The Invesco White Paper Series



The case for venture capital

The past decade has witnessed an explosion in technology-based innovation, turning established industries on their heads, producing hundreds of billion dollar companies, so-called "unicorns," and boosting interest in private technology investment. Uber was founded in 2009 and is currently valued at \$68 billion. Airbnb was started in 2008 and last raised funding at a \$25.5 billion valuation. The ubiquity of smartphones and an evolution in cloud computing and storage has created a fertile ground for starting and building companies, and entrepreneurs have capitalized on these trends.

In 2011, Marc Andreesen famously said "software is eating the world," and there is little doubt this phenomenon of technology disrupting all industries is continuing to develop. Sectors previously seen as impossible to disrupt or disintermediate due to capital intensity or regulatory dynamics have increasingly become targeted by startups and consequently venture capital. Technology is changing industries as disparate and intransigent as financial services, healthcare, education, and transportation and logistics, opening up vast new markets for venture capital investment, and spawning hundreds of billion dollar businesses.

Meanwhile, top quartile performance for venture capital has outpaced that of other asset classes (see Figure 1, below). Limited partners (LPs) who had abandoned venture capital after the bursting of the NASDAQ bubble in 2000 have slowly been returning to the asset class. Even non-traditional investors like mutual funds, hedge funds, and sovereign wealth funds have taken note. As companies remain private longer due to the burdens of being a public company, more of the value is being captured before going public and these investors are increasingly participating directly in later stage private rounds.

Yet venture capital remains opaque for many. Investors may use technology daily and recognize its transformative nature and potential to produce outsized returns, but they struggle to understand venture capital and how to participate in it as an asset class. Ignoring venture capital is a potential missed opportunity. Long a staple of some of the most sophisticated institutional portfolios, prudent exposure to venture capital has the potential to provide meaningful accretion to any asset allocation. Achieving this upside requires access to premier managers and careful portfolio construction.

Strong historical performance

Venture capital (VC) involves investment in startup companies which are traditionally high growth and often technology-centric. A venture-backed company will typically raise multiple rounds of financing before reaching an exit, which is often either in the form of a sale to a larger incumbent or through an initial public offering (IPO). As an asset class, venture capital has the potential to provide significant alpha to a portfolio and therefore has been a fixture in sophisticated institutional investor portfolios for years.

Venture capital investment can be an attractive addition to most diversified portfolios. Because a venture firm's underlying investments are in nascent companies, often with new business models or algorithms, venture capital is inherently risky and illiquid. Investors therefore need to be compensated by higher potential returns.

Top quartile absolute returns for venture capital have historically exceeded those for other asset classes. In particular, when one compares the top quartile of managers across any time horizon shown below, venture capital has dramatically outperformed.²

Figure 1: Historically	outsized re	eturns (%)
Top quartile		

Asset	5-year	10-year	15-year	20-year	25-year
Venture capital	48	38	29	92	57
Private equity	25	22	27	31	31
Real estate	27	24	26	24	24
Large-cap equity	12	7	5	8	10
High yield bonds	5	6	7	6	8
Aggregate core bond	4	5	5	5	6

Source: Cambridge Associates Global Venture Capital, Global Private Equity, and Global Real Estate Benchmarks Return Report. Private equity asset class excludes venture capital. 5-, 10-, 15-, 20-, and 25-year returns representative of average pooled IRR for vintages dating back from 2014. Top quartile returns for all asset classes shown. Large-cap equity proxy is Lipper aggregated US large-cap equity fund performance. High yield bond proxy is Lipper aggregated high yield bond fund performance. Aggregate core bond proxy is Lipper aggregated core bond fund performance. Returns as of Dec. 31, 2015. Sample size for each asset listed is as follows: venture capital: 91-440; private equity: 174-630; real estate: 71-207; large-cap equity: 62-674; high yield bonds: 30-421; and aggregate core bond: 22-385. Past performance is not a guarantee of future results.

Moreover, investors are able to diversify away much of the idiosyncratic risk through investment in a portfolio of venture funds (which in turn have a portfolio of underlying company investments). For instance, a fund-of-funds can be a potential way to benefit from the additional alpha generated by venture capital without some of the associated volatility.

Beyond generating additional alpha, venture capital can provide diversification benefits to an overall asset allocation as well. Despite being a pro-cyclical asset class, venture capital has exhibited low to moderate correlations with other asset classes. Although some of the effect can be attributed to the lack of daily pricing for venture, these correlations likely also stem from the long-term nature of the asset class and the influence on performance of technology.

Figure 2: Modest correlation with other asset classes

Correlation among asset classes' quarterly returns

	Venture capital	Private equity	Real estate	Large-cap equity	High yield bonds	Aggregate core bond
Venture capital	1.00	0.71	0.69	-0.06	-0.13	-0.13
Private equity	0.71	1.00	0.65	0.46	0.33	-0.06
Real estate	0.69	0.65	1.00	0.13	0.03	-0.11
Large-cap equity	-0.06	0.46	0.13	1.00	0.73	0.13
High yield bonds	-0.13	0.33	0.03	0.73	1.00	0.35
Aggregate core bond	-0.13	-0.06	-0.11	0.13	0.35	1.00

Source: Cambridge Associates Global Venture Capital, Global Private Equity, and Global Real Estate Benchmarks Return Report. Venture capital, private equity and real estate data from Cambridge Associates. Private equity asset class excludes venture capital. Large-cap equity proxy is Lipper aggregated US large-cap equity fund performance. High yield bond proxy is Lipper aggregated high yield bond fund performance. Aggregated core bond proxy is Lipper aggregated core bond fund performance. Returns for period dating 1990-2014, as of Dec. 31, 2015. Sample size for each asset listed is as follows: venture capital: 771; private equity: 932; real estate: 309; large-cap equity: 674; high yield bonds: 421; and aggregate core bond: 385. Past performance is not a guarantee of future results.

Thus, venture capital can improve both the risk and return profiles of a portfolio; however, given the long-term nature, it is difficult to time the venture market. Some of the best vintages for venture were 2004-2008, after many investors had abandoned the asset class due to the poor returns of earlier vintages following the bursting of the technology bubble. In addition to making lucrative investments in the newly out-of-favor internet sector, funds raised in this period tended to be more appropriately sized and often maintained a more dedicated focus on early stage investing, both potential recipes for success. Maintaining consistent exposure can be crucial to a successful venture program and realizing outsized returns.

Endowment model

Endowments are often considered among the most sophisticated of institutional investors and have been among some of the more successful investors in venture capital.³ They were some of the first to understand the positive impact a well-crafted venture program can have on a portfolio's return. Many have been consistent investors in the asset class since the 1960s and remain the most ardent supporters today. As a result, they often have some of the best access to high-quality funds.

Figure 3: Endowment asset allocations
Detailed asset allocations for fiscal year 2015 (%)

	Total institutions 812	Over \$1B 94	\$501M- \$1B 77	\$101- \$500M 261	\$51- \$100M 167	\$25- \$50M 117	Under \$25M 96
Domestic equities	16	13	21	27	33	40	42
Fixed income	9	7	9	13	17	20	24
International equities	19	19	20	21	20	18	15
Alternative strategies	52	57	44	34	25	16	11
Private equity	10	12	7	5	3	2	0
Marketable alternatives	20	21	22	17	13	8	7
Venture capital	5	7	3	1	1	0	0
Private equity real estate	6	7	4	3	2	2	0
Energy	6	6	4	3	2	1	1
Commodities and managed futures	1	1	1	1	1	1	1
Distressed debt	2	2	1	1	0	0	0
Alternatives not broken out	2	1	2	3	3	2	2
Short-term/other	4	4	6	5	5	6	8
Short-term securities/cash	3	2	4	3	3	4	4
Other	1	1	2	2	1	2	3
Short-term not broken out	0	1	0	0	1	0	1

Source: NACUBO-Commonfund Study of Endowments®, 2015. NACUBO, www.nacubo.org.

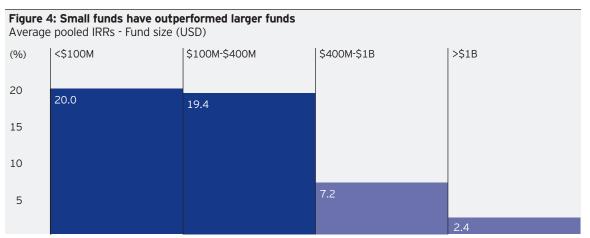
The average endowment committed 5% to venture capital in 2015, but the larger the size of the endowment, typically the greater the allocation. One of the more long-standing (and successful) endowment investors in venture capital is the Yale Endowment. Yale began its venture capital program in 1976 and has achieved a 33.8% annualized IRR since inception. They have steadily increased their allocation to venture capital over the past few years and it now exceeds 16% of their total \$25.6 billion endowment in 2015, up from 10% in 2011.

Other large investors, such as state pension funds and sovereign wealth funds, have increased their allocations to venture capital where viable, but are often constrained by their large investment check size and an inability to access top managers.

Size: Performance bias

Despite the relatively high top quartile returns that venture capital has experienced as an asset class, performance tends to be biased towards certain pockets of the market. Unlike other alternative asset classes like private equity and real estate, venture capital does not scale effectively. Once a venture capital fund grows beyond \$400-500 million in size, performance often begins to suffer.⁵ It is challenging for firms managing large pools of capital to achieve venture-type returns when the majority of exit outcomes occur at relatively modest valuations. In 2015, the median exit valuation was \$121 million, representing a decline of almost 14% from 2014 levels.⁶ Large firms are either forced to invest in more companies or more typically invest more dollars in each company. The former dilutes returns and reduces the amount of time a partner can dedicate to helping each company. The latter inevitably pushes a fund's dollar-weighted capital into larger, later stage rounds at higher pre-money valuations. Moderately-sized funds are in a better position to participate in prudently-sized rounds and are therefore uniquely suited to potentially generate consistent, strong returns.

In addition, due to the lean startup method as well as developments in cloud computing and coworking space, the cost of getting a company off the ground has never been lower. As a result, the requisite initial investment from VCs is smaller and appropriate early stage fund sizes are smaller. Finally, similar to all alternative investment vehicles, as funds scale, managers are reaping significant sums off management fee income and are less incentivized by carried interest. This alters the alignment of interest between General partner (GP) and LP.

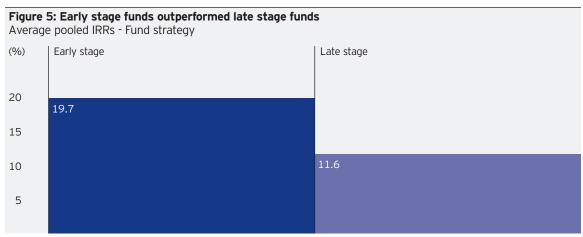


Source: Preqin Global Venture Performance as of Dec. 31, 2015, inclusive of all available vintage years dating from 1969-2015. Sample size for <\$100M is 532; \$100M-\$400M is 365; \$400M-\$1B is 111; and >\$1B is 20. Past performance is not a guarantee of future results.

Unfortunately, many investors are compelled to invest in larger vehicles to get allocations that are meaningful given the size of their plans. High-quality, smaller funds often have limited capacity as well, further forcing investors upstream.

Stage: Performance bias

While related to fund size, investment stage is an important and at times independent determinant of venture capital strategy and performance. Venture capital funds range in strategy from "micro VCs" which focus on the seed stage, to traditional early stage firms which initially invest in Series A and B rounds through to lifecycle, and finally late stage vehicles, which invest the bulk of their capital in Series C rounds or later. Late stage investors are particularly exposed to the potential for down rounds as they're more reliant on less frequent, outsized realizations in order to achieve similar returns to early stage investors. Unsurprisingly, given the risk profile of the underlying companies, early stage funds outperformed later stage funds by a fairly wide margin, roughly 800 basis points per year dating back to 1969.⁷



Source: Cambridge Associates Global Venture by Strategy, as of Dec. 31, 2015, inclusive of all available vintage years dating from 1981-2015. Early stage data represents 1,278 funds and late stage data represents 214 funds. Past performance is not a guarantee of future results

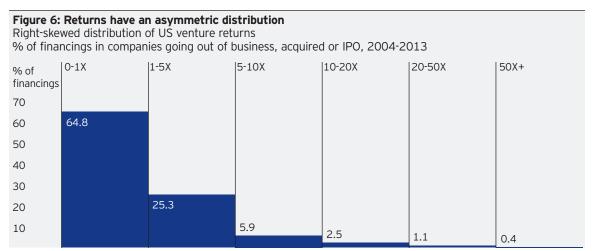
Although the standard deviation of early stage funds is higher, much of this excess risk can be mitigated through diversification. A single early stage venture capital fund will typically have 25-75 portfolio companies. A portfolio of early stage funds could have as many as 500 underlying portfolio companies, alleviating much of the diversifiable, company-specific risk, while maintaining the potential for outperformance.

The opportunity with small and early stage managers is evident, yet many LPs continue pouring money into large, late stage focused vehicles, compounding the problem, or withdrawing from the asset class entirely. However, even those LPs which attempt to invest in smaller, earlier stage funds struggle to do so effectively. They simply cannot access the best early stage managers. As a result, we believe that many sophisticated investors which traditionally eschew fund-of-funds on the private equity side should recognize the value of a fund-of-funds for venture capital.

Access is everything

Top quartile performance in venture has been outstanding. Moreover, the disparity between the top quartile and bottom quartile is greater in venture capital than in any other asset class. The difference between the top quartile and median in venture is larger as well.8 In fact, "since 2000, the average VC fund has underperformed public markets by about 5% over the life of the fund."9 Investing with just any venture firm contains the same risk, but may not yield the exceptional results that make the asset class attractive.

To be successful in venture capital, it is imperative to access the best managers. Unlike most other asset classes, which follow a normal return distribution, venture return distributions tend to be skewed, with a small number of managers generating a disproportionate amount of the returns.



Source: Seth Levine, "Venture Outcomes are Even More Skewed Than You Think," www.sethlevine.com, Aug. 12, 2014. Past performance is not a guarantee of future results.

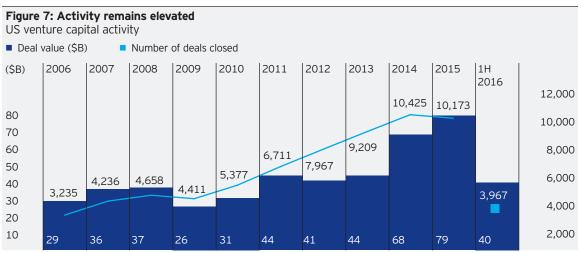
This phenomenon is driven by the outsized outcomes produced by the best venture-backed startups. For instance, Accel Partner's \$12 million investment in Facebook produced \$6 billion in gains for the fund. This is compounded by the tendency for the top venture capital funds to gain access to a disproportionate number of the best outcomes in any given vintage. The most talented founders often have a choice from whom they raise capital. Many of them value the right VC partner (whether an individual or a firm) over the terms of the round, leading to the best VCs continuing to receive the best deal flow. This phenomenon can often lead to another unique dynamic of venture capital – persistence of performance.

Most traditional asset classes, which are focused on publicly-traded, fairly efficient markets tend to exhibit mean reversion (or regression). Even top mutual funds rarely outperform the benchmark over an extended period of time. For example, the vast majority of US mutual funds underperformed over the last decade. Venture capital performance, however, has tended to be persistent. In other words, if a fund has been top quartile in one vintage, there is a higher likelihood that their next fund will beat the benchmark as well. Again, this is attributed to the ability of entrepreneurs to choose their partners. These entrepreneurs will seek out individuals and firms who have been involved with prior successful, often high-profile outcomes. Accessing these top managers is challenging for investors.

Perhaps less appreciated, the cohort of established venture capital firms is complemented in any given vintage by new, emerging funds employing innovative strategies. According to Cambridge Associates, the 10-year period from 2004-2014 saw emerging managers capture upwards of 40%-70% of the total returns for the asset class. Dedicated exposure is crucial in order for investors to capture these returns. Some of these funds will become the new top-tier venture managers and it is imperative to both identify and access them early. Investing merely with the old vanguard of venture firms will cause LPs to miss out on the full spectrum of outsized returns, as well as the potential ability to invest with emerging top performers later on.

Current environment

Venture capital has enjoyed strong performance over the past 5-10 years, leading to increased fundraising and investment activity.¹⁴



Source: Q2 2016 PitchBook US Venture Industry Report, PitchBook Data, Inc.

Although investment activity has slowed over the past year, it remains elevated compared to levels throughout most of the past decade, leading many industry observers to strike a cautionary tone. Much of this capital in recent years has flowed into larger, later stage-focused investment vehicles. This has been compounded by many new, non-traditional entrants (such as asset managers like Fidelity and T Rowe Price) into the market, thereby causing most of the froth in the system to be confined to later stage and pre-IPO rounds. As a result, while early stage pre-money valuations have remained relatively stable over the past decade (through 2014), increasing a total of 230% (for a CAGR of 8% per year), late stage pre-money valuations have inflated 640% over the same time period. 15

A significant correction in public markets and private valuations or a dramatic rise in interest rates will lead to a temporary pullback in private investment, particularly among new entrants. Indeed, the past 9-12 months has witnessed a correction in all private rounds, but especially so in Series D rounds or later, which on average have fallen 50% from 2015 highs. At the same time, the trend toward companies staying private longer is not going away, and the inability of larger institutions to scale their investments in early stage venture capital will likely continue propping up late stage rounds. Therefore, while a prudent allocation to early stage venture should outperform late stage over the long-term (see Figure 5, above), going forward the disparity in performance could widen.

Conclusion

Venture capital is a dynamic asset class, spawning new industries while fueling innovation and disruption across existing ones. Four of the five largest companies by market cap – Apple, Google, Amazon and Microsoft (with Facebook poised to replace Exxon for the fifth spot) – were venture-backed technology companies. Venture has the potential to generate exceptional returns (as well as considerable losses) while providing some diversification benefit to portfolios. However, in our view, investors should not merely attempt to achieve venture capital 'beta.' Despite the outsized performance of top managers, the mean and median return for the asset class is uninspiring and does not compensate an investor for the risk taken. In the venture capital space, access to the best managers is crucial to constructing a successful portfolio, yet these premier funds are often smaller and oversubscribed, making entry that much more difficult for LPs.

A thoughtfully constructed portfolio can provide access to premier venture capital funds focused on the attractive earlier stages of funding while diversifying away much of the unsystematic risk. In the current environment where there is so much opportunity in venture – and concurrently so much risk – a professional, dedicated approach to investing in the asset class is essential.

Notes

- 1 PitchBook, as of June 30, 2016.
- 2 Cambridge Associates Global Venture Capital, Global Private Equity, and Global Real Estate Benchmarks Return Report. Returns as of Dec. 31, 2015.
- 3 Venture Capital Investments earned an annual average of 93% from 1995-2015, The Yale Endowment 2015, Yale Investments Office, Endowment Reports.
- 4 The Yale Endowment 2015, Yale Investments Office, Endowment Reports.
- 5 Preqin Global Venture Performance as of Dec. 31, 2015, inclusive of all available vintage years dating from 1969.
- 6 PitchBook Venture Deal data, VC-backed exits Jan. 1, 2015 through Dec. 31, 2015.
- 7 Cambridge Associates Global Venture by Strategy, as of Dec. 31, 2015, inclusive of all available vintage years dating from 1981.
- 8 Cambridge Associates Global Venture Capital, Global Private Equity, and Global Real Estate Benchmarks Return Report. HFRI, Hedge Fund Research Inc. Returns as of Dec. 31, 2015.
- 9 Robert Harris, Tim Jenkinson, Steven Kaplan, "Private Equity Performance: What do we know?" The Journal of Finance, Sept. 12, 2014.
- 10 Ryan Mac, Accel Partners Raises New Funds Totaling Over \$1 Billion As Facebook Investor Jim Breyer Reduces Role, Forbes, 3/19/2014, www.forbes.com
- 11 Madison Marriage, "86% of active equity funds underperform", US Mutual Funds, www.ft.com, March 20, 2016.
- 12 "Has Persistence Persisted in Private Equity? Evidence from Buyout and Venture Capital Funds.
- 13 Cambridge Associates, "Venture Capital Disrupts Itself: Breaking the Concentration Curse," November 2015.
- 14 Cambridge Associates benchmark data.
- 15 PitchBook, Deal Analytics Data; Average Pre-Money Valuation Mean by Strategy, Global Venture Capital.
- 16 Cooley, Venture Financing Report: "Q2 2016 Investment Climate Cools," www.cooleygo.com, August 2016.

Appendix A

Lifecycle of a venture-backed company

Venture capital refers broadly to the funding of startup companies across their respective life cycles through to an exit in the form of a sale of the company (M&A) or taking the company public (IPO). The funding of a successful venture-backed company typically progresses across the following stages:

- **Seed:** Usually referring to the initial funding of a startup, "seed" funding has historically been the domain of friends and family, but is now commonly regarded as the first institutional funding round in a startup. The majority of seed funding is invested in development resources, continuing to build out the company's initial product through the beta version.
- **Series A:** Once startups have achieved traction (usually in the form of user growth or revenue) they are primed to raise an institutional round from a traditional early stage or lifecycle investor. The product continues to be iterated on and improved as the company incorporates user feedback.
- **Series B:** The final "early stage" round, Series B companies typically have achieved product market fit by this stage and have strong user growth, if not revenue. Companies raise capital primarily for the purpose of investing in sales and marketing.
- Series C: Once a startup has reached a Series C funding, it is generally no longer considered an early stage company. Such companies continue to fund expansion through investment in sales and marketing.
- Series D: Late stage companies at this point typically remain unprofitable and continue to raise capital to fund growth and ultimately achieve an exit, although some companies may exit before this stage.
- Series E+: The last round of funding before an exit is often referred to as a "Pre-IPO round." In recent years, such rounds have become dominated by non-traditional startup investors, like sovereign wealth funds, mutual funds and hedge funds.
- **IPO or M&A:** Successful venture-backed portfolio companies traditionally exit one of two ways: either through a sale to a larger company or through an IPO. While IPOs tend to get more attention from the media, M&A transactions have been the more consistent form of exit for startups of all stages.

Recent years have seen venture-backed companies remain private for longer, due to the burdens associated with being a public company and an abundance of capital willing to invest in late-stage private financings. This has furthered the presence of non-traditional investors in later stage rounds, as more of the value can be increasingly captured pre-IPO.

Appendix B

A brief history of venture capital

The history of venture capital dates back to the late 1940s when George Doriot, then professor at Harvard Business School, founded American Research and Development (ARD), likely the world's first institutional grade venture capital firm. Until that point, investments in private companies had been the province of wealthy individuals and families like the Rockefellers and Whitneys. Boston-based and publicly-traded ARD was one of the first independent firms providing sustained risk capital to private companies. Its most notable investment was a \$170,000 investment in 1957 in Digital Equipment (DEC), a mini-computer company that earned the firm 500 times its investment cost upon going public in 1966.

The 1960s and 1970s saw the rise of venture capital firms on the West Coast paralleling the development of the semiconductor industry in Silicon Valley. Perhaps the most highly-regarded and transformational venture-backed company of this period was Fairchild Semiconductor. Backed by Arthur Rock, an eight member team of Fairchild alumni headed by Gordon Moore and Robert Noyce spun out to start Intel Corporation. Several Intel and Fairchild employees later became key members of illustrious venture capital groups like Kleiner Perkins Caufield & Byers and Seguoia Capital.

A significant development in the evolution of the venture industry was the clarification of the "prudent man rule" in the 1974 Employees Retirement Income Security Act (ERISA). In 1979, the US Labor Department specified that ERISA diversification allowed pension funds to include alternative assets in their portfolio mix. As a result, a flood of money began entering the industry. In 1978, 23 venture funds managed about \$500 million of capital. By 1983, there were 230 firms overseeing \$11 billion.¹⁷

In the late 1970s and early 1980s venture funding evolved from a focus on semiconductors and data processors to include sectors like personal computers and medical technology. The successful public offerings of venture-backed companies like Apple, Fedex, Home Depot and Genentech brought significant attention and increased funding to the still-nascent asset class.

The 1990s saw the exponential growth of the industry around a revolution in software and the development of the internet. This culminated in the 'irrational exuberance' of the late 1990s and the bursting of the internet bubble in 2000. Although the decade did produce a number of lasting technology conglomerates like Google, Amazon and Paypal, most of the startups which emerged in the late 1990s were ahead of their time and absent any tangible traction. Venture capital fell out of favor in the years following the tech bubble collapse. Even as recently as 2009 and 2010, it was still difficult for high-quality VC firms to raise capital with 10-year performance numbers still negative.

This disinterest in the asset class masked significant innovation taking place. The internet was finally delivering on the hype of the late 1990s and producing companies with sustainable business models. Social media was taking off, epitomized by exponential growth at startups like Facebook, Twitter and LinkedIn. On the back of mega trends like "social," followed by "mobile" and "cloud," software began eating the world, disrupting any and all industries in its path, irrespective of capital intensity or regulation.

Which brings us to today. After the high profile successes over the last decade, startups have never been more in vogue, with engineers and MBAs choosing the suddenly glamorous life of an founder over positions in finance and consulting firms. Disruption continues apace, and venture capital has rebounded to capitalize on the opportunities.

¹⁷ Spencer E. Ante, Creative Capital: Georges Doriot and the Birth of Venture Capital, Harvard Business Press, as of Dec. 30, 2013.

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