

The FAANGs: On Terra Firma?

February 21, 2019

A Perspective on Revenue Growth and Capital Spending

FAANGs Acting Like Cyclical

- The market was caught off guard at the end of last year when the FAANGs shed (25)% of their market value in three months after having been up by an equal amount in the first nine. The sell-off was a good reminder that each of the FAANGs operates a business that's inherently cyclical. Increased odds of recession took a toll on the stocks like it's historically done for others in our Big Growers universe. The fact that the capital intensity of these mega-cap stocks has been on the rise didn't help. The aim of this report is to figure out how cyclical FAANG revenue growth might be, and whether or not the cost of sustaining its trajectory will cause investors to look elsewhere for growth.
- The FAANG stocks will experience another bout of anxiety at some point. The market's patience for capital spending tends to wear thin, especially when the macro outlook gets murky. However, we think the stocks are more likely to stay on terra firma for the foreseeable future. The market cap ascribed to the FAANGs is no higher than the ones mega-caps have typically seen and the revenue picture is brighter. Cash flow margins are higher than those of previous market leaders, so the FAANGs can afford to write big checks... at least so long as spending on the cloud continues to bear fruit.

Has Capex Become Consumable?

- Amazon's success with AWS has attracted plenty of competition to the cloud. If newer players invest at a similar rate to Amazon's, cloud-related capex in 2018 could've amounted to 4% of all expenditures made by companies in our large-cap universe. Google has laid out aggressive plans for cloud spending in 2019 and will help push that share up towards 6%. The throw-weight of the cloud will feel even bigger, since aggregate capital spending is set to slow.
- Past spending sprees have tended to surface in industries with long asset lives, including rail cars, pipelines and housing where useful lives range from 35 to 80 years. The current surge is more focused on technology that sports useful lives that are no higher than 10 years and are as little as three. A single year of cloud capex could therefore necessitate maintenance capital of \$10-15 billion annually. That means it'd cost industry participants 2% of aggregate capex simply to stand still. These and other fixed costs could exaggerate incremental margins (in both directions) and heighten cyclicity.
- Short asset lives make for hungry balance sheets. The good news is that excess capacity is easier to cure when capex is consumable. Corporate filings allow us to measure the useful life of assets over time by industry. There's been some pressure in the aggregate as technology has claimed a greater share of overall assets. Inside of tech, the trend isn't as pronounced, though software has seen a clear downward trend. By our count, tech accounts for 14% of all capital expenditures made by companies in our large-cap universe. Analyst forecasts put it closer to 16% in a few years.

Revenue Cyclicity

- As businesses mature they tend to become more cyclical. Wal-Mart's revenue growth was only lightly correlated to GDP in the early 90's, but that's no longer the case. Amazon has begun to show some signs of aging. Its share of incremental retail sales has fallen to 15% from a previous average that was closer to 25%. It's tempting to view Amazon as countercyclical, but the correlation of its revenue growth with GDP has been positive over time, mirroring that of Costco, not TJX.
- Advertising is another key revenue source for the FAANGs and it's been stuck at 2% of GDP for 70 years, punctuating its cyclicity. Online advertising hasn't proven to be an exception to the rule. It'll more closely track the overall market now that it's reached 50% of total ad spending. Netflix, with a low price point and a quasi-addictive offering, is likely to be the least cyclical of the FAANGs, but it might not be immune from the market's risk tolerance that's prone to shift.

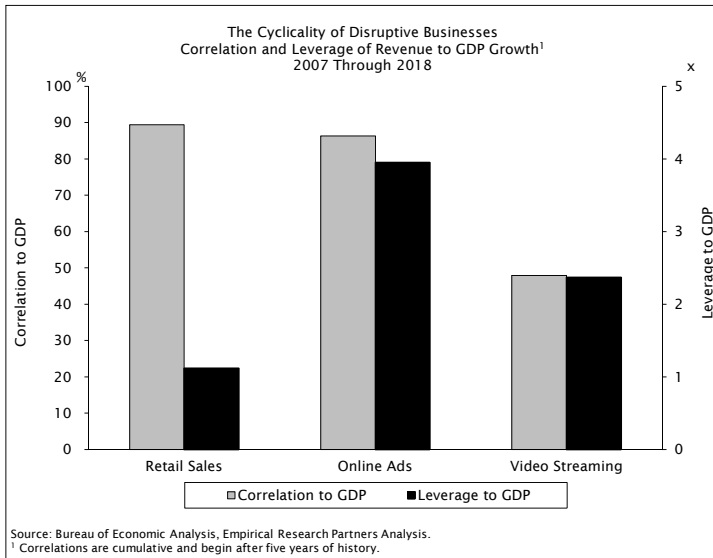
Conclusion: The Honeymoon Might be Over, but the Marriage Can Endure

- We're worried about the market's tendency to sour on companies that are growing capex at a rapid clip. The business models are also apt to become more cyclical as their base of revenue grows. In the meantime, the capital intensity of the FAANGs is still relatively low and cash flow margins are robust. The honeymoon might be over, but a marriage can still endure. Our best advice is to kiss and make up with the FAANGs.

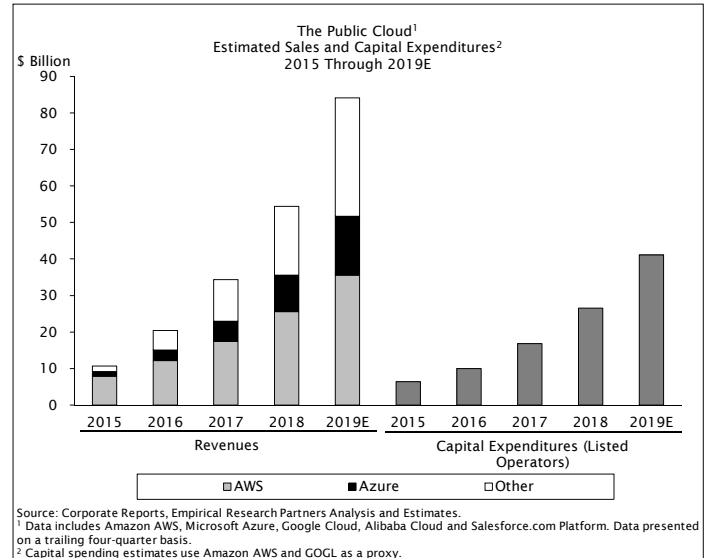
Nicole Price 212 803-7935 Sungsoo Yang 212 803-7925 Yi Liu 212 803-7942 Yu Bai 212 803-7919 Iwona Scanzillo 212 803-7915

Conclusions in Brief

- FAANGs operate in cyclical industries, so growth could slow markedly in a recession:

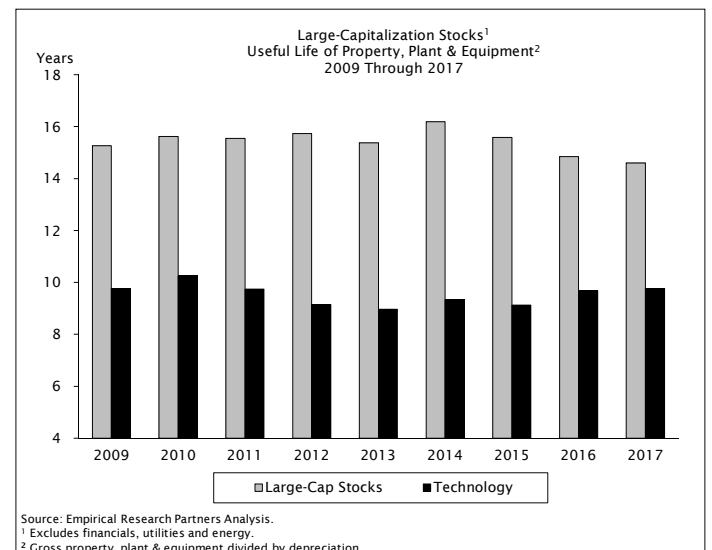
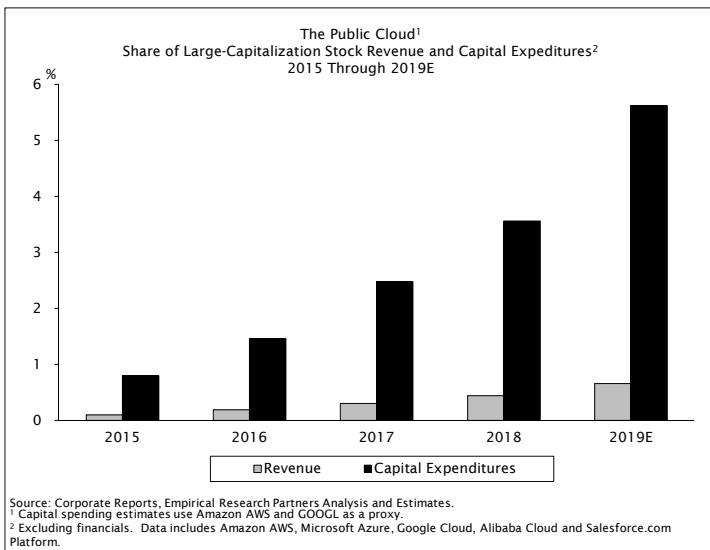


- The cloud has helped sustain growth for many, but it's come at a cost:



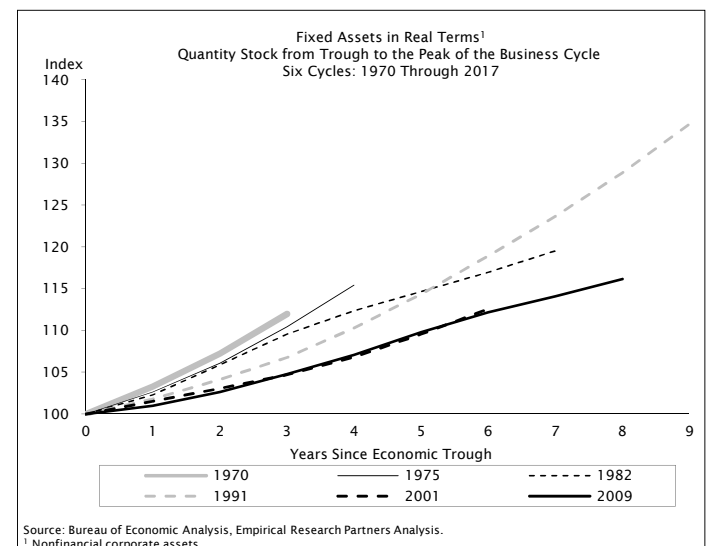
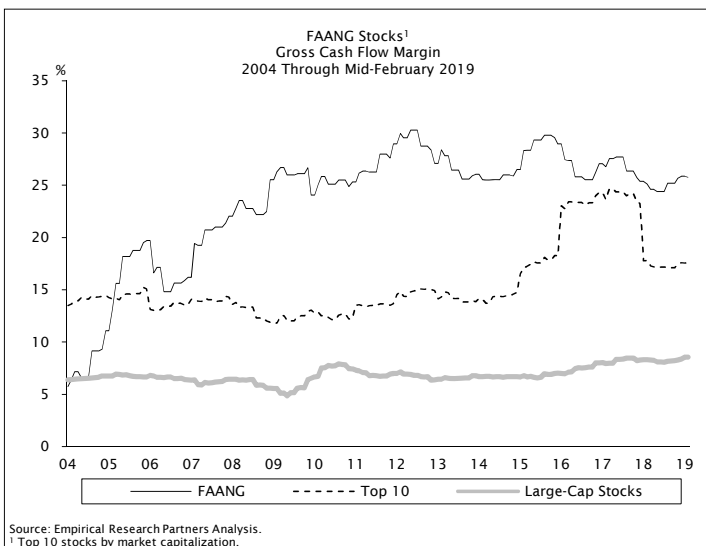
- Spending on the cloud is approaching 6% of all capex...

- ...And shorter asset lives in some industries could make capex somewhat more consumable:



- We're not too worried, since higher cash flow margins mean there's capacity to write bigger checks:

- The capex cycle - in nominal and real terms - doesn't appear to be extended either:

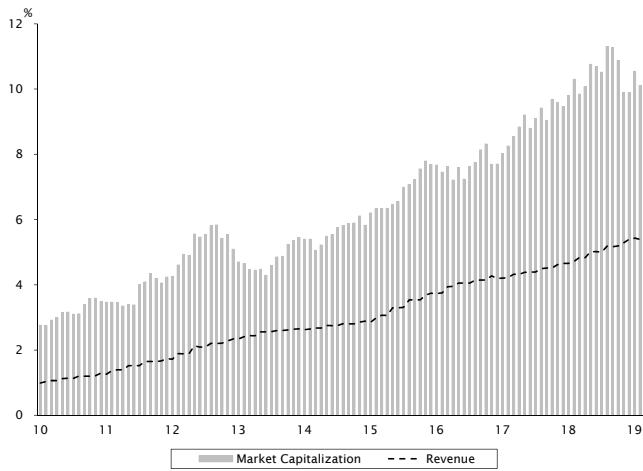


A Lover's Spat or a Bad Breakup?

The Trajectory of Growth

Valentine's Day has come and gone and the market's love affair with FAANG stocks seems to be on firmer ground than it was in Q4 (see Exhibit 1). In the context of a longer history, the Q4 sell-off looks more like a lover's quarrel than a bad breakup. Still, investors are wondering whether the market's affinity for FAANGs will endure or whether the relationship will prove to be more fickle in the coming years. On the surface, the romance appears to be on stable footing. That's because the share of market capitalization ascribed to the FAANGs is about average when compared to the leadership groups of years gone by (see Exhibit 2). The FAANGs also seem to be pulling their weight – and then some – when it comes to revenue growth (see Exhibit 3). The aim of this report is to comprehend the durability of that revenue trajectory and to determine whether the costs needed to achieve it will spoil cash flow margins that've served to underpin the love affair.

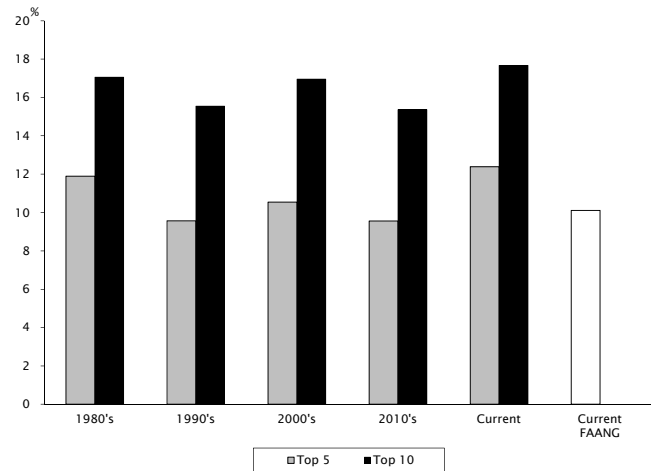
Exhibit 1: FAANG Stocks¹
Share of Aggregate Revenue and Market Capitalization²
2010 Through Mid-February 2019



Source: Empirical Research Partners Analysis.

¹ Facebook, Apple, Amazon, Netflix and Google / Alphabet.
² Share of the largest 750 stocks. Excludes financials.

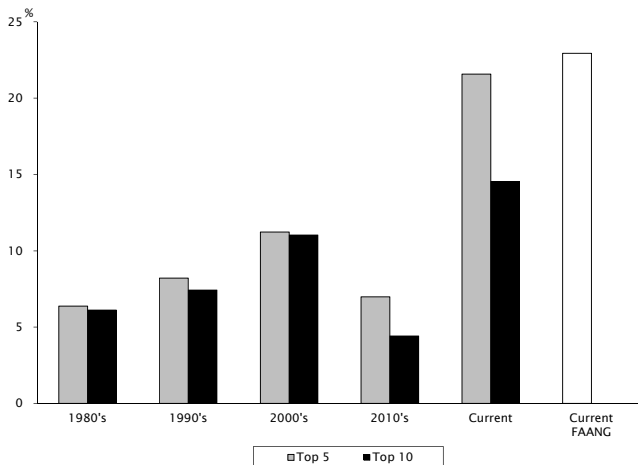
Exhibit 2: Mega-Caps and the FAANG Stocks¹
Share of Aggregate Market Capitalization²
1980 Through Mid-February 2019



Source: Empirical Research Partners Analysis.

¹ Top 5 and 10 stocks by market capitalization. Excludes financials.
² Share of aggregate capitalization for the largest 750 stocks. Average across periods.

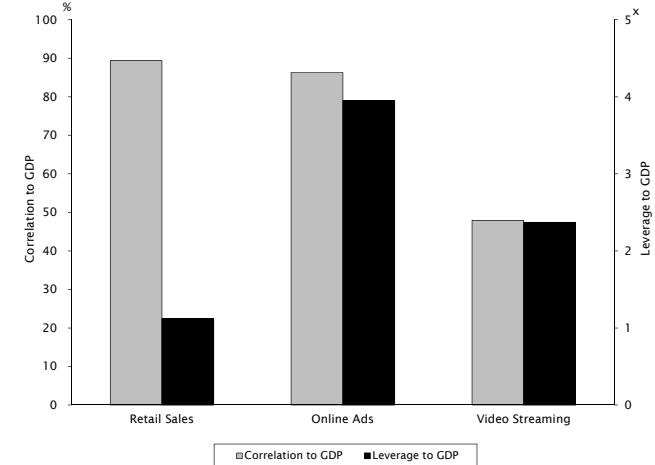
Exhibit 3: Mega-Caps and the FAANG Stocks¹
Revenue Growth
1980 Through Mid-February 2019



Source: Empirical Research Partners Analysis.

¹ Top 5 and 10 stocks by market capitalization. Excludes financials. Average across periods

Exhibit 4: The Cyclicity of Disruptive Businesses
Correlation and Leverage of Revenue to GDP Growth¹
2007 Through 2018



Source: Bureau of Economic Analysis, Census Bureau, Interactive Advertising Bureau, Empirical Research Partners Analysis.

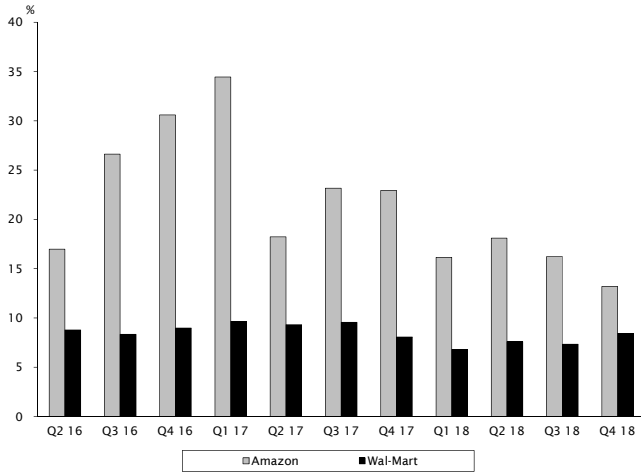
¹ Correlations are cumulative and begin after five years of history.

Gauging Maturity with Cyclicality

We begin by exploring the outlook for revenue growth through the lens of cyclicality. For starters, it's important to realize that each of the five FAANG stocks operates in a cyclical industry. The grey bars in Exhibit 4 (overleaf) depict the correlation of each industry's revenue growth with GDP beginning in 2007. The black bars illustrate the leverage, or beta to GDP growth. Apple was the first to experience a growth air pocket and it took some time for the market to adjust. More recently, Amazon has seen revenue growth in its core retail business begin to slow. Its share of incremental retail sales has dropped to *only* 15% from a previous average that was closer to 25% (see Exhibit 5). The incremental share is still triple the company's baseline share of 5%, but it's hard to miss the fact that incremental dollar growth is now converging towards that of a more mature Wal-Mart.

There's some merit in the notion that Amazon's business might be countercyclical. After all, its biggest incremental market share gains came when retail sales growth was anemic at +3%, but it's been more like +5% lately. The data don't seem to corroborate the view, however. In Exhibit 6 we plot the company's North American revenue growth against that of aggregate retail sales excluding autos and gasoline. The points are more upward sloping than downward, indicating a relationship that's pro-cyclical.

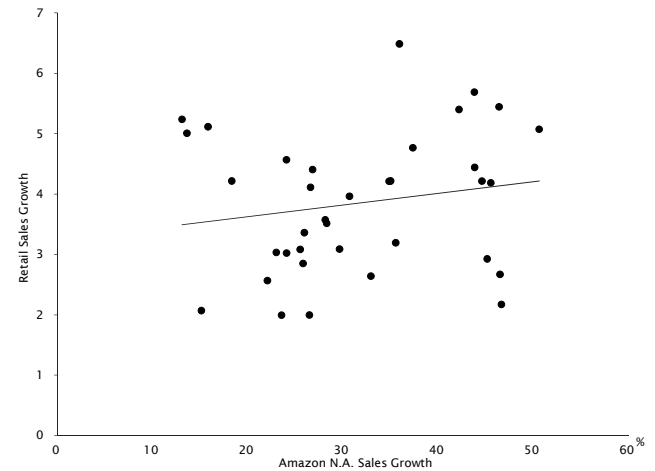
Exhibit 5: Amazon and Wal-Mart Share of Incremental Retail Sales¹ Q2 2016 Through 2018E



Source: Census Bureau, Corporate Reports, Empirical Research Partners Analysis and Estimates.

¹ Retail sales excluding autos and gasoline. Wal-Mart U.S. measured on a trailing twelve-month basis to account for fiscal year. Amazon sales for U.S. only and are adjusted to reflect third-party sales at gross merchandise value.

Exhibit 6: Amazon North American Revenues and U.S. Retail Sales Growth¹ Year-over-Year Change 2010 Through Q4 2018



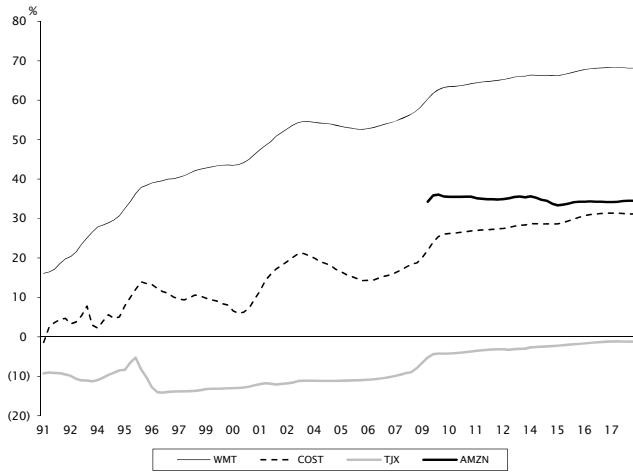
Source: Census Bureau, Corporate Reports, Empirical Research Partners Analysis and Estimates.

¹ Retail sales excluding autos and gasoline.

Cyclicality tends to increase as businesses mature over time. When Wal-Mart was in its heyday, sales growth was only lightly correlated with GDP. As it matured and its sales base became gigantic, the company's business began to mimic the broader economic environment. Amazon's experience has been less dramatic so far. It seems to have nestled in squarely between Wal-Mart and TJX when it comes to cyclicality (see Exhibit 7). The latter has proven to be the most countercyclical of the bunch we analyzed. Amazon and Costco share a lot of common, so we're not surprised to see the two converge on this score. We often think the two companies might've been twins separated at birth, since each operates warehouses with no stores, prefers fast inventory turnover to high margins, and charges a membership fee to belong to the club. The fact that both were conceived in Seattle makes the comparison downright creepy.

Amazon surpassed Costco in terms of revenue and market capitalization a long time ago, but Wal-Mart remains a relevant guidepost. In fact, Amazon was on a very familiar course to the one Wal-Mart charted back in the 80's and 90's. The market capitalization of both companies scaled at a similar pace and they grew to represent 2% of aggregate market cap in relatively short order (see Exhibit 8). Amazon had a breakout year or two recently, but this was partly driven by the hyperbolic - and profitable - growth achieved by its AWS unit. From this point forward, investors would hope to see Amazon's trajectory decouple from Wal-Mart's. That's because WMT shares endured years of multiple compression in the late 90's as its Supercenter growth engine plateaued.

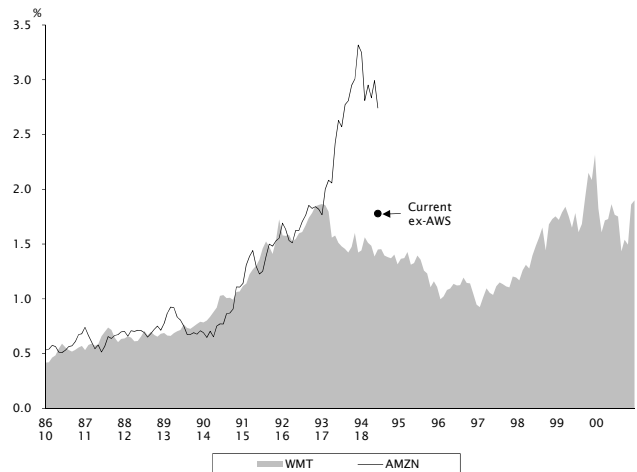
Exhibit 7: The Cyclicalities of Disruptive Retailers
Correlation of Revenue Growth to GDP Growth¹
1991 Through 2018



Source: Bureau of Economic Analysis, Empirical Research Partners Analysis.

¹ Correlations are cumulative and begin after five years of history.

Exhibit 8: Amazon and Wal-Mart
Share of Aggregate Large-Capitalization Enterprise Value^{1,2}
1986 Through Early-February 2019



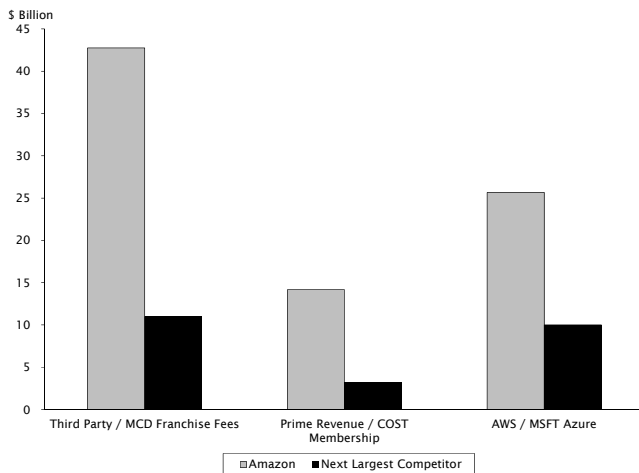
Source: Empirical Research Partners Analysis and Estimates.

¹ Share of aggregate market capitalization excluding financials.

² AWS value assumes 8x forward revenue.

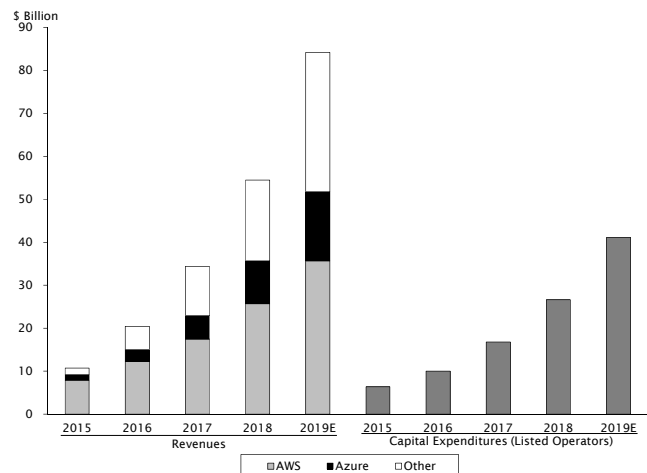
To its credit, Amazon has done a much better job than Wal-Mart did of diversifying its business. In the process it developed three meaningful streams of sticky, or recurring, revenue (see Exhibit 9). Amazon's third-party platform acts a lot like a franchise business that allows merchants to leverage the company's technology, service and brand prowess in exchange for a fee. At \$40 billion, these fees are 4x greater than the franchise income earned by McDonald's, making Amazon the world's largest (de facto) franchisor. Amazon's membership income represents another recurring revenue stream and at \$15 billion, it's 5x the size of Costco's. AWS meanwhile, was the pioneer of cloud computing and it still sports a market share close to 40%, roughly twice the size of its nearest competitor, Azure (see Exhibit 10). The success of Amazon (and Microsoft) has certainly attracted its fair share of competition and investor interest. Exhibit 11 depicts the frequency with which the term "cloud" has been used in earnings calls across the globe.

Exhibit 9: Amazon Recurring Revenue Streams
Comparison to the Next Largest Competitor
2018



Source: Corporate Reports, Empirical Research Partners Analysis and Estimates.

Exhibit 10: The Public Cloud¹
Estimated Sales and Capital Expenditures²
2015 Through 2019E



Source: Corporate Reports, Empirical Research Partners Analysis and Estimates.

¹ Data includes Amazon AWS, Microsoft Azure, Google Cloud, Alibaba Cloud and Salesforce.com Platform. Data presented on a trailing four-quarter basis.

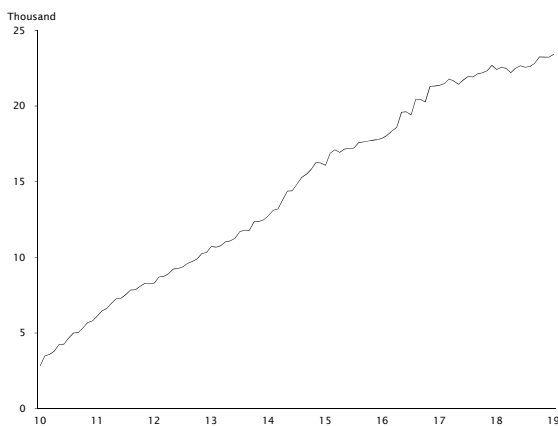
² Capital spending estimates use Amazon AWS as a proxy.

The Cost of Growth is Rising

These and other developing strategies ought to help forestall the company’s maturity, but will they come at a cost? AWS is a highly profitable business with operating margins in the 25% range, but it’s become increasingly capital intensive. As a result, the unit doesn’t generate much in the way of free cash flow despite its competitive lead. Amazon is the only operator in the space that discloses capital spending at the segment level and, according to SEC filings, it devoted 40% of AWS revenue to capex last year. Over the past five years the figure has been closer to 50%.

If we assume the rest of the field spends capital at a similar rate, it would mean that listed companies plowed \$40 billion of investment into the cloud last year. That would amount to almost 4% of aggregate capital spending by companies in our large-cap universe and 15-20% of its growth. As it relates to 2019, Google has already announced plans to spend \$13 billion on U.S.-based projects. Much of that will go towards data centers that support the Google Cloud. We would therefore not be surprised to see cloud spending account for almost 6% of aggregate capital spending in 2019 (see Exhibit 12). And since lovers often quarrel about spending behavior, we’d understand if the market were to treat rising capex budgets with some trepidation. It’s worth noting that the market’s preference for modest capex has been pronounced for technology and telecom stocks over time (see Exhibit 13).

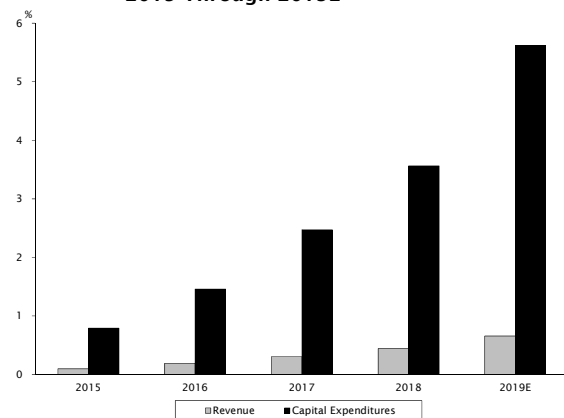
Exhibit 11: The "Cloud"
Number of Mentions in Earnings Calls on a Global Basis¹
2010 Through January 2019



Source: Factset, Empirical Research Partners Analysis.

¹ Data smoothed on a twelve-month basis. Drawn from a universe of global stocks across all market capitalization.

Exhibit 12: The Public Cloud¹
Share of Large-Capitalization Stock Revenue
and Capital Expenditures²
2015 Through 2019E



Source: Corporate Reports, Empirical Research Partners Analysis and Estimates.

¹ Capital spending estimates use Amazon AWS as a proxy.

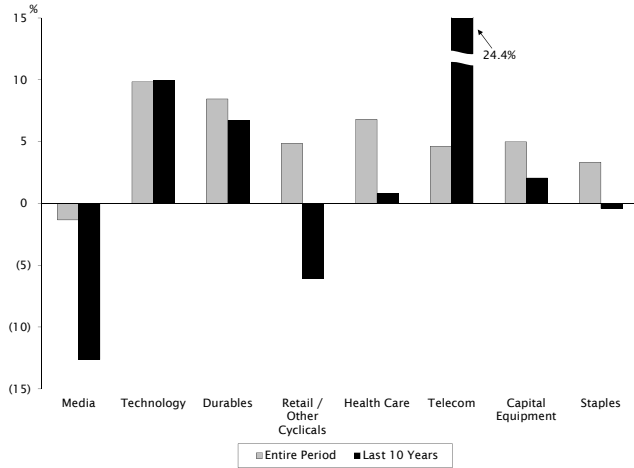
² Excluding financials. Data includes Amazon AWS, Microsoft Azure, Google Cloud, Alibaba Cloud and Salesforce.com Platform.

Netflix isn’t building out a cloud platform just yet, but it’s no stranger to spending. It spent \$13 billion to acquire streaming content last year alone, a figure that’s grown at a +40% compounded rate over the past four years. Analysts expect the pace of content acquisitions to moderate significantly over the next four years, but that’s likely to be a moving target (see Exhibit 14). The trick for Netflix will be to trim the pace of spending while still generating the +25% CAGR in streaming revenue that the market expects. Low barriers to entry will pressure the company to create new content at a hearty pace. And since their library of existing content depreciates in full every three years or so, the spending treadmill will probably get stuck in high gear. If we include content acquisition in the calculation, Netflix and the rest of the FAANGs have greatly increased their capital intensity over the past five years. They now exceed the market’s capex-to-sales ratio by a wide margin (see Exhibit 15).

Is Capex Becoming Consumable?

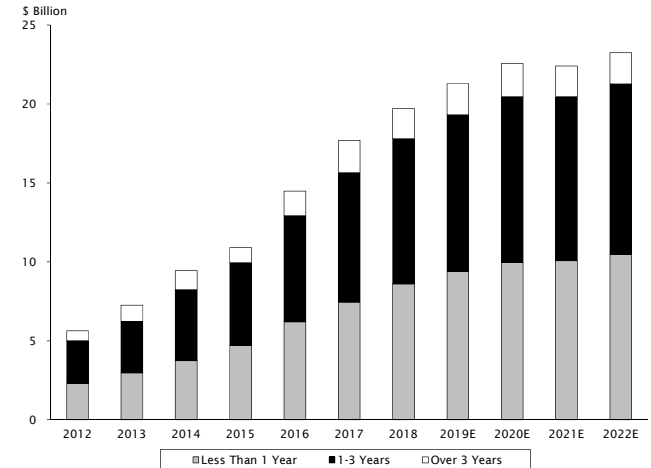
Assets in media and technology may last longer than three years, but they boast the shortest useful lives in the entire market. And since these two sectors account for 20% of the market’s asset base, we’re likely to see elevated levels of maintenance capex persist (see Exhibit 16). Short-lived assets after all, need to be replaced with greater frequency than longer-lived ones. That feature is an important distinction between the current capital spending cycle and others that’ve preceded it. Railroad tracks for example, have an estimated useful life of 38 years, according to the BEA. Power plants and energy pipelines are scheduled to last 40 years. Housing endures for 80 years and land does not depreciate. Each of these industries experienced a bubble at one time or another, but the outcome could be different when a cycle is driven by technology and software that are meant to last no more than 10 years and as little as three.

Exhibit 13: Large-Capitalization Stocks
Lowest-Highest Quintile Returns Spread to
Capital Expenditure Growth by Sector¹
Monthly Data Compounded to Annual Periods
1952 Through 2018



Source: Empirical Research Partners Analysis.

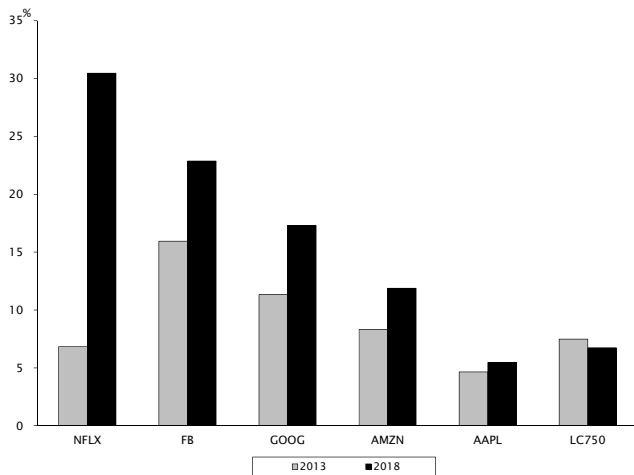
Exhibit 14: Netflix
Content Obligations by Term
2012 Through 2022E



Source: Corporate Reports, Bloomberg, Empirical Research Partners Analysis and Estimates.

¹ Equally-weighted returns. Stocks ranked across the universe.

Exhibit 15: Capital Intensity of FAANG
and Large-Capitalization Stocks¹
Capital Expenditures-to-Revenue²
2013 and 2018

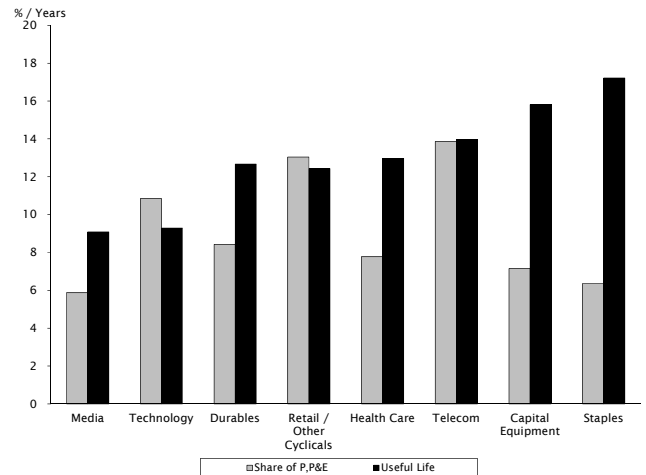


Source: Corporate Reports, Empirical Research Partners Analysis and Estimates.

¹ Large-capitalization stocks excluding financials.

² Netflix includes content acquisition, Amazon includes capital leases and build-to-suit leases.

Exhibit 16: Large-Capitalization Stocks
Share of Property, Plant & Equipment
and the Embedded Average Useful Life¹
2017

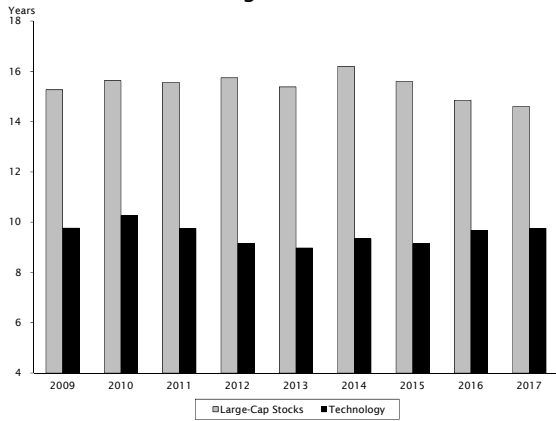


Source: Factset, Empirical Research Partners Analysis.

¹ Useful life defined as gross property, plant & equipment divided by depreciation.

The good news is that excesses are easier to cure when assets are short-lived, but the downside is that capital expenditures can feel like a treadmill that's going nowhere fast. Listed companies competing in the public cloud arena are set to plow \$40 billion into capex in the current year. If useful lives are 3-4 years as Amazon's disclosure seems to indicate, these companies will need to cough up a minimum of \$10-15 billion in maintenance capex just to stand still. The annual cost of simply maintaining the investments made in 2019 would equate to 2% of the market's aggregate capex figure. Asset lives have fallen only modestly across the market as technology has claimed a greater share of the asset base. Technology on its own however has been more stable, but some dynamics that are occurring under the surface might be worth monitoring (see Exhibits 17 and 18). Software is home to some key cloud players, including Microsoft. That segment of the market has seen the most significant downward pressure on useful lives. It's also been responsible for some of the biggest gains in capital spending and they don't look to be subsiding anytime soon (see Exhibit 19).

**Exhibit 17: Large-Capitalization Stocks¹
Useful Life of Property, Plant & Equipment²
2009 Through 2017**

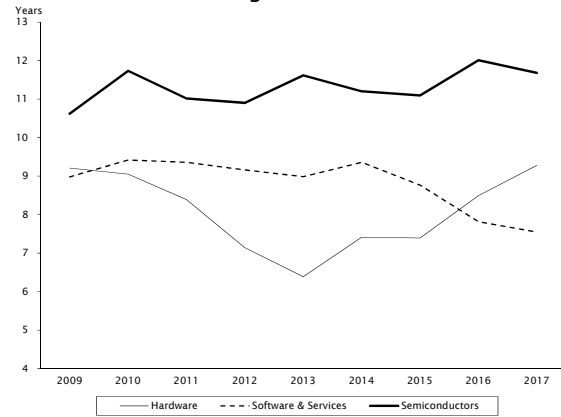


Source: Empirical Research Partners Analysis.

¹ Excludes financials, utilities and energy.

² Useful Life defined as gross property, plant & equipment divided by depreciation.

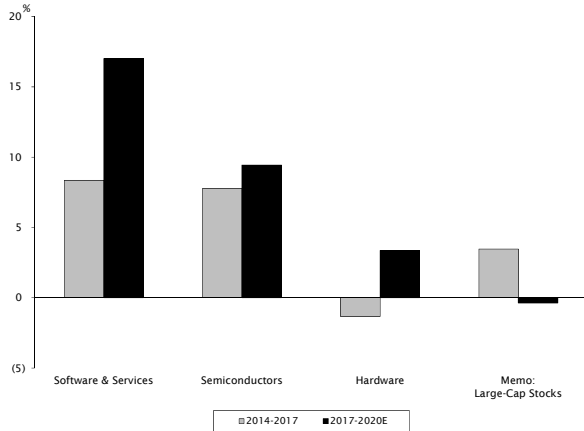
**Exhibit 18: Large-Capitalization Technology Stocks
Useful Life of Property, Plant & Equipment¹
2009 Through 2017**



Source: Empirical Research Partners Analysis.

¹ Useful life defined as gross property, plant & equipment divided by depreciation.

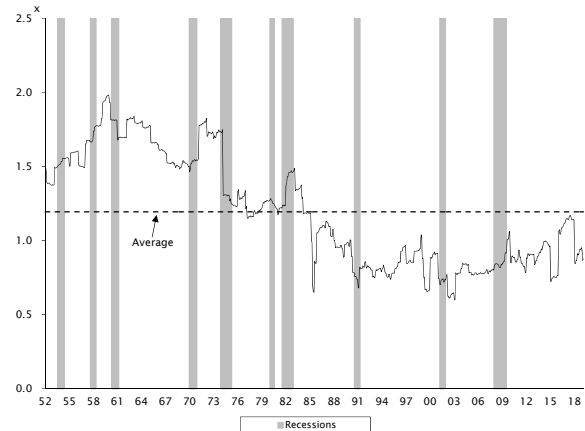
**Exhibit 19: Large-Capitalization Technology Stocks
Capital Expenditure Growth¹
2014 Through 2020E**



Source: Factset, Empirical Research Partners Analysis.

¹ Annualized growth rates.

**Exhibit 20: Mega-Cap Stocks¹
Relative Capital Expenditure-to-Revenue Ratio
1952 Through Mid-February 2019**



Source: NBER, Empirical Research Partners Analysis.

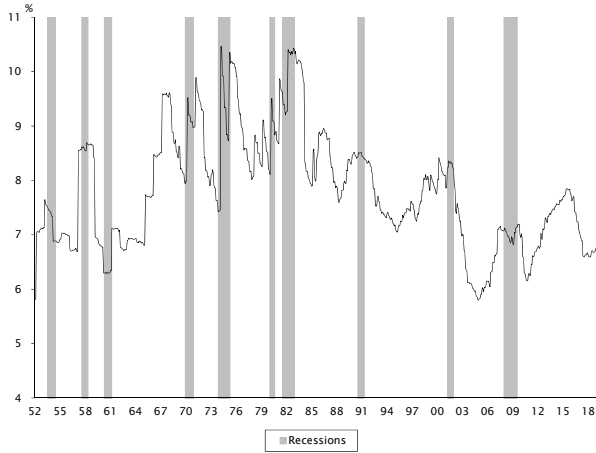
¹ Top 10 stocks by market capitalization. Excludes financials.

Over the past 60 years, the capex-to-revenue ratio for the largest 10 stocks has been +25% higher than that of the market overall. Today the largest stocks sport a ratio that's in line with that historical pattern (see Exhibit 20). The current reading may be more favorable under the surface since the rest of the market has been relatively subdued when it comes to capital spending (see Exhibit 21). The level of spending is also important to consider and it serves to further mitigate the risk. The FAANGs and other mega-cap stocks also have bigger checkbooks than prior regimes did, since gross cash flow margins - before capex - are higher than the ones mega-caps have historically seen (see Exhibit 22). With that as a backdrop, it's hard to get too worked up over the latest increase in capital spending.

Conclusion: Kiss and Make Up

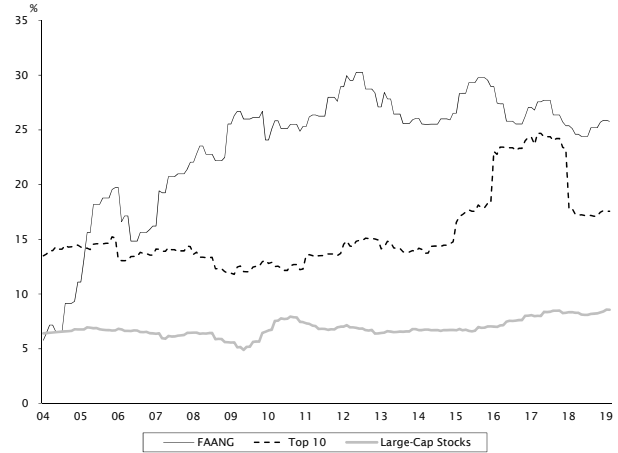
We'll be looking over our shoulder for the next few quarters. It wouldn't be the first time that a rise in capex coincided with the end of an economic cycle. Companies after all, have a habit of investing at the peak whether it's for capex or R&D. The latest rise on spending begs the question of whether the uptick in spending by the FAANGs - and others - augurs a cyclical peak (see Exhibit 23). To get a sense of where we are in the capital spending cycle, we've indexed the growth of fixed assets from the bottom of each post-war recovery. Exhibit 24 shows that we're well below a typical recovery in nominal terms, but that doesn't fully account for the fact that capital spending inputs have been deflationary. Exhibit 25 uses a similar framework in real terms. On this basis, the recovery appears more normal without being over-extended. We're cognizant of the act that the FAANGs, like other big growers, don't work in all settings. Exhibit 26 would suggest that these types of stocks fare best in the middle innings of an economic recovery. If and when the risk of recession rises - like it did last Q4 - it'll be important to reassess. For now, our best advice continues to be to stay the course and forgive the FAANGs for a turbulent end to 2018.

Exhibit 21: Large-Capitalization Stocks
Capital Expenditure-to-Revenue Ratio
1952 Through Mid-February 2019



Source: NBER, Empirical Research Partners Analysis.

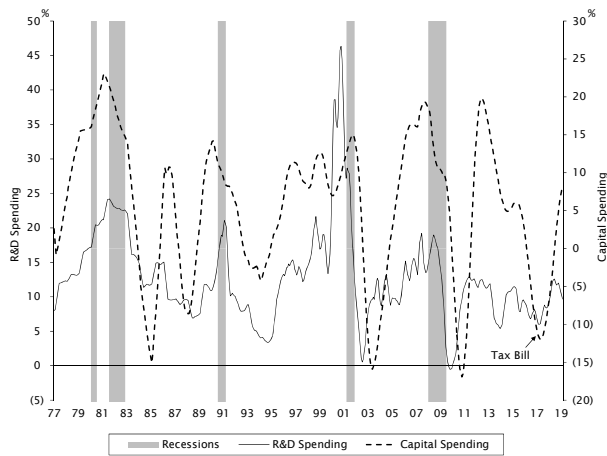
Exhibit 22: Mega-Caps and FAANG Stocks¹
Gross Cash Flow Margin
2004 Through Mid-February 2019



Source: Empirical Research Partners Analysis.

¹ Top 10 stocks by market capitalization.

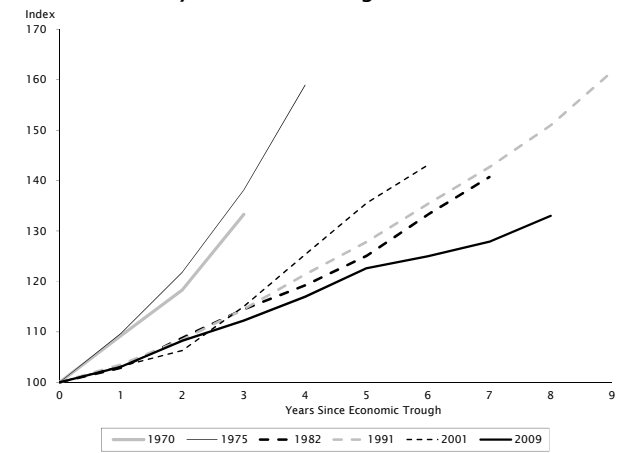
Exhibit 23: Large-Capitalization Stocks
Year-over-Year Change in R&D and Capital Expenditure¹
1977 Through Mid-February 2019



Source: NBER, Empirical Research Partners Analysis.

¹ Data smoothed on a twelve-month basis.

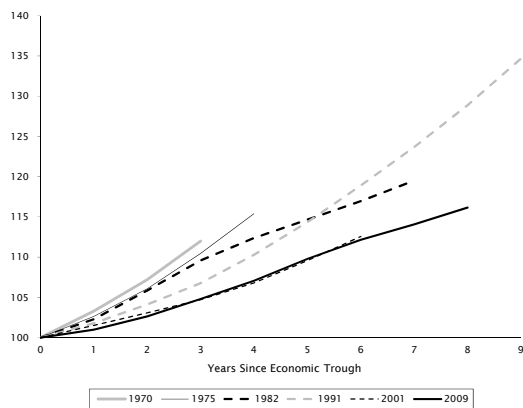
Exhibit 24: Fixed Assets in Nominal Terms¹
Dollar Stock from Trough to the Peak
of the Business Cycle
Six Cycles: 1970 Through 2017



Source: Bureau of Economic Analysis, Empirical Research Partners Analysis.

¹ Nonfinancial corporate assets.

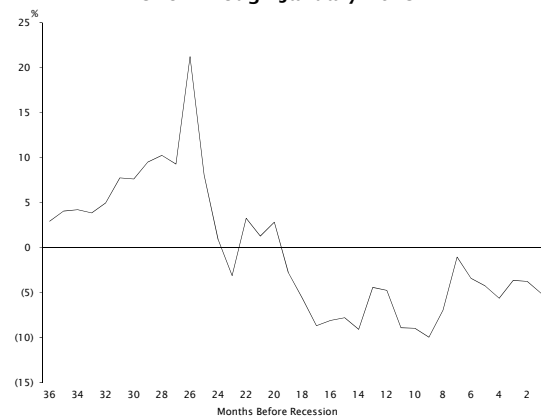
Exhibit 25: Fixed Assets in Real Terms¹
Quantity Stock from Trough to the
Peak of the Business Cycle
Six Cycles: 1970 Through 2017



Source: Bureau of Economic Analysis, Empirical Research Partners Analysis.

¹ Nonfinancial corporate assets.

Exhibit 26: Large-Capitalization Big Growers¹
Relative Returns Prior to Recessions
Forward Twelve-Month Returns
Monthly Data Compounded to Annual
1976 Through January 2019



Source: NBER, Empirical Research Partners Analysis.

¹ Equally-weighted returns.