in IPO listings. It is perhaps unsurprising that this exuberance, especially when combined with inordinate liquidity, record levels of VC activity and multiple fundraising rounds, has often produced stratospheric valuations that are difficult to reconcile with free-cash-flow (FCF) fundamentals.
- As a result, a rising tide of doomsayers have warned that we are repeating the excesses of the dot-com boom, citing several specific developments to support their alarmist view. For a start, nominal IPO supply is on track to set an all-time high in 2019, finally surpassing the record set in 1999.
- Moreover, 81% of recent IPOs are for unprofitable firms, a proportion that ties the record set two decades ago. This is a particular concern for tech IPOs where only 15% of firms are profitable and, in some cases, like Lyft and Uber, the pathway to profitability is anything but clear.
- Further, VCs now back almost 80% of tech IPOs and, similar to the tech bubble, VC exit activity is soaring. This has led us to wonder: Do these savvy and well-apprised private market investors who are rushing to the door know something their public market counterparts don't?
- While these are compelling arguments, we believe unequivocal bears miss three key points.
  - First, since the dot-com boom the median age of tech IPOs has risen from 4 to 12 years and the median sales of tech IPOs has increased more than threefold. One could interpret these developments as evidence that it is becoming even more difficult to become free-cash-flow generative. However, in most cases these are real companies that have developed robust, viable and innovative business models and are exhibiting truly impressive sales growth.
  - Second, most of the oft-cited excesses appear much less worrisome when expressed relative to market cap (which has roughly doubled since the tech bubble) or in constant USD (to eliminate the impact of inflation). Although it is undeniable that some excesses do exist, they are simply not in the same league as those of the late-1990s and certainly do not pose a systemic risk to equity markets.
  - Third, cynics who take a black-and-white view, risk tarring all unicorns* and IPOs with the same brush. This is a mistake as the historical experience and empirical evidence strongly suggests that some of these companies will develop into dominant platforms and become global champions, thus amply rewarding the patience of their investors.

**Unicorn: A startup, private company, typically in a tech-related sector, valued at over $1 bn. They have been dubbed "unicorns" because, in many cases, their billion-dollar valuations are thought to be purely mythical.*

- It is crucial to analyze each company individually, based on its own ability to produce FCF on a sustainable basis and on management's skills in capital allocation, including knowing how aggressively to blitzscale. Although a few of the key metrics employed for valuing digital platforms are somewhat novel, FCF principles are as relevant to unicorns and IPOs as they are to firms that have traded in public markets for decades.

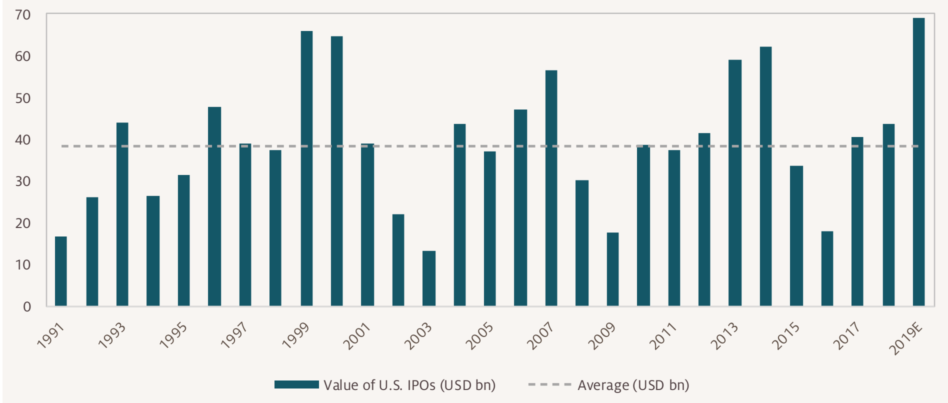
First-Scaler Advantage

The digital transformation of the economy is accelerating and has resulted in a mad rush into platform businesses. Similar to the late-1990s, startups have been scrambling to become the dominant platform in every space, believing that network effects require them to "move quickly and break things." The race to lock up the addressable market has resulted in a ferociously expensive land grab, which is well illustrated by Uber's and Airbnb's frenetic efforts to conquer cities across the globe.[1] One consequence of this dynamic is that there are now over 360 unicorns globally, with most in tech-related sectors. Given the soaring number of IPOs, it would seem reasonable to expect this list to be shrinking. However, just the opposite is occurring as the pace of business model innovation is intensifying, ensuring an escalating number of promising startups. To illustrate, last year delivered a sizeable herd of new unicorns, 96 according to Pitchbook, with 2019 on pace to surpass that number and set a new record.

Digital Platforms Are Eating the World

There are many different types of platforms, with unicorns and recent IPOs spanning a host of industries. The largest number are found in the tech subsectors such as e-commerce, fintech, internet software, ride hailing, data analytics, social media, biotech and cyber security. Also, while this paper focuses on activity in the U.S., where 48% of unicorns reside, there are also a large number in China (29%), as well the U.K. (5%), India (4%), Germany (3%) and S. Korea (2%). To illustrate the geographical and subsectoral diversity

FIGURE 1: U.S. IPO Activity Is Booming and On Pace to Surpass the 1999 Record



Source: J.P. Morgan, Bloomberg, Epoch Investment Partners
Note: 2019E is based on Jan-Apr pace annualized

among the largest unicorns today, consider ByteDance (a media company in China), Didi Chuxing (ride hailing in China), Stripe (fintech), Robinhood (fintech), Palantir (data analytics), Slack (enterprise software), Airbnb (e-Commerce), 23andMe (biotech), Peloton (fitness) and SpaceX (satellites).

With such an impressive number and variety of unicorns, many chomping at the bit to go public, it is perhaps unsurprising that 2019 is likely to break the record for IPOs set in 1999 (**Figure 1**). High profile recent listings have included Uber, Lyft, Pinterest, Beyond Meat and Zoom Video, with a long list of companies anxious to follow suit. By most counts there are over 70 IPOs left on the docket, the vast majority of which are for loss-making companies. This has led some Wall Street investors to gripe that VC sponsors are playing a game of hot potato, foisting loss-making companies into the public arena while they still can. Sure, Silicon Valley excels at pumping out giant startups with expansive visions, but pundits worry that in some cases, such as ride hailing, "There's no profitability within sight, even with binoculars."

Regardless, during the last few years most listings have performed well. According to PitchBook, since 2015, IPO valuations have averaged around 90% above the last private-market valuations. However, the weak post-IPO performance of Lyft, and to a lesser extent Uber, has dented confidence that this impressive trend can continue.[2] The fundamental grumble is that, after multiple fundraising rounds, some unicorns may have been bid up so much that their private-market valuations will both scare off myopic public market investors as well as encourage predacious short sellers to pile in.

Blitzscale-and-Hope as a Business Strategy

Skeptics naturally relish comparisons with the excesses of the late-1990s. From their perspective, Silicon Valley startups are "all sizzle and no steak," obsessed with empty buzzwords such as blitzscaling (even if it wasn't yet called that during the dot-com boom), network effects and digital moats. Cassandras further contend that, although all frenzies are distinct, the mindset is the same: grow as fast as possible, attract buckets of money and then rush to IPO before the VC cash runs out. They expect that, like all bubbles stretching back to tulips, the results for platform businesses will be the same, with the movie once again ending in tears.

Cynics cite several features of the current IPO boom to validate their perspective. Ultra-low interest rates have left investors chasing returns, compelling them to move progressively further out the risk curve (including into private equity and venture capital). Additionally, startups are proliferating as cloud computing, smartphones and social media have turbo-

1. The trials and tribulations of the platform frenzy are thoroughly documented in "The Business of Platforms" by three professors (from MIT, U Surrey and HBS), which includes an analysis of 209 failed platforms.
2. Note that most other 2019 IPOs, such as Zoom Video, Pinterest, Pagerduty, CrowdStrike, Revolve and Beyond Meat, have significantly outperformed the market post-listing.

charged the rate at which new technology platforms are created, scaled and dispersed around the world. This development is well encapsulated by AWS's advertising slogan "Dream Bigger. Build Faster." These dreamers and builders have been emboldened by a handful of superstar platform companies (e.g., Amazon, Google, Facebook, Alibaba and Tencent) that have uncovered the magic formula to immense wealth and fame.

Silicon Valley has become all about applying its magic formula, all bankrolled by gobs of VC money, to as many sectors as possible. However, one must question whether this model of growth at almost any cost is actually magical, allowing investors to take home previously buried pots of gold, or just mythical, like the much sought after, but illusive, unicorn of lore. This is especially a concern given that the clear majority of IPOs are loss-making (**Figure 2**). Last year, 81% of U.S. IPOs had negative EPS, tying the record set at the peak of the dot-com boom.

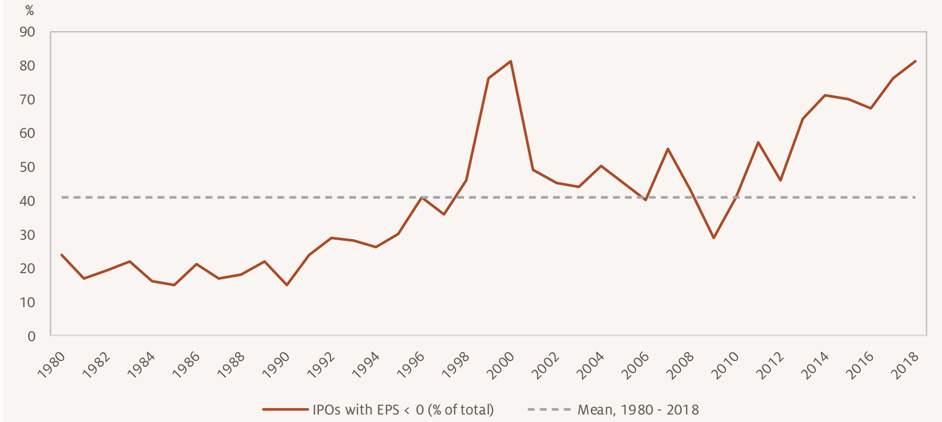
As bad as that may sound, the profit picture is arguably even worse today than it was during the late-1990s. For example, the combined losses of IPOs with negative EPS was $8.4 billion in Q1 of 2019, easily surpassing the previous record set during the tech bubble. Moreover, the composite operating margin for U.S. IPOs had averaged a healthy 4.6% from 1991-2015 but has since plummeted by 9 percentage points to a disturbing -5.4% (**Figure 3**).

Fake It 'Til you Make It

Aside from the "grow fast or die slow" dogma behind the mad rush into platforms, one reason for the increased prevalence of unprofitable IPOs is the burgeoning importance of biotech. While the percentage of total IPOs represented by the tech sector remains close to its historical average of 30%, biotech's share has soared to 43%, up six fold from the 1980-2010 average of 7% (**Figure 4**).

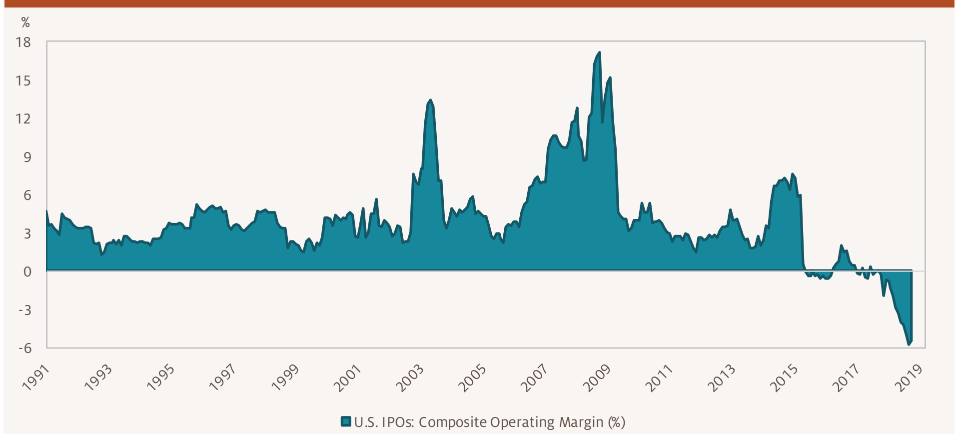
This definitely skews the statistics, as very few biotech IPOs have been profitable. In fact, most biotech IPOs haven't even generated sales, let alone bottom-line earnings. To be more specific, since 2010 only 3% of biotech IPOs have been profitable (down from 23% previously). This is even worse than tech sector IPOs, where a rather dismal average of 27% have been in the black since 2010 (down from the historical mean of 61%). Moreover, during the last two

FIGURE 2: The Proportion of U.S. IPOs with Negative EPS Is Double the Historical Average



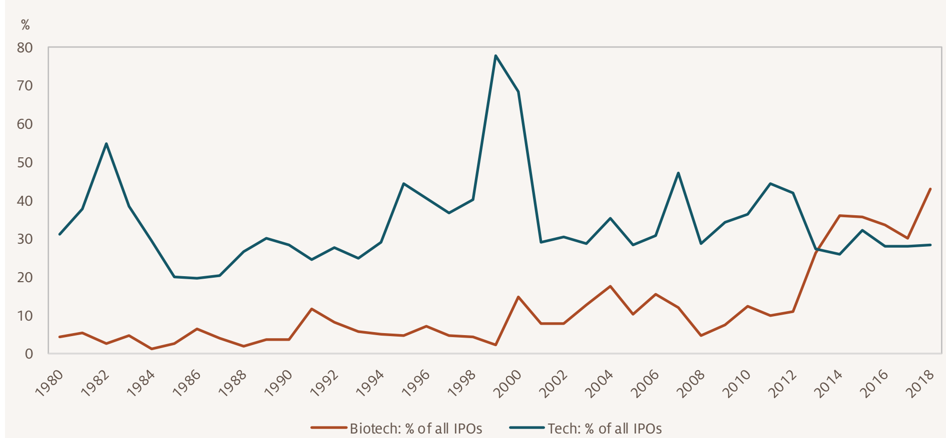
Source: Jay Ritter IPO database

FIGURE 3: The Composite Operating Margin for U.S. IPOs Has Collapsed



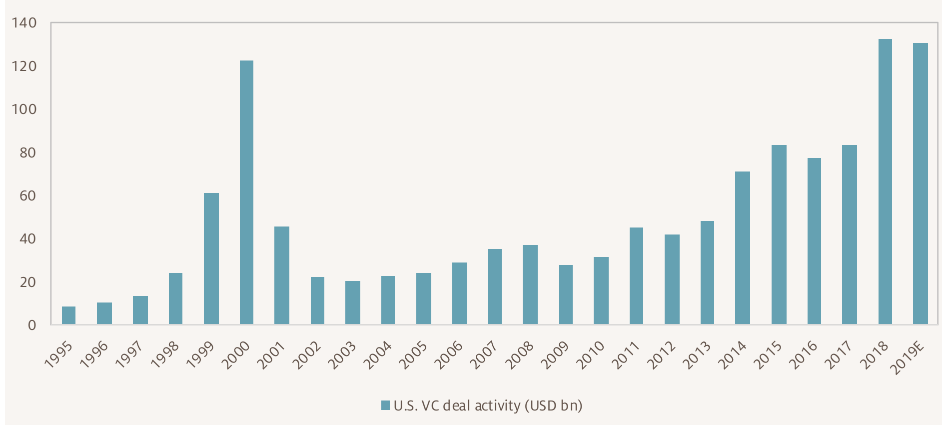
Source: Jay Ritter IPO database, Empirical Research Partners
Note: The margin is calculated on a trailing 12-month basis

FIGURE 4: The Biotech Sector Now Represents Over 40% of IPOs



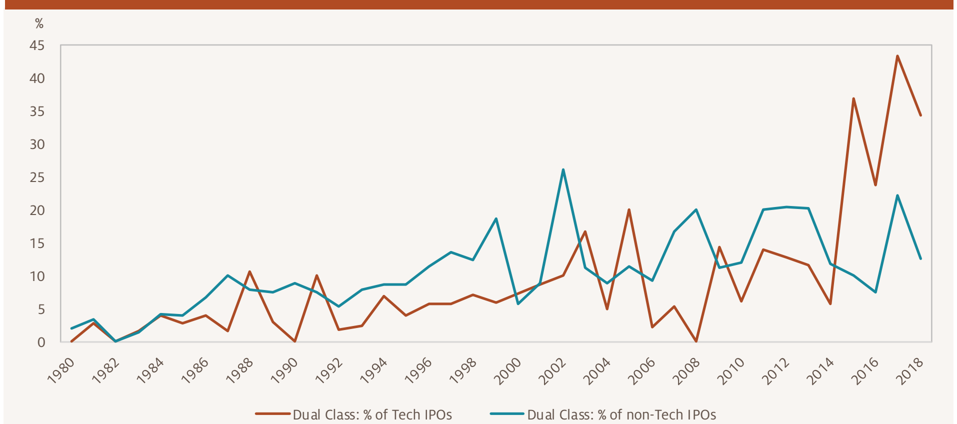
Source: Jay Ritter IPO database, Epoch Investment Partners years the statistics have been even worse. Among tech IPOs, only 17% were profitable in 2017, followed by an even more discouraging 16% in 2018. However, the corresponding numbers for biotech were rock bottom, at 0% and 0%; that is, not a single biotech IPO posted positive earnings during the last two years. This certainly raises questions about the robustness and validity of the funding model behind all these loss-making private companies.

FIGURE 5: The Value of Venture Capital Investment in the U.S. Hit a Record High in 2018



Source: PitchBook, National Venture Capital Association
Note: 2019E is annualized Q1 deal activity

FIGURE 6: The Percentage of Tech IPOs Issuing Dual Class Shares Has Skyrocketed



Source: Jay Ritter IPO database, Epoch Investment Partners

Venture Capital: Phishing for Phools?

"The skill you need most when raising venture capital is the ability to tell a compelling story." This quote is a key theme of "Secrets of Sand Hill Road: Venture capital and how to get it", by Scott Kupor of Andreessen Horowitz. He asserts that VC investors are obsessed with technology differentiation, network effects and the potential for juicy margins. This sounds eminently sensible, but he also demonstrates that even the best VCs aren't terribly good at avoiding failures: in fact, over 50% of VC investments lose money. Rather, he shows that the entire VC business model is based on the 10% to 20% of investments that turn into home runs. Among other things, this helps to explain why the top VCs (such as Sequoia, Kleiner Perkins and Andreessen Horowitz) hold well-diversified portfolios, typically with investments in 25-40 unicorns, spread across sectors.

A second theme of Mr. Kupor's book is that "lemons ripen early." That is, he contends a portfolio of startups will often have early losses as the teams without product/market fit quickly run out of money early. However, the successful startups, the ones that will become dominant platforms, take time to emerge. It can take 5+ years from a company's founding to understand its likely growth trajectory. As a result, the goal is a J-curve with the startup initially showing losses, followed by chunky margins and impressive profitability in the later years. This is why VCs are so infatuated with huge TAMs (total addressable market) and frequently declare that few ideas are big enough.

The VC perspective is important to understand, as they backed 79% of tech IPOs in 2018, up dramatically from the 1980-2010 average of 57%. (The corresponding percentages for all IPOs were 66% and 35%, respectively.) Reflecting this trend, last year was a banner year for VC investments into startups, with 2019 expected to be just slightly lower (**Figure 5**). However, this does raise the question of whether the spike and subsequent collapse of two decades ago will be repeated this time around.

Not only are VCs placing unprecedented amounts into startups, they are also setting records for the dollar amounts they are cashing out. According to PitchBook, 2018 set a record of $126 bn in total exit value for VCs. With a host of major listings still on the horizon, it is all but assured that total VC exit values will smash this record in 2019. For reference, from 2010-2017 VC exits averaged $82 bn annually.

The above trends certainly seem to enable the manic behavior of startups, many of whom appear to be adopting a slightly different mantra, "move quickly and burn money," sprinting to an IPO before the VC cash runs out. An additional and final cause for concern is the rising number of tech IPOs that are issuing dual class shares, which are typically viewed as a way to raise money but without ceding control. To illustrate, an average of 35% have issued such shares since 2015, up dramatically from the historical mean of 6% (**Figure 6**).

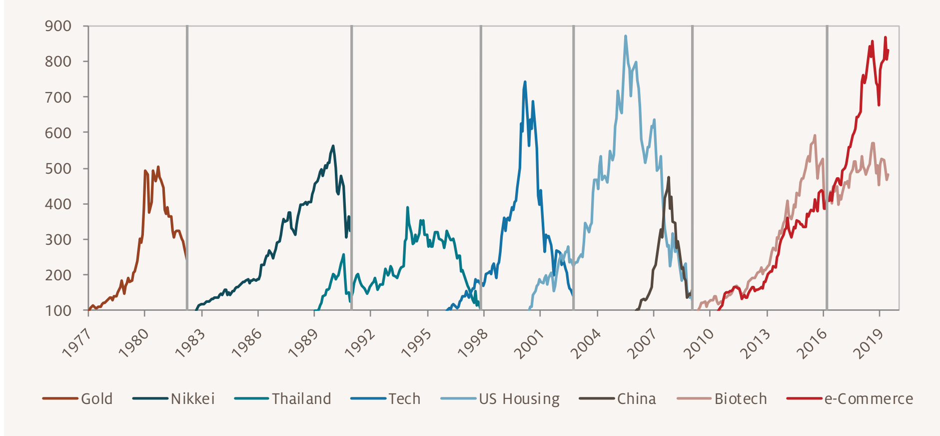
For most of the modern history of American equity markets the NYSE did not list companies with dual-class voting. However, standards have slipped during recent decades. Popularized by the Google IPO in 2004, weighted voting rights have been featured in the high-profile IPOs of LinkedIn, Groupon, Zynga, Facebook, Fitbit, Blue Apron and Dropbox. Snap took this awkward development to a new level in 2017 when it became the first company since at least 1940 to launch an IPO with shares having zero voting rights. This allowed CEO Evan Spiegel and CTO Robert Murphy to hold a combined 88.5% of the company's total voting power. More recently, Lyft and Pinterest are among the 2019 listings that have issued dual class shares.

To illustrate why this is a problem, earlier this month 32% of Facebook's external shareholders voted against the reelection of Mark Zuckerberg to the board, with 67% backing a proposal for the introduction of an independent board chair. However, neither of these moves stood a chance as Zuckerberg holds 58% of the voting power, even though he only owns 13% of the total company shares. Unchallengeable control by one person over such a large and complex firm is troubling, especially considering the multiple controversies the company is currently grappling with. Facebook has become the poster child for governance challenges, with an increasing number of regulators and institutional investors calling for sunset provisions or even outright bans on dual-class structures.

The complexity of voting rights can also make the valuation of VC-backed companies extremely confusing.[3] After multiple funding rounds, many unicorns end up with convoluted financial structures, which can be confusing and misleading, even for sophisticated insiders. Such complexity is a common feature of asset bubbles (this was particularly the case during the housing market excesses a decade ago), which raises the question of whether the surge in unicorns and IPOs is just the tip of a much larger iceberg.

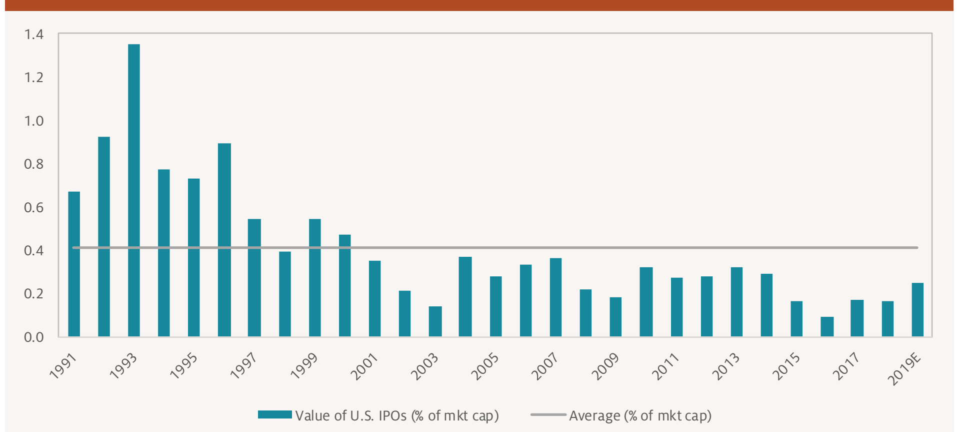
The e-Commerce index is up over eight times since mid-2010, a runup exceeded only by U.S. homebuilders a decade ago

FIGURE 7: Is e-Commerce the 2nd Largest Bubble of the Last Four Decades?



Source: Bloomberg, DoubleLine, Epoch Investment Partners
All eight series are indexed to begin at 100. Implying, for example, that e-Commerce is up over 8x from its base.
The Dow Jones Internet Commerce index consists of 15 companies including Amazon, Google, PayPal, Facebook, Snap, Twitter, Netflix, eBay, and Expedia.

FIGURE 8: When Expressed as % of Market Cap, U.S. IPO Activity Appears Quite Moderate



Source: J.P. Morgan, Bloomberg, Epoch Investment Partners
Note: 2019E is based on Jan-Apr pace annualized

Is the IPO Frenzy Just One Aspect of a Broader E-Commerce Bubble?

There have been (at least) seven clearly identifiable bubbles over the last 40 years or so (**Figure 7**). The first bubble is gold, which peaked in 1980 at about 5x its initial price. The most recent candidate is e-commerce, which is up over 8x since mid-2010. Although we are not convinced it's a bubble, we must admit it shares a lot of the characteristics of one. Such excesses always involve a dislocative event that promises to upend the existing order. The current hype about two-sided digital platforms and blitzscaling, featuring a growth over profits mentality, certainly raises the possibility that e-commerce might be yet another bubble just waiting to be popped.

In addition to a dislocative event, bubbles also require that conventional valuation measures become stretched and untethered from fundamentals. Epoch has always preferred companies with business models that are capable of generating sustainable FCF, if not immediately then in the near future. On that basis, though, the e-commerce Index appears only slightly extended. The index currently trades on a FCF yield of 4.1%, which is only moderately below the 4.5% yield of the S&P 500. This suggests the index could be marginally overpriced, but not even close to bubble territory. Taking this point further, the remainder of this paper will present evidence that the surge in unicorns and IPOs may indicate a moderate degree of froth, but

3. See "Squaring Venture Capital Valuations with Reality," UBC and Stanford University, W. Gornall and I. Strebulaev, 2018.

nothing like what transpired during the dot-com boom and certainly not representing a systemic risk to the equity market.

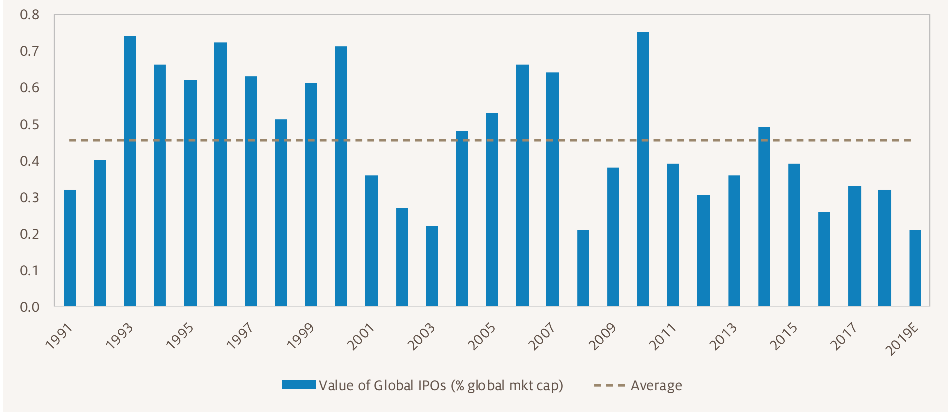
A Bit of Froth, but Few Signs of Irrational Exuberance

It is undeniable that nominal IPO activity is booming, with the value of U.S. IPOs in 2019 on pace to exceed the previous high seen in 1999. However, this year's IPO boom is not creating indigestion in equity markets because it represents a small percentage of overall market cap (**Figure 8**). This follows from U.S. equity market capitalization having increased more than eightfold since the mid-1990s.

Moreover, outside the U.S., IPO activity has been rather weak, with the nominal value of global issuance in 2019 on pace to come in below its historical average. Further, when expressed as a percentage of global market capitalization, it is less than half the historical average (**Figure 9**). Part of the reason why global IPO activity is so underwhelming is that major equity markets, like Europe and Japan, have produced a dearth of tech-related startups.

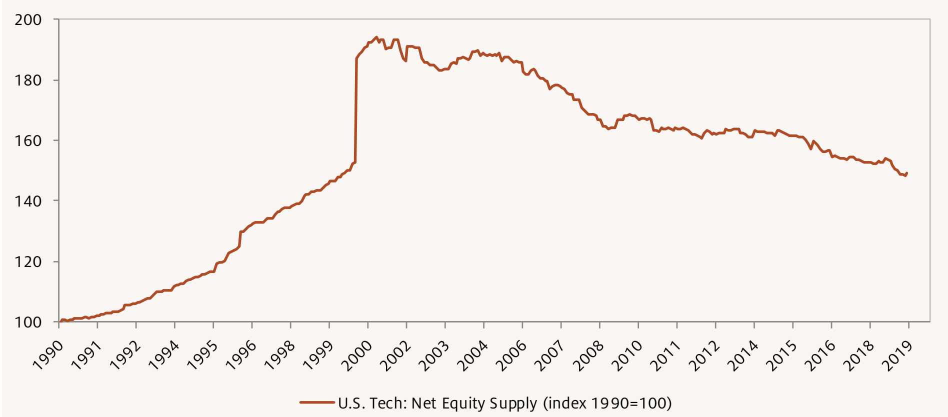
Additionally, after taking into account delistings, cash-funded M&A and buybacks (which are at a record level in the U.S. and surging in Japan), global net equity supply was actually negative in 2018.[4] Altogether, this strongly suggests that this year's U.S. IPO boom presents little in the way of a systemic threat to global equities.

FIGURE 9: Global IPO Activity Is Soft, Especially When Expressed as % of Market Capitalization



Source: J.P. Morgan, Bloomberg, Epoch Investment Partners
Note: 2019E is based on Jan-Apr pace annualized

FIGURE 10: Net Equity Supply for the U.S. Tech Sector



Source: Citi Research

De-equitization: Too Little Tech Supply

There are many parallels between the U.S. tech sector now and in the late 1990s: The sector has dramatically outperformed; multiples are higher than the rest of the S&P 500; loss-making companies are being awarded huge IPO valuations; and so on. However, as Citi Research has emphasized, between 1996 and 2001, net supply of equity in the U.S. tech sector increased by 69%. By contrast, in the last five years, it has contracted by 9% (**Figure 10**).[5]

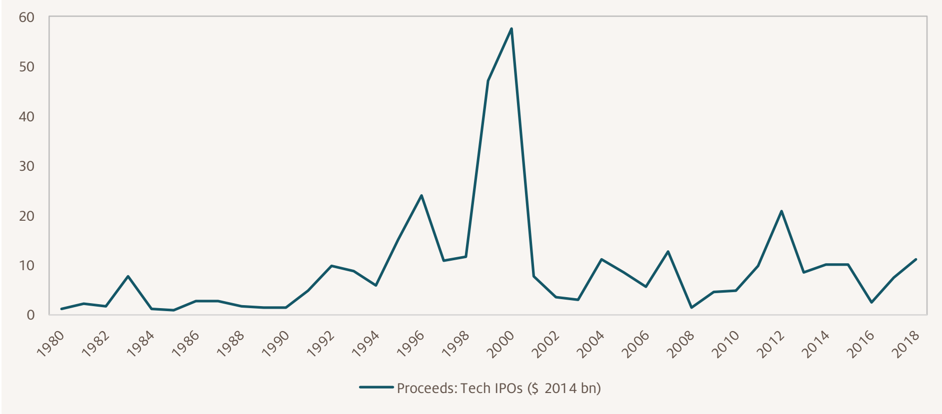
To illustrate, U.S. tech buybacks have amounted to $370 bn since 2017, which dwarfs new listings of $183 bn and fresh capital raising of $24 bn. In effect, the sector has become self-financing. That is very different from the late 1990s when the sector gorged on unsustainable inflows of new investor capital. To be more specific, tech IPO proceeds peaked at $46.9 bn in 1999 and $57.4 bn in 2000, whereas last year the sector raised only $11.2 bn (all expressed in 2014 USD, to adjust for inflation). While the current IPO market for tech is hot, it is nothing like the frenzy experienced during the dot-com boom (**Figure 11**). Next, we demonstrate two other ways in which today's environment is markedly different from that of the late-1990s.

Most of Today's IPOs Represent Real Businesses

During the late-1990s many firms came to market prematurely; the median age of companies going public was only four years, half of what had been seen previously. As toddlers, their revenue base was also subscale and their business models often untested. For example, three-year-old Webvan went public in late-1999, but burned through so much cash that it became defunct in 2001. Pets.com listed in February 2000, just a year after it was founded, and nine months later said it would shut down. eToys.com was established in 1997, went public in 1999 and filed for bankruptcy in 2001.

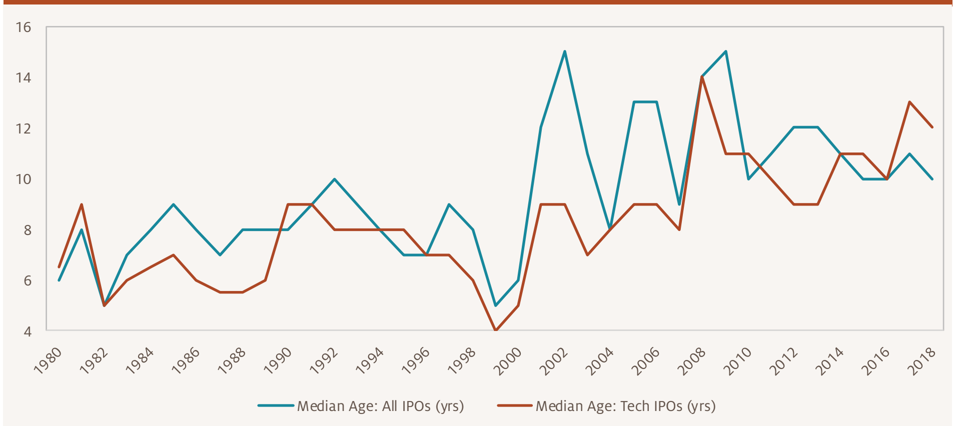
4. 2016 was the first time ever that global net equity supply was negative. It was slightly positive in 2017, but then turned negative last year and is set to repeat this unusual outcome in 2019.
5. A similar pattern occurred with the overall U.S. equity market. Net equity supply increased by an average of 4.7% annually from 1996–2001 but, this decade, it has shrunk for nine consecutive years.

FIGURE 11: Recent U.S. Tech IPO Proceeds Are Modest Compared to the Late-1990s



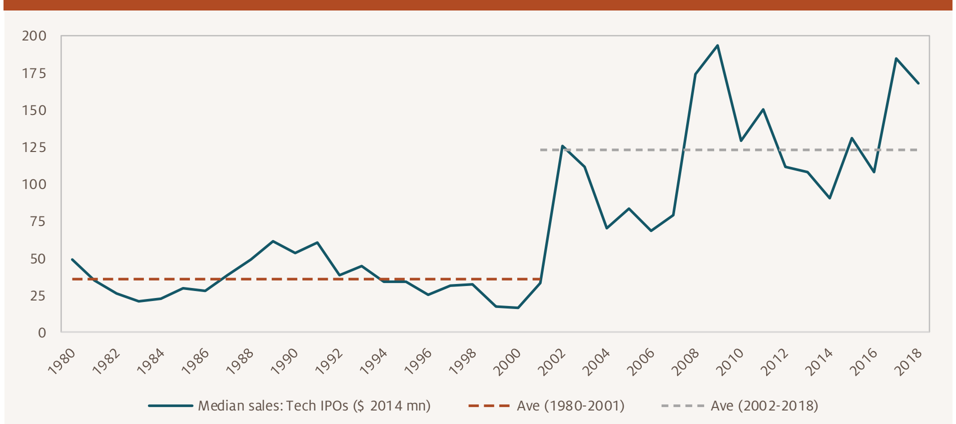
Source: Jay Ritter IPO database, Bloomberg, Epoch Investment Partners

FIGURE 12: The Median Age of Tech IPOs Has Increased Threefold Since the Late-1990s



Source: Jay Ritter IPO database, Epoch Investment Partners

FIGURE 13: The Median Sales of Tech IPOs Increased Over Threefold After 2001



Source: Jay Ritter IPO database, Bloomberg, Epoch Investment Partners

Fortunately, the situation today is different, and not by a little, but by an order of magnitude. IPOs in the tech sector are now 12 years old on average, and they've achieved greater scale from a revenue perspective (**Figures 12 and 13**). This means that many of the companies coming to public markets are fairly well capitalized and have already proven their business strategy to be viable and robust. Valuation multiples are also somewhat less stratospheric. To illustrate, the median price/sales ratio averaged 14.5x from 1996–2001 but declined to 5.3x this decade. However, this ratio did rise to 7.6x last year, its highest since 2001. This is an unfortunate and worrisome development, and yet another sign of froth in the IPO market.

Returns to IPOs: Enormous Dispersion

Today's relatively high valuations suggest a challenging environment for IPO returns going forward. While performing a comprehensive analysis of the returns to IPOs as a group is fiendishly difficult and well beyond the scope of this paper, we would like to highlight a couple observations. To begin, the mean first day return to U.S. IPOs has been positive in every single year since 1976. The average return, calculated over the last four decades, is 14% (not annualized). Unsurprisingly, the mean first day return peaked in 1999 and 2000, at 57% and 46%, respectively. More recently, 2017 printed 16% and 2018 was 19%, slightly above the historical average but nowhere near the irrational exuberance characteristic of the dot-com boom.

Next, the average three-year buy-and-hold return (calculated from the first closing price, therefore excluding the generally positive first day return) to IPOs tends to track the market. However, this average masks a number of empirical findings. Beginning with the least surprising, three-year returns to IPOs in the late-1990s dramatically underperformed the broader market. Second, over the last two decades VC-backed IPOs have, on average, performed in line with those that did not have VC backing. Next, IPOs with sales above $1 bn tend to outperform the market, while those with sales below $100 mn tend to underperform. Finally, there is enormous dispersion in returns across IPOs. Roughly 30% exhibit five-year buy-and-hold returns of less than -50%, while 25% produce returns greater than 100%. This suggests there could be significant rewards for investors who can demonstrate skill in distinguishing between losers and potential winners.

Separating the Wheat from the Chaff: How to Value the Innovation Tsunami

We have written extensively about our conceptual framework for analyzing the digital economy under the banner "Tech is the New Macro."[6] Our research suggests several points that investors need to keep in mind when analyzing unicorns and newly minted IPOs. First, many startups are spending voraciously to build up their tech infrastructure and apply sometimes hefty subsidies to develop two-sided markets. This blitzscaling implies an extended period of negative FCF, but with the aspiration of eventually becoming sufficiently FCF generative to justify the patience of their investors. However, this raises a potential contradiction for such long duration strategies: If the process of creative destruction is getting faster and faster, yet unicorns are taking longer and longer to become FCF positive, isn't there a rising probability that many will never successfully cross the finish line?

Next, although a large majority of unicorns and newly minted IPOs are unlikely to attain titan status, it is probable that a few will, and with that become extremely profitable. The meteoric success of companies such as Amazon, Google and Facebook attests to the wealth that can be created when a new dominant platform arrives on the scene. However, this happens less frequently, and its reign at the top of the food chain is much more fleeting, than many upstarts and their VC-backers would have us believe.

Additionally, unicorns often market themselves to investors simply on the basis of the numbers of customers, users or subscribers they have. It is essential to recognize that the number and growth of users is not the end game, but rather a means to an end. Value ultimately comes from cash flows, although forecasting and valuing these cash flows raises a number of challenges, especially if the business model is still evolving. While valuation first principles do not change, what does change is the information that is needed (e.g., forecasts for total addressable market, market share, customer lifetime value and client acquisition costs) and the mistakes that have to be avoided.

With that, there are two warning signals that investors need to be cognizant of when analyzing unicorns.[7] First, beware of companies that make it "all about users, all the time." It is a conspicuously dangerous sign if the entire sales pitch is about user or subscriber numbers, rather than operating results and cash flow. Companies that do not understand this have losses that scale up as the company gets bigger, and then go bankrupt with lots of users. Second, be skeptical of companies that lack transparency regarding key metrics such as client acquisition costs and renewal rates. The companies that are most opaque are typically the ones that possess business models that are not sustainable.

When it comes to unicorns and IPOs, separating the proverbial wheat from the chaff requires that investors apply a rigorous approach that is focused on the ability to produce FCF on a sustainable basis and on management's skills in capital allocation, including investing today for future value creation. Epoch has always focused on identifying companies with business models that are capable of generating sustainable FCF. That doesn't necessarily mean they need to be FCF generative from day one, but we do need to be confident that a clear and viable path does exist.

Investment Conclusions

A rising chorus of investors are warning that we are repeating the excesses of the dot-com boom. Among the arguments they cite is that nominal IPO supply is on track to set an all-time high in 2019, finally surpassing the record set in 1999. Moreover, only 15% of tech IPOs are in the black and, in some cases, the pathway to profitability is anything but clear. Further, VCs now back almost 80% of tech IPOs, similar to their level of involvement during the tech bubble.

While these are all valid reasons to remain vigilant, we believe unequivocal bears miss several key points. First, since the dot-com boom the median age of tech IPOs has risen from 4 to 12 years and the median sales of tech IPOs has increased more than threefold. In most cases these are real companies that have developed robust, viable and innovative business models and are exhibiting truly impressive sales growth. Second, most of the oft-cited excesses appear much less worrisome when expressed relative to market cap or in constant USD. Although it is undeniable that some degree of froth does exist, it is simply not in the same league as that of the late-1990s and certainly does not pose a systemic risk to equity markets.

Moreover, cynics who take a black-and-white view risk tarring all unicorns and IPOs with the same brush. This is a mistake as the historical experience suggests that a few of these companies will develop dominant platforms and become global champions, and thus amply reward the patience of their investors. Rather, it is crucial to analyze each company individually, based on its own ability to produce FCF on a sustainable basis. Although a number of the key metrics employed for valuing digital platforms are somewhat novel, the FCF principles we have been applying for years are fully relevant to startups that have not yet listed on public markets.

This paper has focused on unicorns and IPOs, but Epoch has always believed that, regardless of geography or sector, investors should focus on companies that: (a) have an ability to produce FCF on a sustainable basis; and (b) possess superior management with a proven track record of allocating capital wisely, including investing today for future value creation. We are confident that these companies are the most probable winners and the ones most likely to provide investors with the best returns. Crucially, we believe these principles are as relevant to unicorns and IPOs as they are to firms that have traded on public markets for decades.

6. Please see "Is e-Commerce a Bubble?" (Sept 2018), "When 'Bits' Meet 'Atoms'": Implications of the Second Machine Age for Corporate Profitability and Traditional Business Models" (Jan 2018), "Tech is the New Macro – Part 2" (Aug 2017) "Tech is the New Macro – Part 1" (Jun 2017).

7. See "User and Subscriber Businesses: The Good, the Bad and the Ugly!" by A. Damodaran, NYU, 2018.

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