SPARKLINE CAPITAL

Value Investing Is Short Tech Disruption

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Executive Summary

Value investing has a long and distinguished pedigree but is currently in a deep thirteen-year drawdown. We believe this is because value has rotated into a massive losing bet against technological disruption. We isolate this exposure using machine learning and find it fully explains value's losses. We offer takeaways for both stockpickers and asset allocators.

The Church of Graham

All fields have their hallowed tenets. In investing, it is that value stocks - those trading below perceived intrinsic value - beat the market. Value investing's distinguished lineage originates with Ben Graham in the 1930s and counts among its practitioners such legends as Warren Buffett and Eugene Fama. Nearly a century of empirical support for the outperformance of value over growth stocks has solidified its place in the investment canon.

However, its extremely poor recent performance has called these long-held beliefs into question. Value has failed its disciples for thirteen consecutive years, with its struggles intensifying into the COVID-19 pandemic. This challenge to one of investing's sacrosanct assumptions has shaken and fractured the investment community. Iconoclasts point to the secular economic transformation that has occurred since the days of Graham. Meanwhile, value apologists urge us not to repeat the sins of our fathers, who abandoned the faith in the late-1990s only to be crushed when the tech bubble burst.

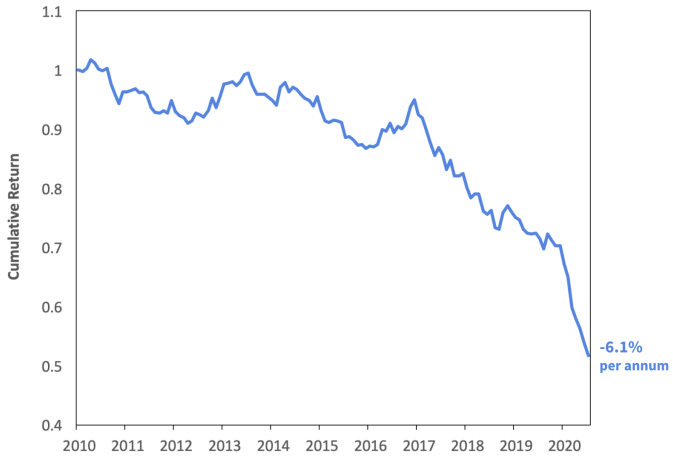
Regardless of one's beliefs, the value-growth spread has reached such extremes that investors simply cannot ignore it anymore. Whether you are an asset allocator or stockpicker, this phenomenon looms over markets. Entire careers are likely to be made or broken on this single call.

The Debate in Three Charts

Over the past thirteen years, the value factor has been in a prolonged drawdown. While initially a gentle decline, the trickle has accelerated into a torrent, culminating in massive losses in the COVID-19 pandemic. Our first chart shows the performance of Russell 1000 Value relative to Russell 1000 Growth.

Exhibit 1

Why Value Investing Sucks

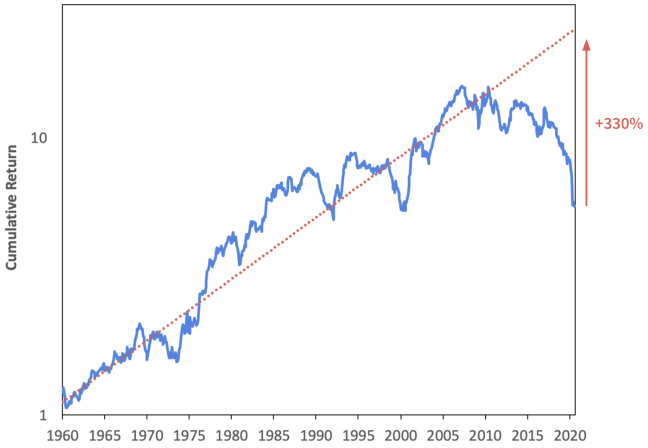


Source: Sparkline, iShares, FTSE Russell (as of 7/31/2020)

This drawdown is especially concerning in light of value's lengthy history of market-beating returns. Exhibit 2 depicts the long-term performance of the Fama-French value factor. Value has dug itself a very deep hole. It would have to more than triple to get back to its historical trend.

Exhibit 2

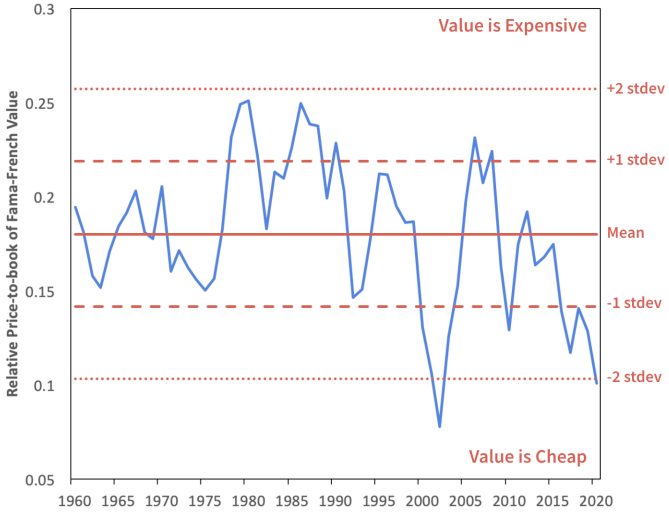
Wait, So Is This Time Actually Different?



Source: Sparkline, Ken French (as of 7/31/2020)

The flipside is that this grave underperformance has driven valuations to extremely attractive levels. Value companies are trading at their deepest discount since the peak of the tech bubble. The relative price-to-book ratio of Fama-French value is now two standard deviations cheap compared to its historical average. Many well-regarded value investors are calling this the buying opportunity of a generation.

Exhibit 3
Mean Reversion Opportunity?



Source: Sparkline, Ken French (as of 7/31/2020)

The Big (Tech) Short

In the Great War, there are many battlefronts. Investors furiously debate the role of low interest rates, outdated accounting rules, and passive flows on value investing. Rather than get caught up in an academic discussion, let's look at the companies you actually get when you buy a value portfolio. Exhibit 4 shows the sector composition of Russell 1000 Value and Growth.

Value investors are making an epic 34.7% short bet against the technology sector. Moreover, this bet is more than fully explained by their underweight to the FAANG+M companies. Value has a meager 1.4% position in FAANG+M compared to Growth's 39.4%. Not only are value investors short tech, but they are short Big Tech. And in a big way.

Exhibit 4
Russell 1000 Value vs. Growth Exposures

GICS Sector	Value	Growth	Value - Growth
Financials	18.3	2.0	16.3
Industrials	12.5	4.5	7.9
Utilities	6.0	0.0	6.0
Energy	4.9	0.1	4.8
Materials	4.7	0.8	3.8
Consumer Staples	8.2	4.7	3.5
Real Estate	4.7	1.9	2.8
Health Care	14.2	14.3	0.0
Communication	9.6	11.2	-1.6
Consumer Discretionary	7.1	15.9	-8.8
Information Technology	9.7	44.4	-34.7
Total	100.0	100.0	0.0

Company	Value	Growth	Value - Growth
Apple	0	11.5	-11.5
Microsoft	0	10.0	-10.0
Amazon	0	8.4	-8.4
Google	1.4	4.3	-2.9
Facebook	0	3.9	-3.9
Netflix	0	1.3	-1.3
Total	1.4	39.4	-38.0

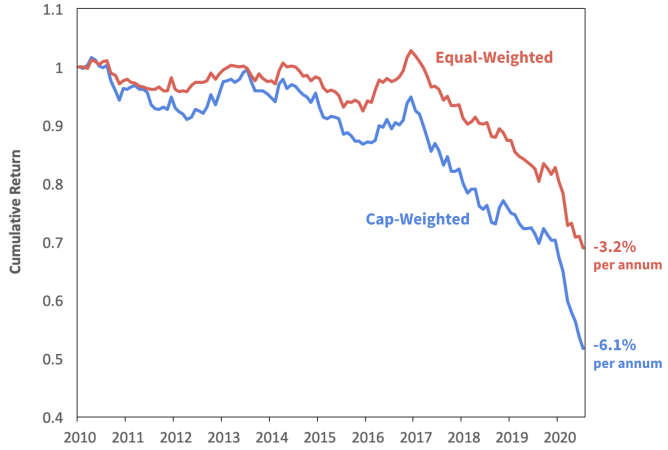
Source: Sparkline, iShares, FTSE Russell (as of 8/6/2020)

This is a very bold move. As the recent Congressional hearings underscore, Big Tech has effective monopolies in many critical verticals ranging from social networking to online retail. The FAANG+M stocks comprise around 25% of the market capitalization of the Russell 1000 index. In other words, six companies control a quarter of the stock market. This extreme concentration would make even the Monopoly man blush.

Big Tech is paradoxically both disruptive and monopolistic. We will return to the value of monopolistic tech ecosystems later. For now, let's set this aside and focus on the concept of disruptive technology. We will now (and for the rest of the paper) focus on equal-weighted (opposed to cap-weighted) portfolios. This means all stocks in the index get the same weight. This limits the influence of Big Tech, allowing us to isolate the broader impact of technological disruption.

Equal weighting reduces the technology underweight from -35% to a smaller but still very significant -20%. As expected, this somewhat mitigates the value factor's drawdown but still leaves plenty of losses unexplained.

Exhibit 5
Equal-Weighted Russell 1000 Value vs. Growth



Source: Sparkline, iShares, FTSE Russell (as of 7/31/2020)

Technological Disruption

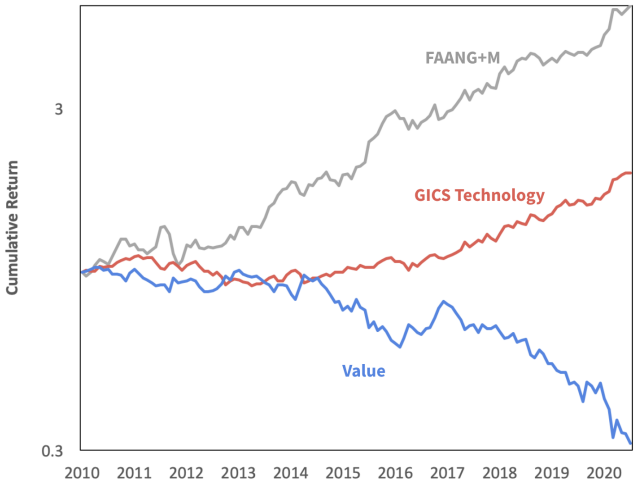
For those of us who work with technology, the past decade has been very exciting. Technology has transformed the way we conduct our daily lives and has reshaped every facet of our world -- political, economic, social and environmental.

Technological disruption has impacted all industries to varying degrees. Companies employing outmoded, legacy business models have faced the wrath of Schumpeter's Gale. Creative destruction has decimated industries ranging from print media to brick-and-mortar retail while simultaneously anointing a new generation of winners, such as Facebook and Uber.

The pandemic-driven lockdown has only accelerated this disruption, further shifting demand from physical businesses to the internet. Shopping malls, department stores, and brick-and-mortar retail shops have struggled for many years. COVID-19 has been the final nail in the coffin for many. Dozens of iconic retailers have filed for bankruptcy, including J. Crew, Neiman Marcus, JCPenny and Brooks Brothers. On the other hand, Amazon as well as traditional retailers who have managed to grow their online channels have flourished.

This narrative is borne out in the outstanding performance of technology stocks. Exhibit 6 shows the performance of FAANG+M and GICS Technology compared to the market. It also shows the poor returns of the value factor, which we define here as the equal-weighted top vs. bottom deciles of price-to-book ratio in the Russell 1000. Value is on the losing side of the tech disruption trade.

Exhibit 6
Value on the Wrong Side of History

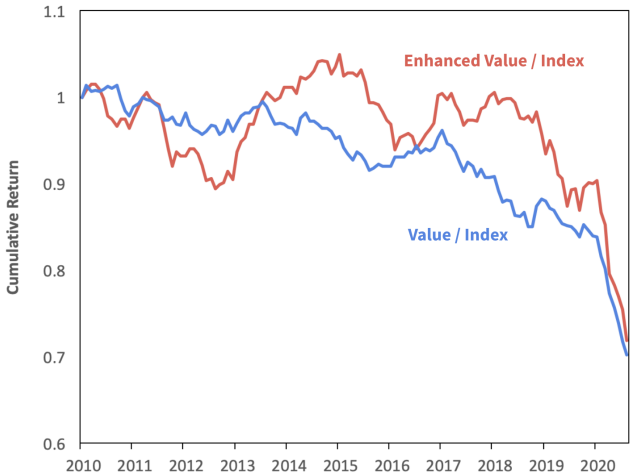


Source: Sparkline, MSCI, S&P (as of 7/31/2020)

The Problem With Industry Classification

One potential way to fix value would be to neutralize its industry exposure. In other words, we would force the net exposure of each sector to be zero. Each analyst would then only be able to buy cheap and short expensive stocks within their assigned industry. The MSCI USA Enhanced Value Index accomplishes this using a blend of valuation measures. Exhibit 7 compares the performance of the sector-neutral Enhanced Value Index to the standard MSCI USA Value Index.

Exhibit 7
Sector-Neutral Value



Source: Sparkline, MSCI, S&P (as of 7/31/2020)

Industry neutralization improves performance leading up to 2018, reducing the drag from the massive tech underweight. However, it still fails spectacularly in the great value selloff of the past couple years. This is surprising given tech stocks' exceptional performance over this period.

We can quickly resolve this issue by examining the actual names held by Russell 1000 Value and Growth. We will start with the tech sector in Exhibit 8.

Exhibit 8

Biggest Value Tilts in GICS Technology

GICS Technology	Value	Growth	Value - Growth
Intel	1.38	0	1.38
Cisco	1.36	0	1.36
IBM	0.75	0	0.75
FIS	0.61	0	0.61
Micron Technology	0.36	0	0.36
Global Payments	0.35	0	0.35
Analog Devices	0.25	0.03	0.22
Cognizant	0.23	0.02	0.21
HP	0.18	0	0.18
Qualcomm	0	0.77	-0.77
Accenture	0	0.91	-0.91
Salesforce	0.09	1.03	-0.94
Adobe	0	1.37	-1.37
Paypal	0	1.47	-1.47
Nvidia	0	1.65	-1.65
Mastercard	0	1.79	-1.79
Visa	0	2.06	-2.06
Microsoft	**0**	**9.96**	**-9.96**
Apple	**0**	**11.46**	**-11.46**

Source: Sparkline, iShares, FTSE Russell (as of 8/6/2020)

Even within the technology industry, there is significant dispersion in companies' disruptiveness. In addition to Apple and Microsoft, the GICS Technology sector contains many "old economy" technology companies, which tend to be more favored by value investors.

One interesting fact: 80% of the FAANG companies aren't even classified by GICS as Information Technology. Facebook, Netflix and Google are in the Communication sector, sitting alongside more utility-like companies such as AT&T and Verizon. Amazon is considered a Consumer Discretionary company along with the brick-and-mortar retailers that it is disrupting. Similarly, we see no distinction made between Tesla and its legacy competitors.

Exhibit 9

Biggest Value Tilts in GICS Communication and Consumer Discretionary

GICS Communication	Value	Growth	Value - Growth
Verizon	1.61	0	1.61
Walt Disney	1.58	0	1.58
AT&T	1.43	0	1.43
Netflix	**0**	**1.33**	**-1.33**
Alphabet	**1.35**	**4.28**	**-2.93**
Facebook	**0**	**3.92**	**-3.92**

GICS Consumer Disc.	Value	Growth	Value - Growth
McDonald's	0.87	0.13	0.74
Target	0.43	0	0.43
General Motors	0.22	0	0.22
Ford	0.18	0	0.18
Lowe's	0	0.7	-0.7
Nike	0	0.75	-0.75
Tesla	0	1.35	-1.35
Amazon	**0**	**8.41**	**-8.41**

Source: Sparkline, iShares, FTSE Russell (as of 8/6/2020)

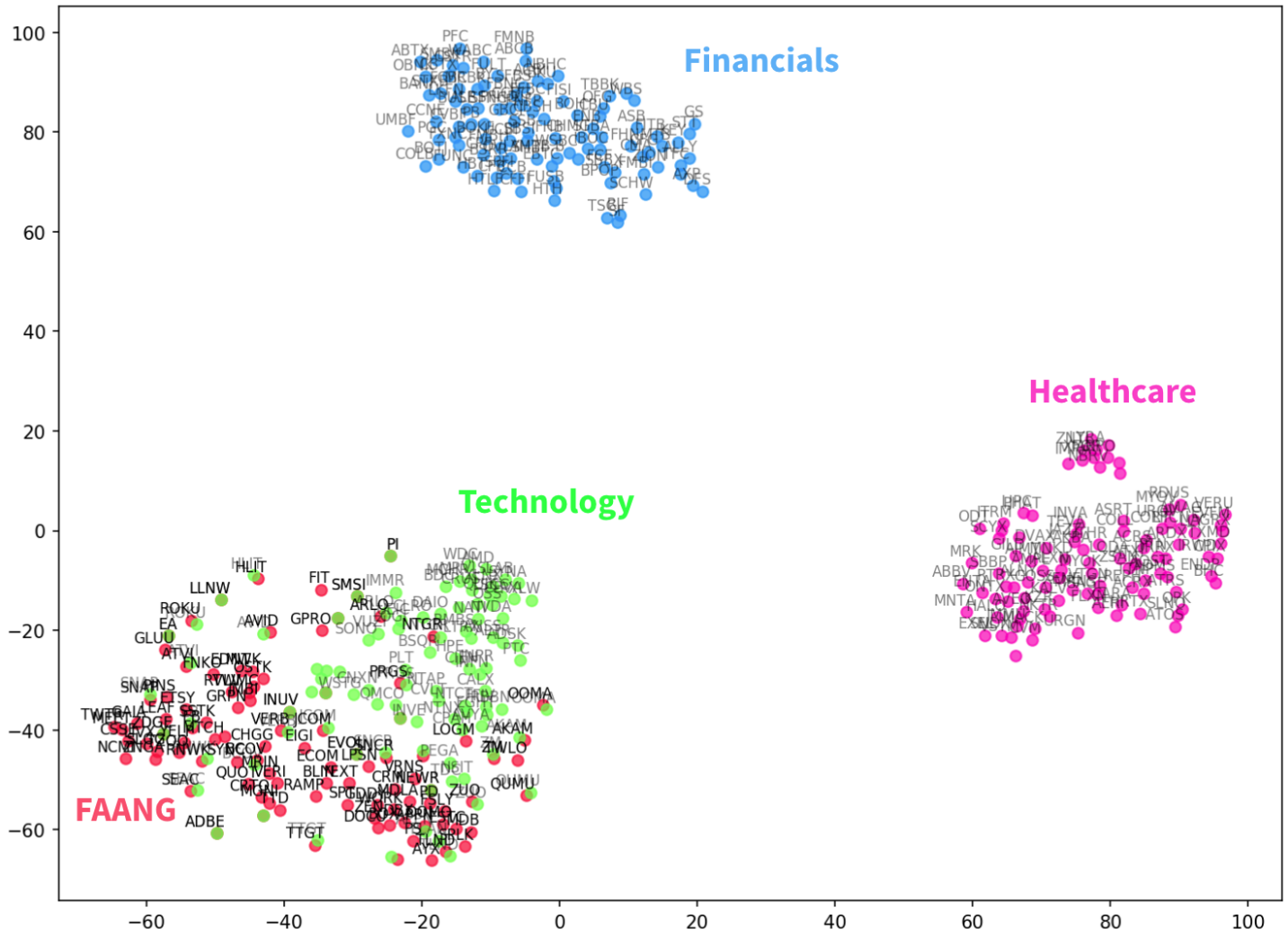
We clearly see that industry classifications are a crude and insufficient tool to capture the concept of technological disruption.

FAANG Company Embeddings

Technology is reshaping all industries. However, often this disruption is being wrought not by pure tech companies but by industry players employing technology to gain an edge over their more staid incumbents. We need a more flexible way to identify disruptive companies than industry classifications.

In Investment Management in the Machine Learning Age, we introduced the concept of company embeddings. In the "Business" section of their 10-K filings, companies are required to provide a description of their products and services. We use machine learning to build a measure of semantic similarity for all companies with each other. These company embeddings provide us with a continuous (opposed to binary), dynamic, and multi-dimensional map of the corporate landscape. This mapping subsumes the concept of industry, but also includes a multitude of other dimensions.

Exhibit 10
FAANG Company Embeddings



Source: Sparkline, SEC

Let's assume for now that the FAANG companies are representative paragons of disruption. We can then find other companies that are close to the FAANG stocks in embedding space. It would follow that these FAANG-like companies more cleanly epitomize tech disruption.

Exhibit 10 uses machine learning to visualize our company embeddings. We create three "industry" clusters: healthcare (pink), financials (blue), and technology (green). These clusters are seeded with a few representative names (e.g., JNJ, JPM, CSCO) and then surrounded by the 100 most similar companies. We also seed a FAANG cluster (red).

These FAANG-like companies appear as a subset of the technology industry. However, as seen earlier, the tech sector is heterogenous, consisting not only of disruptive FAANG-like companies but also more traditional tech names.

Exhibit 11 shows the proximity of a representative sample of companies to the FAANG stocks in embedding space. As expected, the most FAANG-like companies are those that provide services in cloud, e-commerce, social media, and SaaS. Like the FAANG companies, they have also been very successful in the past several years.

Exhibit 11
FAANG-Like Companies

High	GICS Sector	FAANG Similarity
Snap	Communication	0.86
Pinterest	Communication	0.81
Twitter	Communication	0.80
Microsoft	Information Technology	0.77
Zoom Video Communications	Information Technology	0.76
Etsy	Consumer Discretionary	0.75
Dropbox	Information Technology	0.75
Activision Blizzard	Communication	0.75
Slack Technologies	Information Technology	0.74
Wayfair	Consumer Discretionary	0.71
Medium		
Costco	Consumer Staples	0.39
Broadcom	Information Technology	0.38
Tiffany & Co.	Consumer Discretionary	0.38
Paychex	Information Technology	0.38
Marriott Vacations Worldwide	Consumer Discretionary	0.38
JetBlue	Industrials	0.37
Clorox	Consumer Staples	0.37
ConocoPhillips	Energy	0.36
Intel	Information Technology	0.36
Hyatt Hotels	Consumer Discretionary	0.36
Low		
Alcoa	Materials	-0.06
Travelers	Financials	-0.06
Pfizer	Health Care	-0.07
BlackRock	Financials	-0.08
Dell Technologies	Information Technology	-0.12
Medical Properties Trust	Real Estate	-0.14
Aflac	Financials	-0.15
Lowe's	Consumer Discretionary	-0.15
Reinsurance Group of America	Financials	-0.22
Fox	Communication	-0.36

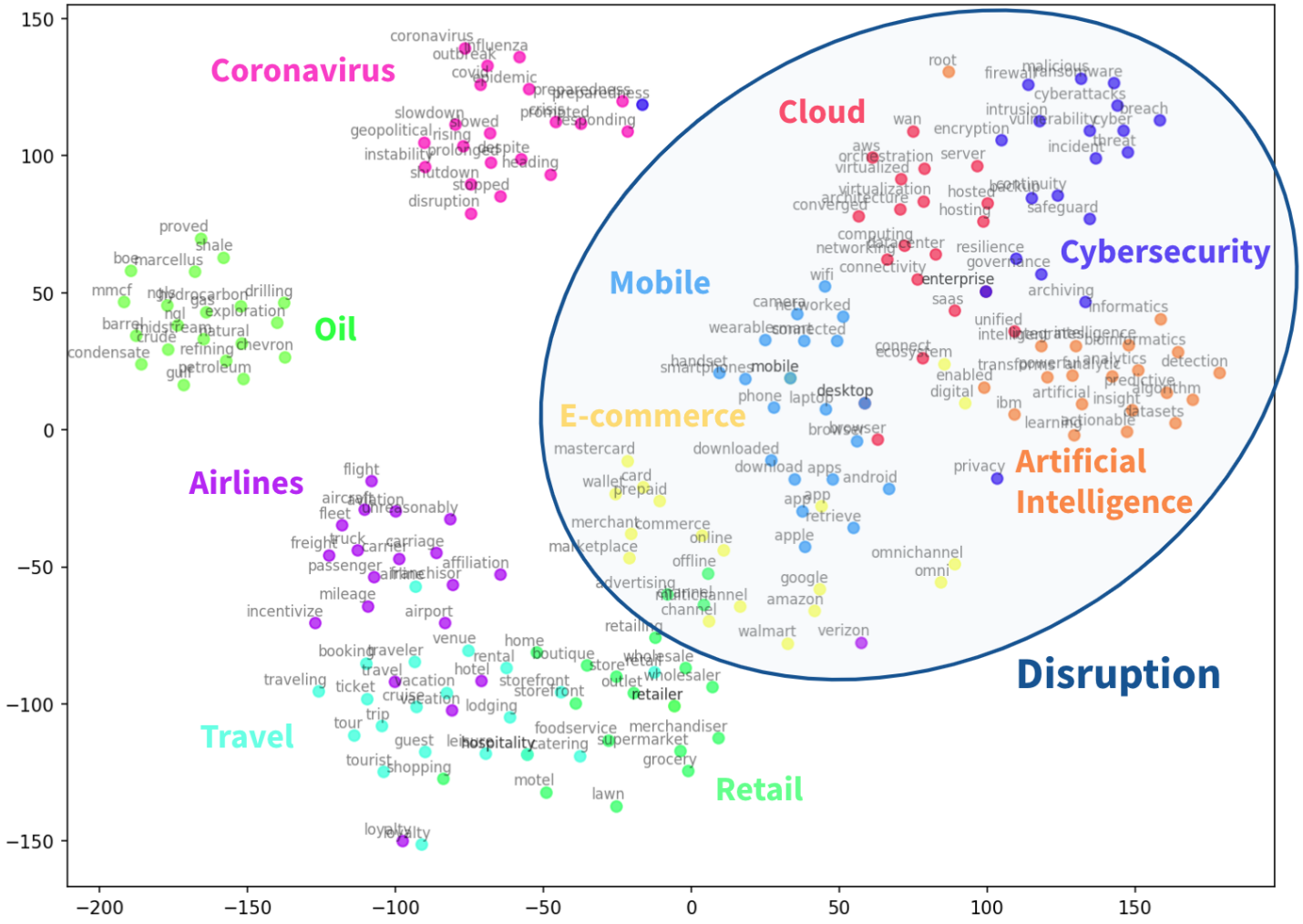
Source: Sparkline, SEC

Company embeddings are a powerful tool. However, as mentioned, Big Tech conflates the themes of concentration and disruption. Many other companies are also transforming their respective industries. These companies are smaller and span a more diverse set of industries. Or they are traditional companies that have been early to embrace disruptive technologies. Rather than build a long list of companies that we (subjectively) believe to be disruptive, we will now turn to another machine learning approach.

The Disruption Metanarrative

Textual documents can be viewed as a mixture of multiple topics. For example, a single Wall Street Journal article might cover a variety of topics, such as a company's labor practices, segment growth, and M&A activity. We can train a machine learning model to identify the presence of relevant topics in texts ranging from 10-K filings to earnings calls.

Exhibit 12
The Disruption Metanarrative



Source: Sparkline, SEC

In our case, we are seeking themes related to technological disruption. The concept of disruption is broad and nebulous. Therefore, we instead focus on more specific and tangible subthemes, such as e-commerce, cloud computing, and artificial intelligence. When woven together, these subplots tell the grander story of a society reshaped by technological change.

Exhibit 12 shows how the various storylines flow together. Cybersecurity, cloud, artificial intelligence, mobile and e-commerce together comprise the technological disruption metanarrative. From here, the e-commerce thread flows into general retail, which connects to travel and then airlines. Meanwhile, the oil and coronavirus topics form their own distinct clusters.

We train our models to recognize the presence of these disruptive subthemes in text documents. Exhibit 13 shows an example of the cloud computing topic appearing in a recent earning call.

Exhibit 13
Cloud Computing Example

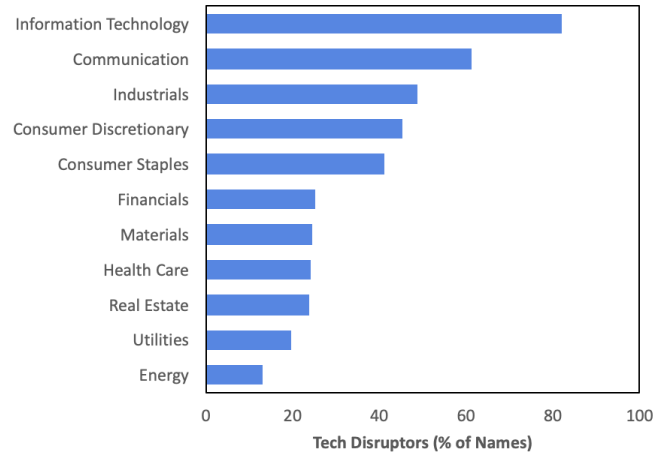
> "Now I'll share some details on each of those four drivers, starting with recent market dynamics in the contact center space. As I mentioned earlier, we believe the migration of on-premises to the cloud is steady, if not accelerating, due to COVID-19. So customers now recognize the critical nature of business continuity plans for their contact centers, and there's an increased appreciation for the fact that cloud solutions can address these needs far better than on-premises solutions."
>
> *- Five9, 2020 Q2 Financial Results Webcast (8/3/2020)*

Source: Sparkline, Five9

Each stock gets a disruption score based on the quantity of disruptive narrative in its associated texts. For simplicity, we convert this continuous disruption score into a binary classification (i.e., disruptor or non-disruptor).

Exhibit 14 shows the fraction of companies in each sector classified as disruptors by our model. While most technology companies are disruptors, most disruptors are not technology companies. There are companies innovating in every industry - even stodgy fields like finance!

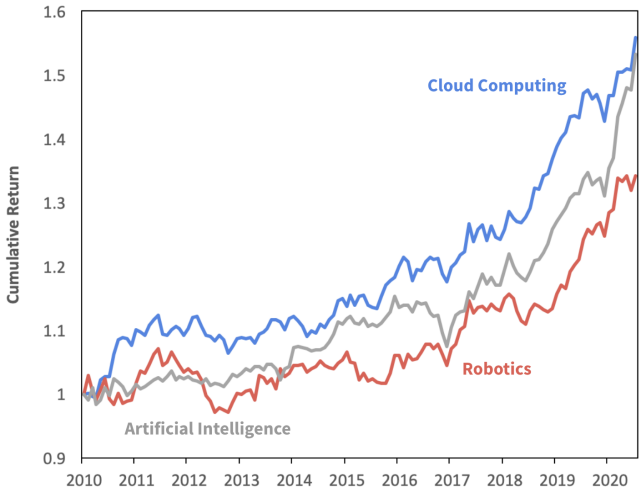
Exhibit 14
Sector Composition of Disruption Factor



Source: Sparkline, MSCI, S&P

We next examine the performance of portfolios built around each of these subthemes. These portfolios have all done quite well, but some have done better than others. For example, cloud computing has been consistently profitable, while robotics has only heated up more recently.

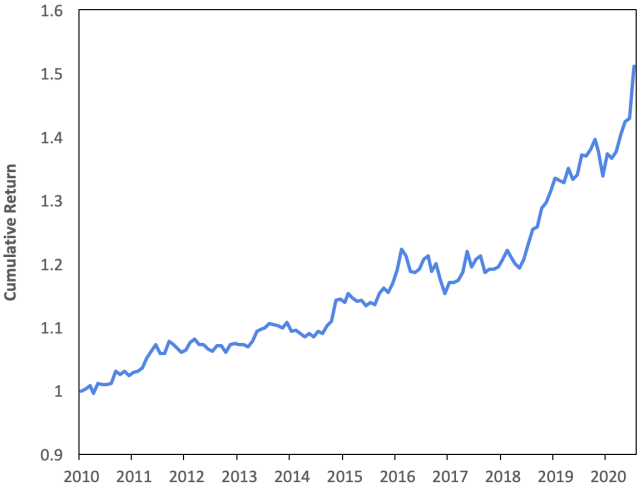
Exhibit 15
Disruption Subtheme Performance



Source: Sparkline, MSCI, S&P (as of 7/31/2020)

We can combine all our subthemes into an overall tech disruption theme. The performance has been extraordinary, delivering a Sharpe Ratio over 1.0. More importantly, it encapsulates a purer version of the tech disruption factor than that which we were able to obtain earlier using GICS.

Exhibit 16
Disruption Metanarrative Performance

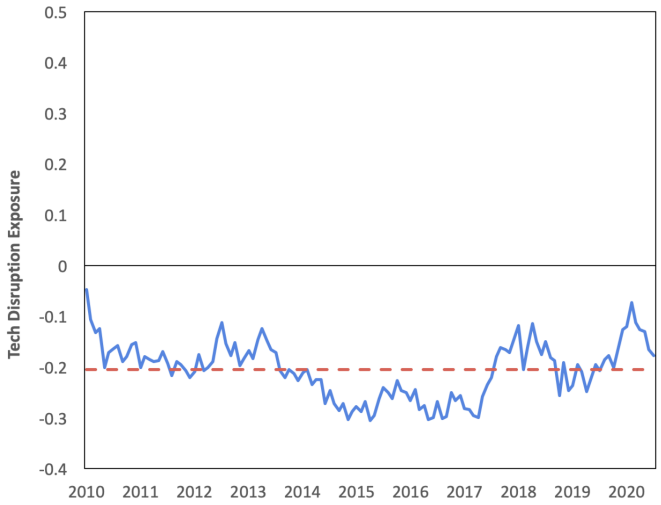


Source: Sparkline, MSCI, S&P (as of 7/31/2020)

Value Investing Is Short Disruption

We already showed that value investors are short the GICS technology sector. Thus, it should not be a surprise that they are also short the pure tech disruption factor. We find that the value factor has run a fairly constant -20% exposure to tech disruption over the past decade.

Exhibit 17
Value Is Short Disruption



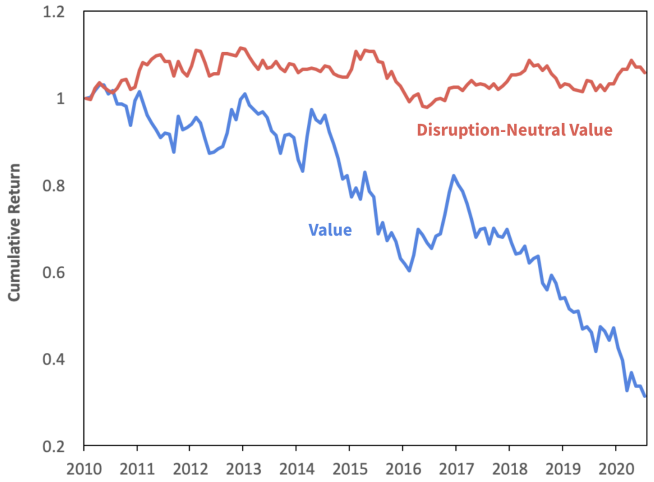
Source: Sparkline, MSCI, S&P (as of 7/31/2020)

This is completely intuitive and expected. Value investors favor companies that are cheap compared to book value or historical earnings. However, a tech disruptor's value lies not in its capital stock but its newer technology, business model, or other intellectual property. These businesses often reinvest heavily, reducing near-term profits. They are also commonly newer market entrants gradually chipping away at the market share of industry incumbents but who have not yet established market dominance.

In order to show the impact of value investors' short disruption bet, we once again build a neutralized portfolio. However, instead of simply neutralizing GICS sector exposure, we neutralize our pure tech disruption theme.

Once we neutralize its anti-disruption bet, we find that value's lost decade disappears. Value's drawdown is fully explained by its big bet against disruption!

Exhibit 18
Disruption Explains Value's Demise



Source: Sparkline, MSCI, S&P (as of 7/31/2020)

The Oracle of Cupertino

Value investing's rich pedigree is a blessing and a curse. It has both contributed to its wide acceptance by the investment community and made it difficult for newer investors to stray from established value dogma.

Ironically, it is value's oldest and most famous practitioner - Warren Buffett - who gives us a blueprint for adaptability. Buffett began his investing career working for Ben Graham, the father of value investing. Graham honed his craft in an industrial economy of railroads and steel mills. Security analysis came down to assessing the value of a company's hard assets and buying companies with prices below liquidation value.

However, Buffett gradually evolved his approach beyond that of his mentor. With the help of his partner, Charlie Munger, he realized that Graham's "cigar-butt" investment style was neither scalable nor sustainable. Meanwhile, the economy was evolving, marked by the rise of the great American consumer brands, such as Coca-Cola, which enjoyed loyal customers and wide moats. Buffett embraced a more holistic focus on brand and management quality. His new blueprint: "Forget what you know about buying fair businesses at wonderful prices; instead, buy wonderful businesses at fair prices."

Buffett has a well-known reputation for staying away from the technology sector. He has on numerous occasions

described tech companies as outside his "circle of competence." Thus, it is extremely striking that he spent 2016-2018 building up a $35 billion stake in Apple. After Apple's value tripled in a mere three years, Buffett now has an enormous $100 billion position in Apple. This single position comprises over one fifth of Berkshire Hathaway's entire value!

Buffett explained his investment in his 2018 shareholder meeting, "I didn't go into Apple because it was a tech stock... [but] because of the value of their ecosystem and how permanent that ecosystem could be." In other words, Apple is just like the high-quality, wide-moat consumer brands he feasted on in the '80s and '90s. In the same meeting, he acknowledged that Graham's style would have to once again be adapted to the modern information economy: "The four largest companies today by market value do not need any net tangible assets. They are not like AT&T, GM, or Exxon Mobil, requiring lots of capital to produce earnings. We have become an asset-light economy." (h/t Adam Seessel)

Buffett has had a legendary career spanning multiple economic cycles. He has established himself as one of the best investors ever. Yet his greatest legacy is perhaps his adaptability. As the world changed around him, he evolved his investment style in response. The technology sector now makes up 25% of the S&P 500. Buffett has wisely realized that it can be ignored no longer and has found a way to incorporate it into his investing blueprint.

Value investors would benefit from following the Oracle's lead. They should discard any blind prejudice they have against companies simply because they are in the tech sector. Technology is, for better or for worse, a fundamental part of our lives. They should also adjust their measures of intrinsic value to reflect the reality of today's "asset-light" economy. They should develop ways to assess the considerable value of the tech ecosystems. If the 89-year-old Buffett can continue to evolve, so can we all.

We Are All Tech Investors

Many allocators have a significant tilt to value managers. In the past, justifying these allocations was easy. One merely had to cite the Gospel of Graham and point to the outstanding historical performance of his disciples. However, thirteen years in drawdown has put many allocators in a tough position.

Developing an informed view on value is among the greatest priorities for allocators today. However, the value factor and technology sector have become inextricably linked. Value managers are making a giant short bet on disruption. There is no way to form a view on value without first conducting a thorough analysis of tech industry trends.

Long value (i.e., short tech) is not necessarily a bad bet. It is extremely difficult to know with certainty if we are living through a bubble or paradigm shift. Technology is clearly changing the world, but, as we saw in 2000, the disruption narrative can become overblown. There exists compelling evidence that the recent returns, valuations, and concentration of tech companies are unsustainable. A full analysis is beyond the scope of this article, but we will make a couple quick suggestions.

First, investors should determine their overall portfolio-level exposure to technological disruption. We have shown that value managers tend to be short disruption. However, many allocators also hold venture capital or growth-oriented equity funds, which provide positive exposure to disruptive companies. These positions may balance each other out, resulting in a hedged overall position.

Second, investors should not view tech as a monolith. We have already pointed to the related but distinct theme of monopoly power in tech ecosystems. Investors should consider the role of Big Tech in their portfolio differently from that of smaller and newer firms that have not yet established such dominance. Valuations can (and should) differ widely between cap ranges and between public and private markets.

Conclusion

Value investing has rotated into a massive bet against technological disruption. This position cuts across diverse industries but can be isolated using machine learning. The anti-tech bet explains value's ongoing drawdown. We suggest that value investors evolve their framework to accommodate the rising role of technology in our economy. Meanwhile, we believe allocators must invest in developing an informed view on technological trends in order to truly underwrite their value managers.

Kai Wu

Founder & CIO, Sparkline Capital LP

Kai Wu is the founder and Chief Investment Officer of Sparkline Capital, an investment management firm applying state-of-the-art machine learning and computing to uncover alpha in large, unstructured data sets.

Prior to Sparkline, Kai co-founded and co-managed Kaleidoscope Capital, a quantitative hedge fund in Boston. With one other partner, he grew Kaleidoscope to $350 million in assets from institutional investors. Kai was solely responsible for the models and technology driving the firm's investment processes. He also jointly managed all other aspects of the company, including operations, trading, investor relations, and recruiting.

Previously, Kai worked at GMO, where he was a member of Jeremy Grantham's $40 billion asset allocation team. He also worked closely with the firm's equity and macro investment teams in Boston, San Francisco, London, and Sydney.

Kai graduated from Harvard College Magna Cum Laude and Phi Beta Kappa.