

Global Insights



Reflections on the
Revolution in Finance



Today, economic growth and value creation depend on intangible assets that are hard to value but easy to steal. As data, proprietary technology and other intangibles have displaced physical assets as the main source of corporate value, the listing propensity of growth companies has steadily declined.

With growth businesses staying private longer, more of their total returns accrue to private rather than public investors.

Though the supply of IPOs has dwindled, as companies stay private longer, demand for IPOs among stock market investors remains as hot as ever.

REFLECTIONS ON THE REVOLUTION IN FINANCE

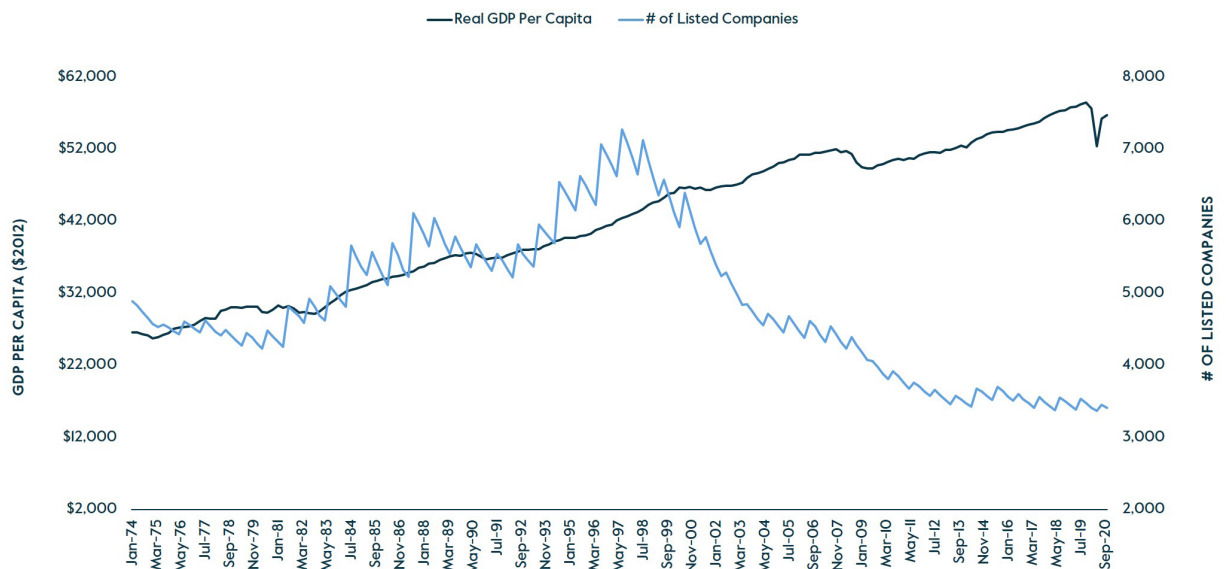
Recent high-profile fluctuations in stock prices have reignited the age-old debate about the stock market’s relationship with the real economy. Are these exchanges merely casinos where traders place bets on liquidity-driven outcomes? Or do they serve an indispensable role mobilizing savings and financing real economic activity?

The available evidence once seemed to provide overwhelming support for the latter contention. Cross-country analyses found that the richer the economy, the larger and more well-developed its stock market tended to be.¹ Robust stock trading was not just a sign of economic development but understood to be a critical contributor to its emergence, with long-run

economic growth and living standards seemingly explained, in large part, by the size, depth and liquidity of domestic stock markets.

Over the past twenty years, the stock market’s contribution to economic growth has become progressively less obvious. Rather than increase proportionally with real GDP and productivity, the number of listed companies has declined by over 50% in the U.S. (Figure 1) and several other advanced economies. Over the same period, emerging market economies, particularly in Asia, have achieved robust growth and improvement in living standards without a commensurate increase in public listings (Figure 2) or stock market liquidity.²

Figure 1. U.S. Public Listings & GDP Per Capita Diverge

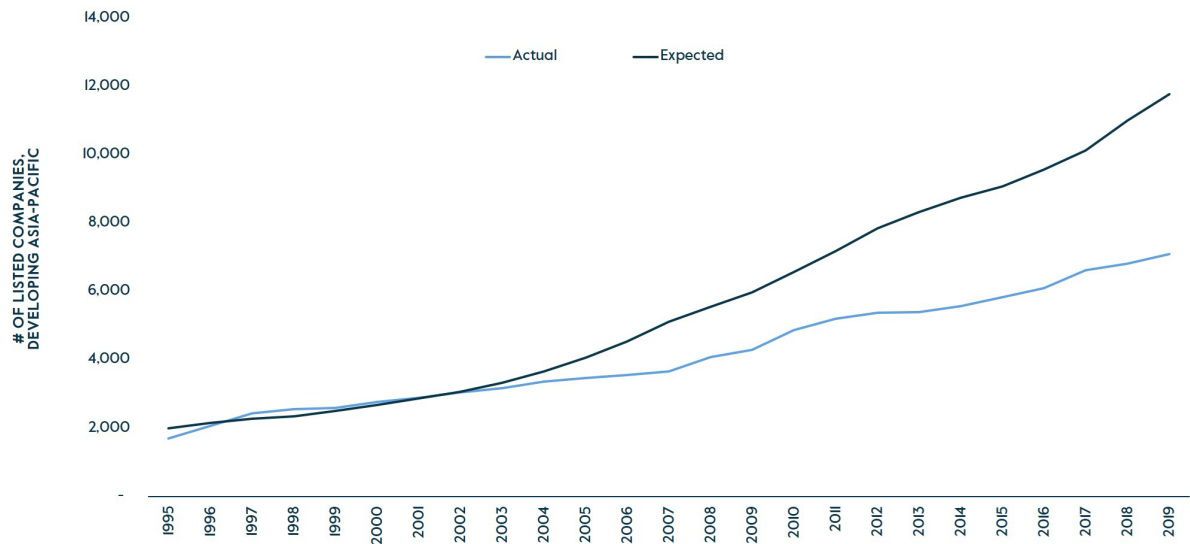


1 Levine, R. and S. Zervous. (1996), “Stock Market Development and Long-Run Growth,” *The World Bank Economic Review*.

2 Pan, L. and V. Mishra. (2018), “Stock Market Development and Economic Growth: Empirical Evidence from China,” *Economic Modeling*.

Figure 1. Source: Carlyle Analysis; CRSP, January 2021; Bureau of Economic Analysis.

Figure 2.
40% Fewer Listed Businesses in Asia Pacific than Expected Based on GDP Growth & Entrepreneurship



STOCK MARKETS FACILITATE INDUSTRIAL DEVELOPMENT...

In retrospect, it seems that the stock market’s symbiotic relationship with the real economy was not a permanent state of nature, but a feature of the industrial era. The stock market’s broadly diffused ownership model lowers businesses’ cost of capital by casting the widest possible net for savings across the economy, but also introduces information asymmetries between (outsider) owners and (insider) operators. While researchers and policymakers have devoted decades studying the ways legal regime, accounting rules and disclosure requirements could close this information gap,³ nothing matters more in this regard than the assets themselves.

Physical assets – property, plant, equipment and inventories – provide a readily ascertainable source

of value. A bookkeeper can record how much they cost and investors could estimate how much they might fetch in a liquidation. When economic activity was really just the return on these physical assets, their depreciated cost basis (i.e. book value) served as a reliable barometer of a company’s fundamental value, allowing savers to invest confidently in a business even when they lacked intimate knowledge of its management, personnel, operations or strategy. Indeed, quantitative trading strategies emerged that bought and sold stocks based on observed deviations between market and book values,⁴ implying a limited role for company-specific information beyond that contained in the statement of financial condition (Figure 3).

3 Bushman, R. and A. Smith. (2003), “Transparency, Financial Accounting Information and Corporate Governance,” Federal Reserve Bank of New York Economic Policy Review.

4 Fama, E. and K. French. (1993), “Common Return Factors in the Returns of Stocks and Bonds,” Journal of Financial Economics.

Figure 2. Source: Carlyle Analysis of WDI Database, IMF WEO Database, October 2020. There is no guarantee any trends will continue.

Figure 3.
High Market-to-Book Ratios Once a Sign of Overvaluation, Now Often a Sign of Valuable Intangible Assets

	Value Companies (Lowest Price/ Book Ratio)	"Growth" Businesses (Highest Price/Book Value)	Differential		Apple	Microsoft	Amazon	Alphabet	Facebook
1950-59	20.44%	19.57%	0.87%	Market Cap (\$B)	1,973	1,617	1,598	1,197	785
1960-69	10.42%	8.12%	2.30%	Book Value (\$B)	65.34	123.39	82.78	212.92	11773
1970-79	14.57%	1.64%	12.92%	Goodwill (\$B)	-	43.89	14.96	20.87	19.03
1980-89	23.89%	11.79%	12.10%	Other Intangible Assets (\$B)	-	6.92	0.00	1.52	0.74
1990-99	16.90%	19.94%	-3.04%	Cash (\$B)	90.94	13798	68.40	132.60	19.08
2000-09	7.65%	-3.57%	11.22%	Market-to-Book	30.2x	13.1x	19.3x	5.6x	6.7x
2010-19	8.33%	15.59%	-7.26%						
2020	-11.43%	48.29%	-59.72%						
2010-2020	6.4%	18.2%	-11.9%						

ANNUALIZED RETURNS

...BUT ARE POORLY SUITED TO FINANCE INTANGIBLE INVESTMENT

As intangible assets like proprietary technology have emerged as the main driver of economic growth and value creation, accounting data have become less informative.⁵ The most productive and highest-returning business investment today involves software, data and related algorithms, and research and development (R&D) programs.⁶ Yet, current accounting rules do not allow internally-generated intangible assets to be capitalized and recorded on the balance sheet.⁷ As a result, book value no longer serves as a reliable measure of a company's financial position and quantitative trading strategies based on industrial era notions of value have delivered negative returns over the past decade that keep getting worse (see bottom of Figure 3).

Were this simply a problem of accounting rules,

it could be easily solved. But there is no way to standardize accounting for internally-generated intangible assets; the variance in both returns and residual value is too great.

For some businesses or development programs, every \$1 of spending yields \$10 of additional enterprise value.⁸ For others, that dollar is effectively wasted as the new product, service or feature never comes to market. While some industrial-era firms made more productive use of new equipment than others, the variance in the future income associated with the purchase of a new crane or stamping press, for example, is trivially small by comparison. And the crane or stamping press can be sold to an extent that a company-specific software development project cannot.

5 Kahle, K. and R. Stulz. (2016), "Is the American Public Corporation in Trouble," NBER Working Paper 22857.
 6 Current accounting rules also require intangible investment to be expensed. If \$100 is used to purchase new industrial equipment, the accounting hit can typically be spread out over seven years. If the same money were instead used to develop proprietary software, the entire cost would subtract from operating income in the current period.
 7 Gratton, L. (2018), "The Long Journey to Understanding Intangible Assets," MIT Sloan.
 8 Saunders, A. and E. Brynjolfsson. (2016), "Valuing IT-Related Intangible Assets," MIT Quarterly.
 Figure 3. Source: Carlyle Analysis, CRSP Data, January 2021. There is no guarantee any trends will continue.

Valuing R&D, brands, business methods, digital platforms, and proprietary technology takes time and requires large amounts of information. But these intangible assets are not only harder to value than plant and equipment but also easier to steal (Figure 4). Until digital businesses or biotech firms reach a requisite scale, regulatory approval or user base, the more information they publicly disclose about their proprietary technology, platform or strategy, the greater the risk that competitors or would-be competitors gain access to sensitive information and expropriate the opportunity. This risk is especially great today given the widespread use of natural

language processing and computational linguistics to monitor the content of public disclosures in search of competitive advantage.⁹

As with the accounting rules, the problem here is not the law but the economics. A disclosure regime that allows digital businesses to keep all sensitive details private would leave prospective investors with a black box to which few would be willing to allocate capital. Stock markets present digital businesses with a catch-22: disclose nothing and fail to secure necessary funding, or disclose too much and provide a template for rivals to steal your ideas.

Figure 4.

Digital Transformation Breaks Stock Market-Real Economy Nexus

ASSETS MORE DIFFICULT TO VALUE

Industrial age:

- Company value based on fixed assets (property, plant & equipment), all of which accounted for on balance sheet.
- PP&E easy to value through modest adjustments to carrying value
- Investments in PP&E can be depreciated, easing earnings impact of new investment

Digital Age:

- Company value based on internally-generated intangible assets, which cannot be capitalized & recorded on balance sheets.
- R&D & proprietary technology difficult to value; significant variation in returns to the same inputs
- R&D outlays expensed, reducing operating income relative to investment in fixed (tangible) assets

ASSETS EASIER TO STEAL

Industrial age:

- Public disclosures unproblematic: Company sees no competitive threat from disclosing the existence of fixed assets (property, plant & equipment) that do not allow for simultaneous or rivalrous use and cannot be stolen
- PP&E create barriers to entry & scale advantages
- Proprietary production processes & techniques boost productivity at the margin

Digital Age:

- Company value based on ideas, proprietary technology, algorithms, digital platforms, etc., the details of which the company may wish to conceal from the public until it attains requisite scale
- Scale comes from user base & network effects: nearly infinite scalability of platforms as revenue grows with little incremental investment
- S-1, IO-K, IO-Q, 8-K public filings allow competitors & would-be competitors to replicate processes & enter markets

9 Kankanhalli, G. et al. (2019), "Speech Is Silver, but Silence Is Golden: Information Suppression and the Promotion of Innovation," American Finance Association Annual Meetings.

DECLINE IN IPOS & LISTING PROPENSITY

As physical assets and related capex have been displaced by intangible investment, the listing propensity of growth companies has steadily declined (Figure 5). At the late-1990s public market peak, roughly two of every five businesses with 500 or more employees were public; last year, just one-in-seven opted for a public listing, a -63% decline. Over the same period, the total number of IPOs of operating businesses has dropped by -75% on a five-year moving average basis (Figure 5).

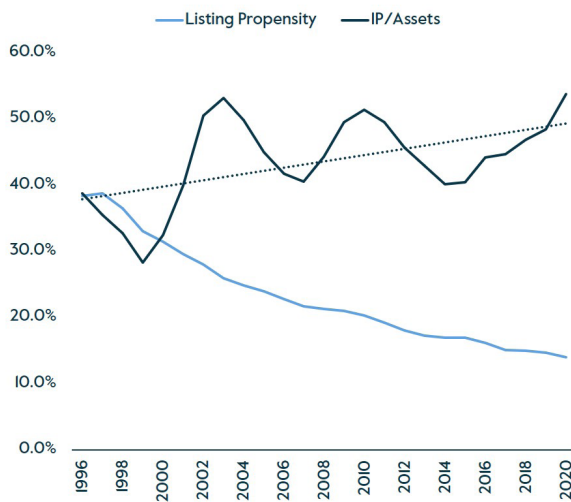
As broadly diffused ownership structures have proved to be poorly suited for funding digital assets, more capital formation has gravitated to private markets.¹⁰ Private investors sign confidentiality agreements that allow them to learn everything they need to value the

business' intangible assets, while also protecting the entrepreneur from unwanted disclosures.

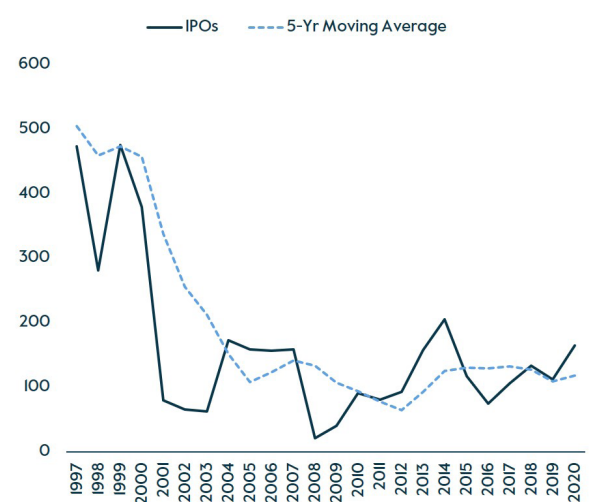
This trend is evident in the changing characteristics of both stock market constituents and private equity deals. The typical public company is now nearly 3x larger (in real terms) and 50% older than was the case twenty years ago (Figure 6). These more mature businesses are far more likely to send cash back to shareholders rather than require additional capital; in recent years, stock repurchases have exceeded new issuance by nearly \$800 billion annually (Figure 7). At the same time, the total dollars invested in private companies – including secondary buyouts – has risen 6x and accounted for more than 60% of the increase in private equity assets under management (Figure 8).

Figure 5.
Public Listings Decline with Digitization

LISTING PROPENSITY FOR MIDCAP BUSINESSES



U.S. IPOS OF OPERATING BUSINESSES



¹⁰ Stulz, R. (2020), "Public Versus Private Equity," Oxford Review of Economic Policy.
Figure 5. Source: Carlyle Analysis of Federal Reserve Data; U.S. Census Bureau, December 2020. Jay Ritter, IPO Data, University of Florida, February 2021.

Figure 6.
Listed Stocks Now Skew Towards Larger, More Mature Companies

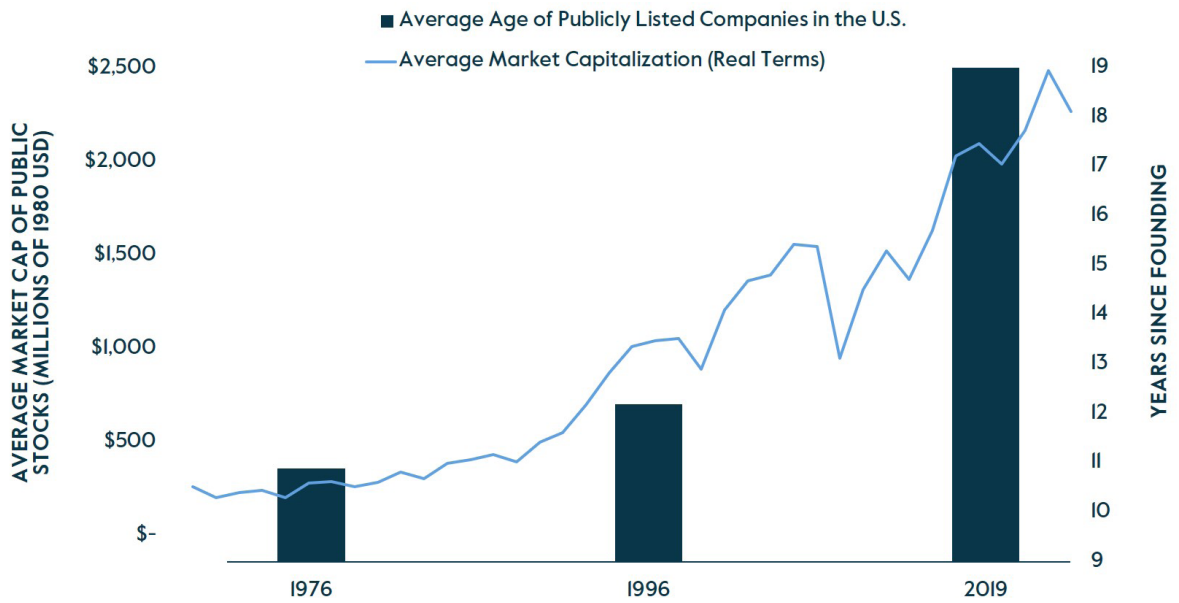


Figure 7.
Stock Repurchases Exceed New Issuance, on Net, by Nearly \$800bn Annually

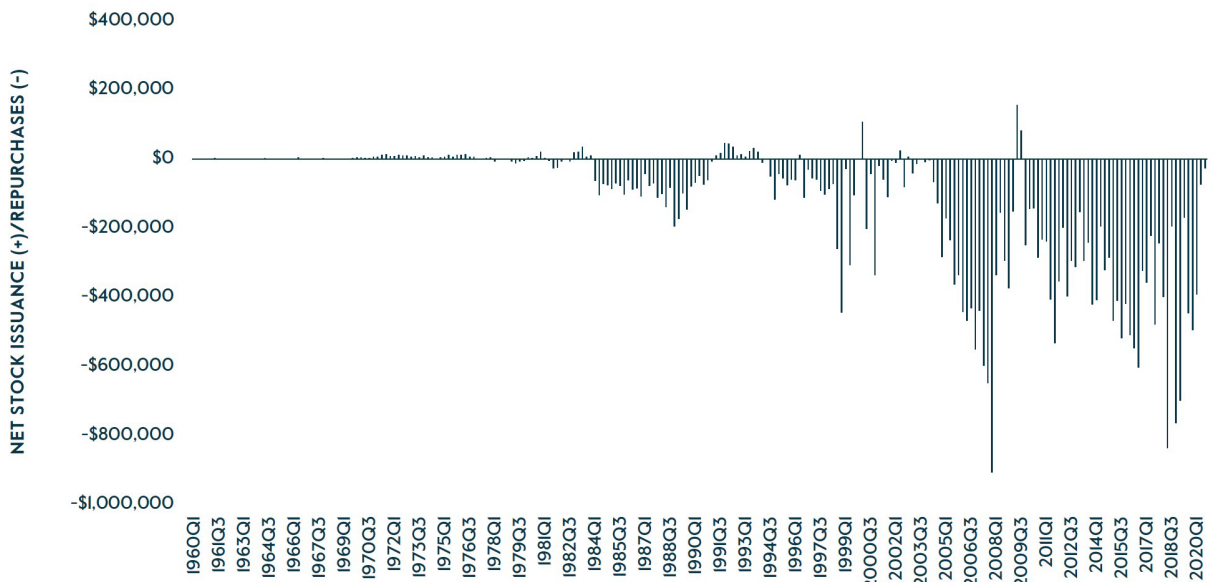
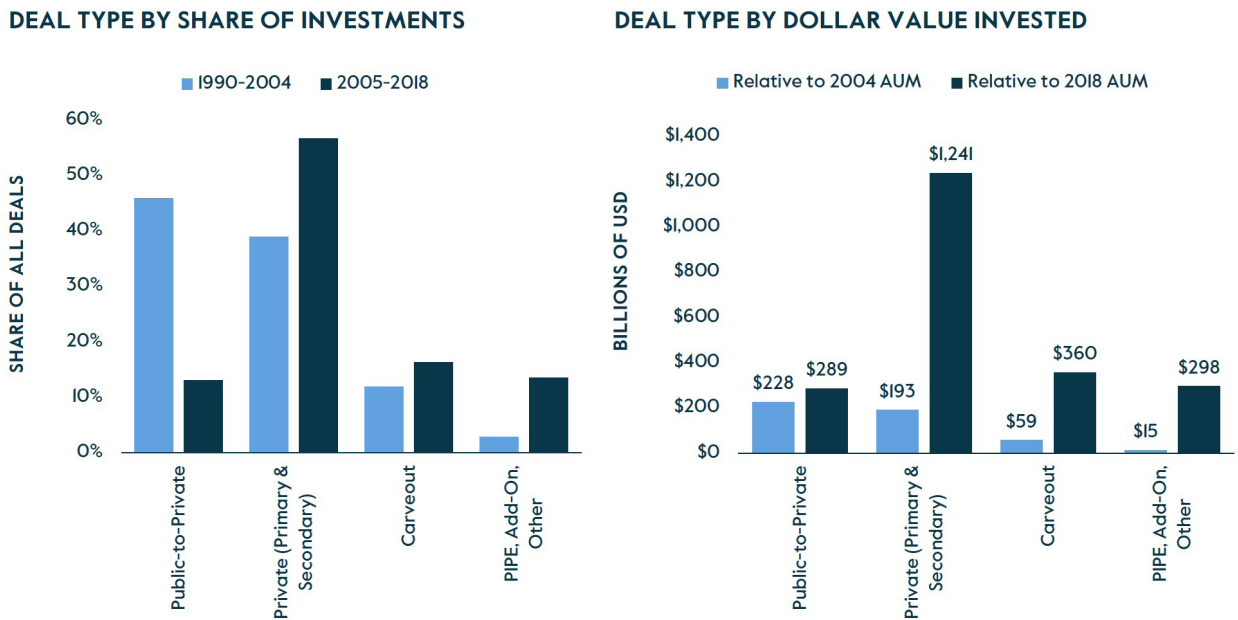


Figure 6. Source: Carlyle; WDI; U.S. Bureau of Labor Statistics; Morgan Stanley, August 2020; Bartram, Brown, and Stulz, (2018), "Why has Idiosyncratic Risk been Historically Low in Recent Years?" Dice Center for Research in Financial Economics. There is no guarantee these trends will continue.

Figure 7. Source: Federal Reserve Board of Governors, F. 103, December 2020.

Figure 8.
Changing Nature of PE Deals, 1990-2018



NEW DEMOGRAPHY OF GROWTH CAPITAL

Twenty years ago, it was typical for successful venture-backed businesses or other start-ups to IPO within three-to-five years.¹¹ Today, IPOs typically occur ten or more years after company founding as digital businesses obtain funding through private rounds, strategic partnerships or partial or full buyouts. Successful startups are more likely to remain private 12 years after their founding than to go public within their first three (Figure 9).

As growth businesses stay private longer, more of their total returns accrue to private rather than public investors. Consider that the typical business involved in a tech IPO last year was 17x larger, in terms of trailing twelve months' revenues, than had been the case

in 2000 (\$202 million vs \$12 million).¹² Among private companies that went public over the past five years with a valuation \$1 billion or more, median cash-on-cash returns for private investors were 6.7x relative to just 1.1x for public investors.¹³ While part of this reflects the shorter time horizon under public ownership, growth rates also tend to slow with company age. A stylized company lifecycle based on these data would imply that private investors capture roughly 80% of total value generated, roughly double their share from the pre-2005 period (Figure 10).

As of 2020, there were 464 private companies globally with valuations in excess of \$1 billion, a 3x increase from the 140 "unicorns" in existence just five years earlier (Figure 11).

11 Brown, Keith C., Wiles, Kenneth W. (2020), "The Growing Blessing of Unicorns: The Changing Nature of the Market for Privately Funded Companies," Journal of Applied Corporate Finance.

12 Ritter, J. (2021), "Initial Public Offerings: Updated Statistics," University of Florida.

13 Brown and Wiles (2020).

Figure 8. Source: Presented for illustrative purposes only. Josh Lerner, Harvard Business School, Global Preqin Data, June 2019, Carlyle Analysis of Portfolio Data. There is no guarantee these trends will continue.

Figure 9.
Growth Businesses Go Public Later in Digital Era

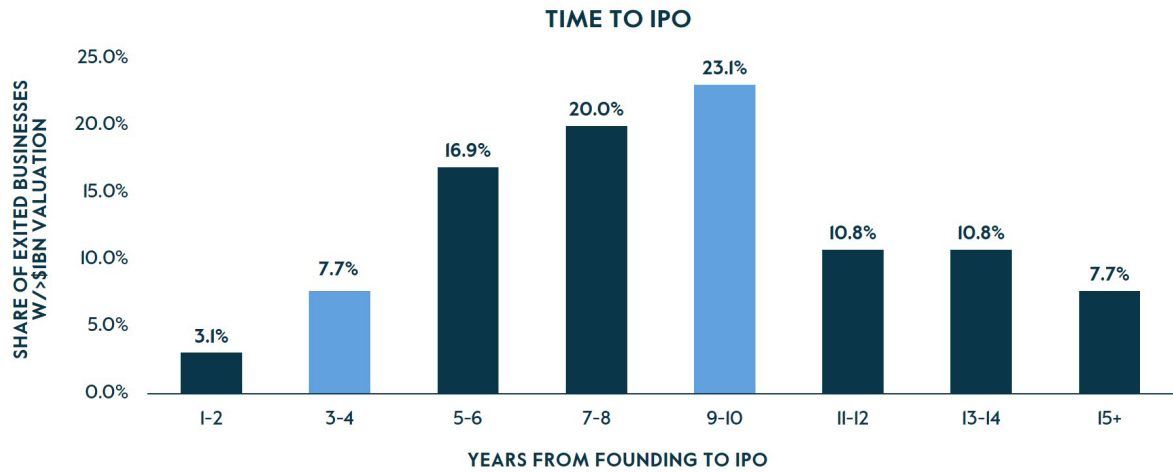


Figure 10.
With Companies Staying Private Longer, Most (~80%) of the Value Creation Accrues to Private Investors

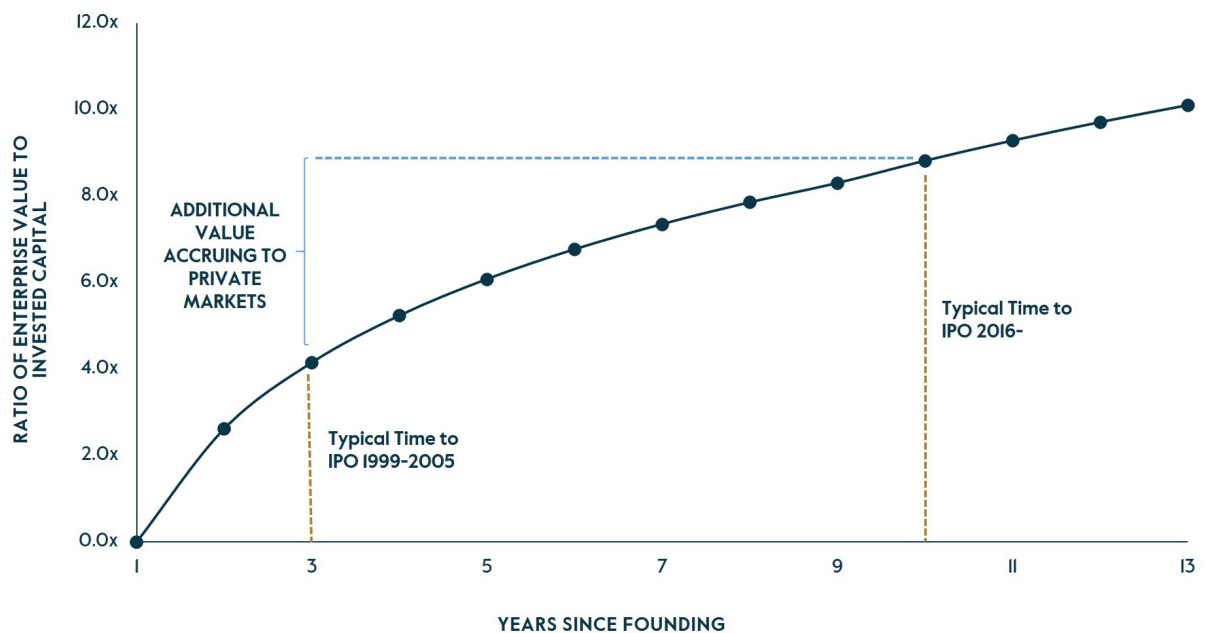


Figure 9. Source: Carlyle Analysis; Brown, Keith C., Wiles, Kenneth W., "The Growing Blessing of Unicorns: The Changing Nature of the Market for Privately Funded Companies," Journal of Applied Corporate Finance, 2020. There is no guarantee any trends will continue.

Figure 10. Source: Carlyle Analysis; Brown, Keith C., Wiles, Kenneth W., "The Growing Blessing of Unicorns: The Changing Nature of the Market for Privately Funded Companies," Journal of Applied Corporate Finance, 2020. There is no guarantee any trends will continue.

Asia's share of such businesses has nearly doubled over this period thanks to a 5.3x increase in China and 4.8x growth elsewhere in the region, especially India where eight additional private businesses exceeded \$1 billion valuations last year.¹⁴ As with internet-based businesses and mega-cap technology stocks, businesses based in the U.S. and China dominate the global market for growth capital, accounting for 73% of unicorns and total capital deployed.

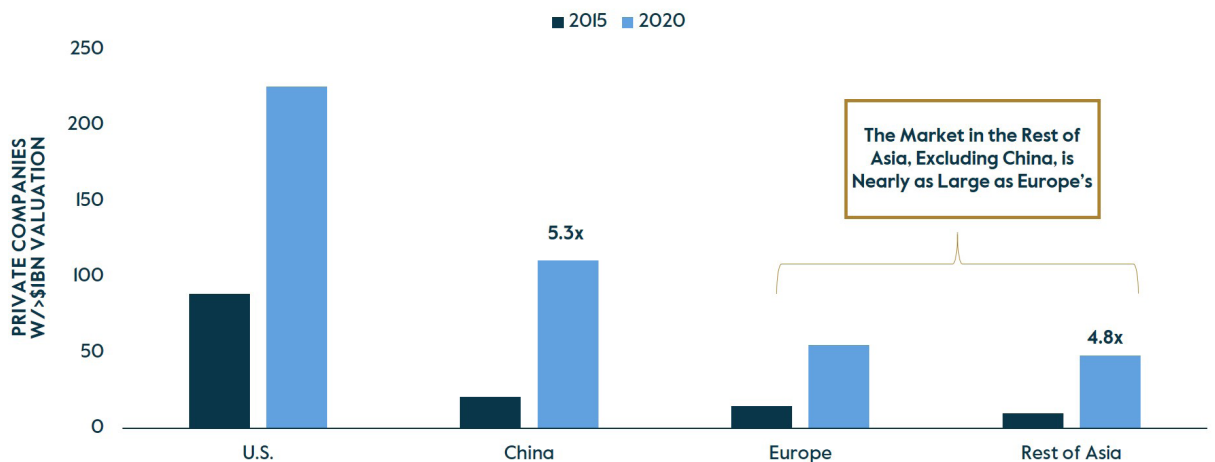
DO NOT CONFUSE THE PUBLIC MARKETS' HEAT FOR HEALTH

Though the supply of IPOs has dwindled, as companies stay private longer, demand for IPOs among stock market investors remains as hot as ever. Digital businesses that have scaled their user base or revenues to a level where public disclosures no longer pose an existential threat can typically sell shares at huge premiums to private valuations. In 2020, private markets valued fast-growing technology businesses at roughly 7x trailing sales, on average – an extremely

high multiple that many observers feared was a sign of a private market bubble. Yet, this was nothing compared to what stock market investors were willing to pay for comparable assets. In 2020, the median tech IPO was priced at 13.4x trailing sales and traded up by an average of 76% on its first day to close at 23.3x sales.¹⁵ Overall, public markets have priced recent unicorn IPOs at roughly 3x their last private valuation since the start of 2020 (Figures 12 and 13).

The strong demand for IPOs in 2020 was also reflected in the 4x rise in special purpose acquisition companies (SPACs), shell companies that raise IPO proceeds to fund the acquisition of a yet-to-be-identified company within two years. SPACs outnumbered traditional IPOs by 50% and raised 34% more capital last year (Figure 14). Though these SPACs will compete with private investors for potential targets, their rise is probably the clearest evidence of the current market disjunction, as stock markets continue to command the lion's share of capital even as growth opportunities have shifted decisively to private markets.

Figure 11.
Asia Home to Nearly 40% of Private Companies worth >\$1b, Nearly Double its Share from Five Years Ago



14 Quartz, November 25, 2020.

15 Ritter (2021).

Figure 11. Source: Brown, Keith C., Wiles, Kenneth W., "The Growing Blessing of Unicorns: The Changing Nature of the Market for Privately Funded Companies," Journal of Applied Corporate Finance, 2020. There is no guarantee any trends will continue.

Figure 12. Companies that Go Public Do So at Significantly Higher Valuations, On Average

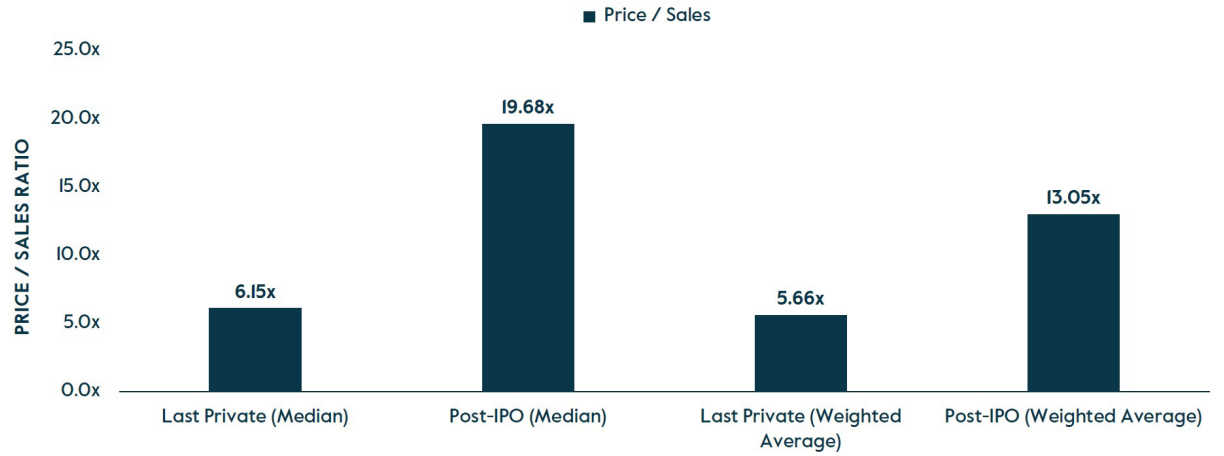


Figure 13. Returns to Unicorn IPOs

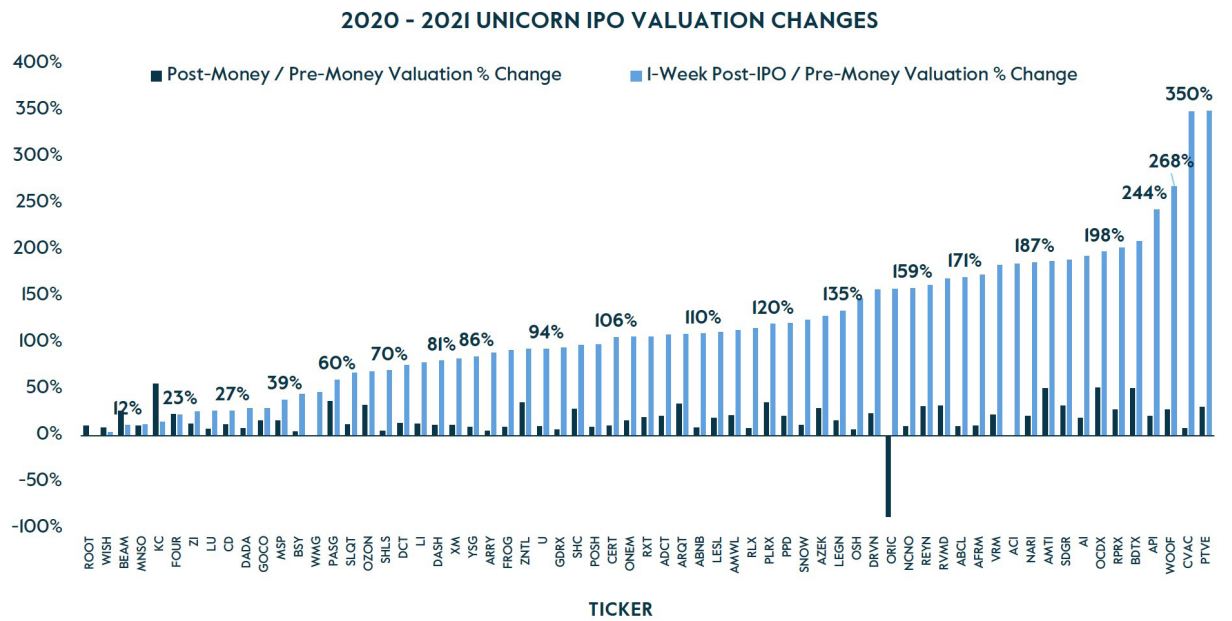


Figure 12. Source: Carlyle; PitchBook; S&P Capital IQ; February 2021. Data pertains to select 2020 and early 2021 unicorn IPOs through January 31.
 Figure 13. Source: Carlyle; PitchBook; S&P Capital IQ; February 2021. Data pertains to select 2020 and early 2021 unicorn IPOs through January 31.

Figure 14.
SPACs Rise as a Share of IPOs and Proceeds

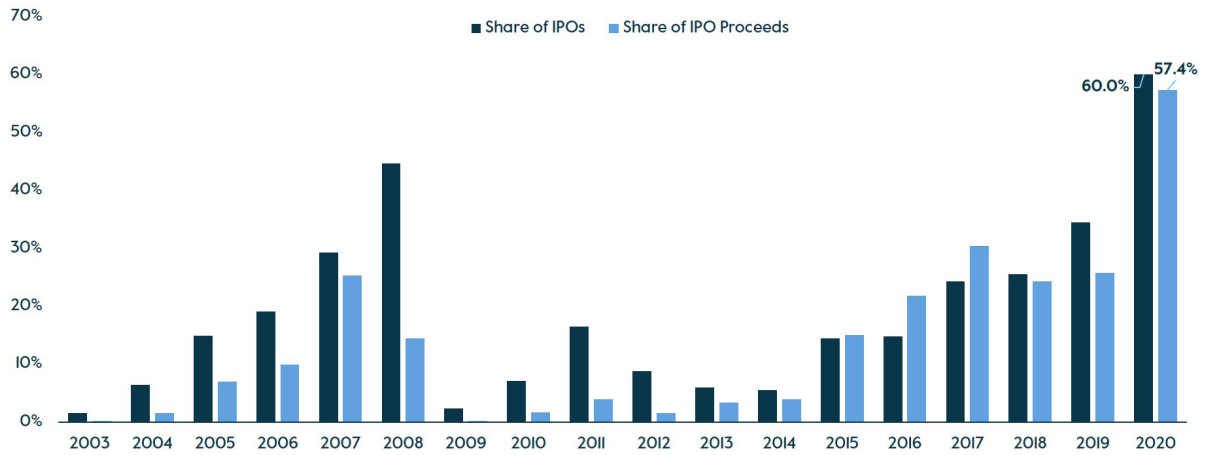


Figure 15.
Infinite Scalability of Intangible Assets: Top Fifth of Businesses Earn 10x More than the Median Company

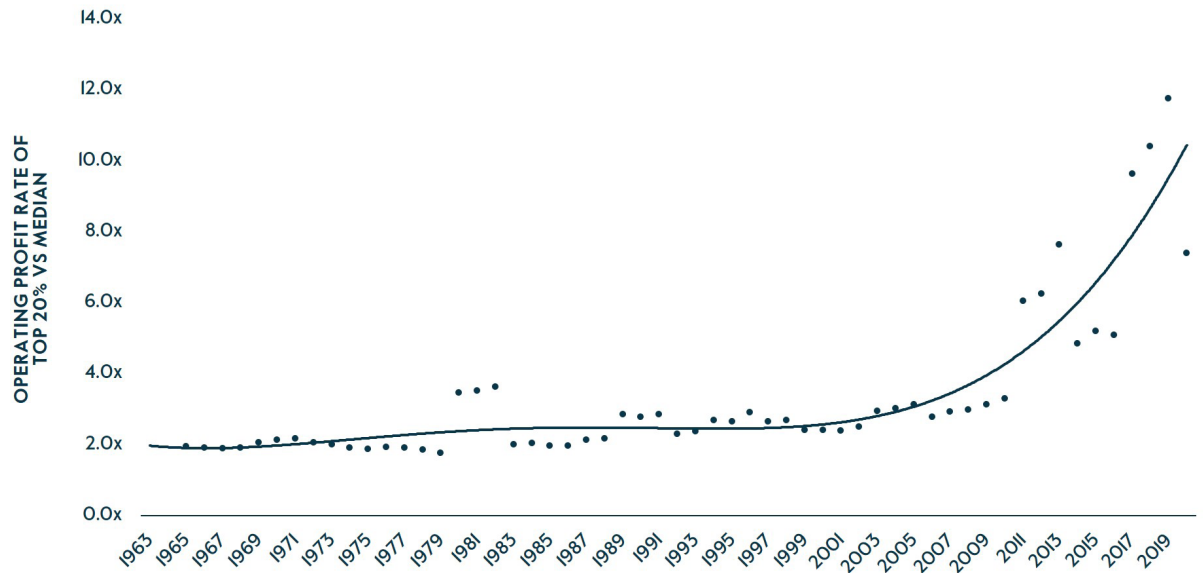


Figure 14. Source: Jay Ritter, IPO Data, University of Florida, February 2021. SPAC Data, February 2021.
Figure 15. Source: Carlyle Analysis of CRSP Data, November 2020.

CONCLUSION

The symbiosis between the stock market and real economy was not a permanent state of nature, but a feature of the industrial epoch, where capital was the key constraint on growth and physical assets provided a clear and conspicuous measure of fundamental value. Today, economic growth and value creation depend on intangible assets that are hard to value but easy to steal. As a result, the bulk of global capital formation occurs in private markets where confidentiality agreements allow intangible assets to be valued in transactions that do not introduce the same risks of expropriation.

The stock market is not dead, of course. It continues to attract the lion's share of global capital flows, offers attractive exit opportunities and remains the largest determinant of household and business net worth.¹⁶ But myriad signs of a disconnect between the stock market and real economy should not be viewed as an aberration, but a potential fact of life in a digital age where earnings scale nonlinearly and “fundamental” values are much harder to ascertain (Figure I5).

¹⁶ Federal Reserve, B. 104 when adding pension funds and mutual fund shares to direct corporate equity holdings the sum far exceeds the market value of the housing stock.

Jason Thomas

HEAD OF GLOBAL RESEARCH

jason.thomas@carlyle.com / (202) 729-5420

Jason Thomas is the Head of Global Research at The Carlyle Group, focusing on economic and statistical analysis of Carlyle portfolio data, asset prices and broader trends in the global economy. He is based in Washington, DC.

Mr. Thomas serves as Economic Adviser to the firm's Global Private Equity and Global Credit Investment Committees. His research helps to identify new investment opportunities, advance strategic initiatives and corporate development, and support Carlyle investors.

Prior to joining Carlyle, Mr. Thomas was Vice President, Research at the Private Equity Council. Prior to that, he served on the White House staff as Special Assistant to the President and Director for Policy Development at the National Economic Council. In this capacity, Mr. Thomas served as primary adviser to the President for public finance.

Mr. Thomas received a BA from Claremont McKenna College and an MS and PhD in finance from George Washington University, where he studied as a Bank of America Foundation, Leo and Lillian Goodwin Foundation, and School of Business Fellow. Mr. Thomas has earned the chartered financial analyst designation and is a Financial Risk Manager certified by the Global Association of Risk Professionals.