

## Insight



# Breaking Up Tech Companies Means Breaking Up Teams And The Underlying Technology

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### *Executive Summary*

In the wake of several scandals involving the largest tech companies, many are seeing the size of these companies as the fundamental problem and are calling for the government to break them up. Tech investor [Roger McNamee wants](#) “Google to be broken up into eight or 10 different monopolies.” Machine learning pioneer Yoshua Bengio thinks the centralization of wealth, power, and capability in some of the big tech companies [necessitates breaking them up](#). [NYU professor Scott Galloway](#) has “become 100 percent convinced that it’s time to break these companies up.” Professor [Steven Strauss believes](#) that “absent a compelling technological reason for a monopoly or oligopoly, the government should move to split up large companies.” Jonathan Taplin, who used to run the Annenberg Innovation Lab at the University of Southern California, [thinks the biggest players](#) in the tech space should be broken up. Selwyn Duke, a conservative media personality, [has suggested](#) that tech companies should be broken up, as has Marco Rubio’s 2016 presidential [campaign digital director](#).

These concerns come from people across the ideological spectrum, but their concerns all rest on the fundamental observation that the largest tech companies hold significant market share and thus market power. Some are concerned that their positions stifle competition among tech firms and hurt consumers, while others are concerned that their power allows them to depress wages for workers. Still others are concerned about their impact on the country’s democratic institutions and the ability of people to express their views.

What many advocates for breaking up these companies fail to think through, however, is precisely how breaking up these companies would work, and what the impact would be on both these companies and the broader tech marketplace. Breaking up a company is among the most draconian actions that governments can take, and that fact is only amplified in the case of tech companies. Breaking up tech companies means that government has to break up the firms’ teams and underlying technology. It also has to put into place a legal and regulatory system that keeps the targeted firms separate from other markets. For any firm, this route is strict. For highly integrated tech firms, it is a death sentence.

This paper focuses on three important components. First, the unique nature of competition on platforms is explored. As will be shown, traditional competitive analysis simply falls flat when it is applied to platforms. Building on that description of platform economics, the next section will show why ad divestiture, a common suggestion for forced divestiture, is simply a nonstarter. In the third section, the analysis will dive into the technical problems of simply “breaking up Big Tech,” including the necessity of requiring a wholesale separation of highly technical and integrated systems. Cumulatively, these avenues of analysis demonstrate why this policy would result in a fundamental destruction of value with little consumer benefit.

## *Competition on Platforms*

One of the most prominent arguments for breaking up the largest tech companies is that such a move would increase competition. Advocates of this argument are driven by three interrelation notions. Many believe that competition is lax simply because of the presence of large tech firms. If government were to impose sanctions, the market would be more competitive. And smaller firms would innovate more and consumers would benefit, especially when it comes to privacy.

But the biggest tech firms are fundamentally different than other companies that the government has broken up in the past. In the technical parlance, Google and Facebook are known as “multi-sided platforms,” a term to describe those businesses that create value by facilitating interactions between two or more groups. Visa’s credit card payment system, local TV, newspapers, radio, the OpenTable app, Lyft, Uber, Apple’s iOS, Android, Sony’s PlayStation, and Microsoft’s Xbox are all examples of multi-sided platforms, as are Fandango, Ticketmaster, Airbnb, and eBay.

For Google, Facebook, and other ad-supported social media, the platform brings together consumers with advertisers. In the case of a one-sided business, like a laundromat or a mining company, there is one downstream consumer. Platforms are more complex since value must be balanced across the different participants in a platform, which leads to interdependencies and cross-subsidization. Google and Facebook users pay nothing, while advertising dollars help to maintain the platform.

These companies’ nature as multi-sided platforms means that their [competition can](#) come from at least three places.

First, any single-sided firm on any one side of the platform can put competitive pressure on the platform. Large retail stores, to take one example, often offer store credit or charge cards, which compete with platform payment systems like Visa or Mastercard. Second, multi-sided platforms can compete against other platforms on some but not all sides. Google’s Android operating system acts as a platform for handset manufacturers, users, mobile operators, and software developers. The Apple iPhone runs on a similar system, but it doesn’t have to work with outside handset manufacturers since it produces the iPhone in-house. For Apple, the iPhone also competes against Google’s Android operating system in addition to handset manufacturers such as Samsung, LG, and, Huawei. This final dynamic is the third kind of competition, where multi-sided platforms .

All together, these angles of platform competition make competition asymmetric, eroding the possibility of using simpler analytical tools applied to traditional markets. Consider a platform with two sides, users and advertisers. If users experience an increase in price or a reduction in quality, then they will exit the platform, reducing overall participation. Since advertisers value the platform because they can access users, advertiser demand will drop even if the prices they face stay constant. As a result, user demand will fall further because the total amount of content has dropped, making the platform less valuable to them. ([Research](#) on magazine price changes confirms this theory.) Small changes in price or quality tends to have a much bigger impact in chasing off both groups from the platforms than one-sided goods. Because of their two-sidedness, platforms also tend to have less power over pricing than one-sided companies, lessening their power over consumers.

Facebook is facing this dynamic presently as the company reconsiders aspects of its platform. While it is often assumed that ad-based platforms stack the deck for advertisers, advertisers have long had concerns about online [ad effectiveness](#) and whether or not they’re [getting their money’s worth](#). As Talking Point Memo [reported](#), advertisers “started noticing a new level of platform instability and reductions in targeting efficiency” on

Facebook. If this instability persists, advertisers will move elsewhere. That report concluded by noting the challenge facing Facebook,

For now, keep in mind that Facebook isn't just dealing with a reputational crisis. It's having to clean up the reputational mess by rejiggering parts of its core revenue stream [and] it's not clear it really knows how to do [this]. That creates a lot of unpredictability. More than most people seem to realize.

Put simply, competition analysis for platforms is more complex than the analyses that have typically been used for one-sided companies. If the interdependencies among the sides of the platform aren't carefully considered, then the typical analytical tools will yield incorrect assessments. As scholars David Evans and Richard Schmalensee [explained](#), "The key point is that it is wrong as a matter of economics to ignore significant demand interdependencies among the multiple platform sides." As countless competition regulatory authorities across the world have recognized, multi-sided platforms don't conform to the standard approaches for assessing market definition and market power.

In the case of Google and Facebook, analysts must move away from the simple logic of "these companies are monopolies, therefore break them up" and engage in more pointed and nuanced analysis.

### *Ad Divestiture, Structural Separation, and the Specter of Antitrust Enforcement*

The most forceful advocates of breaking up big tech think that this goal can be achieved by simply cleaving off platforms like Google and Facebook from their ad networks. While that approach may technically be possible, there are a number of reasons it is unlikely to produce either a more competitive environment or promote greater value for consumers.

First, the value of both Facebook and Google comes in creating the platform, which combines users with advertisers. Before the integration of ad networks, the search engine industry was struggling and it was simply not a major player in the Internet ecosystem. In short, the search engines, while convenient, had no economic value. As Michael Moritz, a major investor of Google, [said of those early years](#), "We really couldn't figure out the business model. There was a period where things were looking pretty bleak." But Google didn't pave the way. Rather, [Bill Gross at GoTo.com](#) succeeded in showing everyone how advertising could work to build a business. Google founders Larry Page and Sergey Brin merely adopted the model in 2002 and by the end of the year, the company was profitable for the first time. Marrying the two sides of the platform created value. Tearing them apart will also destroy value.

Second, there is no reason to think multiple ad networks would emerge if Facebook and Google were forced to divest. Breaking off the ad portions of Google and Facebook from the user base and parent company would only create a guaranteed ad-seller to these companies. In practice, the independent ad company would work closely with Facebook and Google to serve ads. The user network would need to share demographic data with the new ad company to ensure that the ads were seen by the intended audiences. Both companies would also need to integrate their services tightly, as the current companies do now, so that ads are served quickly. In other words, while the companies might be structurally separated in some sense, they would be functionally integrated. As antitrust scholars have long noted, contracts achieve the same thing as vertically integrating, so there is little reason to keep the two sides arms-length apart.

Last, this type of ad divestiture would set in motion a radical restructuring of the digital economy. Many of the biggest firms engage in internal cross-subsidization, supporting services that simply aren't profitable on their

own. YouTube is the classic example, as it is widely assumed [not to be profitable](#) (because there isn't specific data, there is no way to know for sure). Google [has also funded](#) broadband through Google Fiber, self-driving cars through Waymo, and AI through Google Brain, which was only recently integrated under the Alphabet, Inc. banner. In just the first quarter of 2016, Alphabet announced they [had spent over \\$800 million](#) on these and other “moonshot” bets—none of which are profitable on their own, but each of which can gestate under the support of Google’s overall profitability. Facebook has also been [underwriting moonshot technologies](#). Not only has it supported Internet access throughout the world through Internet.org and its Terragraph projects, the company backs researchers in AI, computer science, and human-computer interaction. Breaking up the tech companies would likely pare down significantly, if not outright eliminate, the funding that allows these programs to exist.

Cleaving the ad network from these tech companies would have drastic ramifications for the tech marketplace, but it would also erect legal barriers to experimentation and innovation. Splitting up platforms would require explicit limits on those companies from expanding into other markets through line-of-business restrictions as well as an adjudication apparatus to make final judgments.

The AT&T breakup is instructive here. When the company was broken up in the 1980s, a two-part system was created. AT&T was explicitly limited to provide just long-distance service, while the seven regional Baby Bells were limited to local telecommunication service. [Within just four months](#) of the creation of these regional carriers, a wave of waiver requests came in. The local companies wanted to get into new markets, ranging from real-estate services to providing telecommunication service to NASA, and some wanted to get into cellular services. Yet because the regional companies could not provide a long-distance offering, cellular service remained a local affair for years. Only after a waiver was granted in [the early 1990s](#) did cellular service take off.

Breaking up big tech firms will require this kind of permission-first innovation, which is sure to stifle dynamic markets. As one manager and scholar noted, “I witnessed first-hand and on a daily basis the big and small ways the threat of antitrust crippled the company’s strategy. It loomed over every announcement of new products, over every proposal, over every customer and supplier briefing, often explicitly.” The mere threat of antitrust disincentivizes entry and competition—which was supposed to be one of the goals of breaking up these companies.

### *The Technical Problems with Tech Breakups*

Many advocates pushing for tech firms to be broken up haven't thought through *how* this heavy-handed intervention could split up these firms practically. To do so, regulators would be involved in two simultaneous acts. First, the government would have to split up the organizational teams, and then, at the same time, they would have to break the technology stack. Neither process would be pretty.

Tech companies are tightly integrated firms, not holding companies, so the practical act of breaking them apart is far more difficult. It is important here to understand [the basic types](#) of company organization: functional organization and divisional organization. Functional organizations silo the basic functions of an organization; the early stages of large companies typically take this form. Finance, sales, customer service, and administration all work independently of each other, and the department head becomes responsible for maintaining performance. As a company and its product lines also grow, many firms will shift toward a divisional structure. The divisional form separates the company’s operational functions by product in order to optimize efficiencies. Under a divisional structure, each product is essentially a company unto itself. Engineering, finance, sales, and customer service are all unified within one division, which sits separate from other divisions within a company.

Google and Facebook [combine elements of the two structures](#), and are thus considered “matrix form” companies. Both companies rely upon flexible teams to solve problems that tend to cross the normal divisional and functional bounds. Teams prioritize communication and coordination, and [both companies](#) invest heavily to ensure cross-company collaboration.

Joaquin Candela, Facebook’s head of applied machine learning, explained the outcome of these amorphous organizational boundaries to the [Wall Street Journal](#), “If you look at all the engineers at Facebook, more than one in four are users of our AI platform. But more than 70% [of those] aren’t experts.” Facebook engineers, thus, are using AI algorithms without knowing how to build them. As Candela further noted, the system is “a very modular layered cake where you can plug in at any level you want.”

The result is a complex webbing of distinct yet clearly interconnected organizational divisions. This webbing makes implementing a Standard Oil-style trust-busting effort difficult at best.

Adding to that complexity, any trust-busting action would also require breaking up the company’s technology stack — a general name for the suite of technologies powering web sites. For example, [Facebook developed its technology stack](#) in-house to address the unique problems facing Facebook’s vast troves of data. Facebook [created BigPipe](#) to dynamically serve pages faster, [Haystack](#) to store billions of photos efficiently, [Unicorn](#) for [searching the social graph](#), [TAO](#) for [storing graph information](#), [Peregrine](#) for [querying](#), and [MysteryMachine](#) to help with end-to-end performance analysis. The company also [invested billions in](#) data centers to quickly deliver video, and it [split the cost](#) of an undersea cable with Microsoft to speed up information travel. Where do you cut these technologies when splitting up the company?

Google has a suite of tools that countless companies use to deliver services. They have released [Polymer](#), an open-source JavaScript library for building web applications; [AngularJS](#), a web application framework; [AMP](#) to improve the performance of web content and advertisements; [Dart](#) for making applications on Internet of Things devices; [Flutter](#) for Android and iOS mobile apps; [Compute Engine](#), which can launch virtual machines on demand; [App Engine](#) for developing applications on Google data centers; and [Analytics](#) for website traffic reporting, just to name a few.

On the back end, things are [far more integrated](#). The [Google File System](#) provides a block data storage system; [Bigtable](#) drives data storage systems; [Spanner](#) is the company’s globally distributed database; [MapReduce](#) helps with parallel programming; [Dremel](#) offers quick, interactive queries through a column-oriented datastore; and [Borg/Omega](#) acts as cluster manager and scheduler.

Some assume breaking up companies like Google and Facebook will allow competition to flourish like never before, making consumers the ultimate winners. But the more likely outcome is that productivity will be destroyed. For one, large frontier firms [more quickly deploy](#) innovative tech. In part, getting productive ideas to the market is [getting more expensive](#) over time, so companies are having to assemble larger and more specialized teams to be productive. In [one study](#) of steel minimills, it was found that “the productivity effect of teams is significantly larger in more complex production lines, consistent with the result that more complex production lines are more likely to adopt problem-solving teams.”

By their very nature, communication and computer technologies drive down the cost of connectivity and collaboration, helping to [drive productivity](#) within companies. Even though it should be obvious, [several studies](#) have charted the link between the use of computing technologies in a firm and the ability of that company to adjust to consumer demands and to innovate. Top firms use these technologies in spades. Economist James

Bessen summarized the field when [he said](#), “IT system use is associated with greater plant size, greater labor productivity, and greater operating margins for the top four firms in each industry compared to the rest.”

On the outside what looks like an expansive and large firm is more accurately one that is using technology to its fullest—and that efficiency requires scale. Moreover, integrating tech into production processes isn’t easy, since about [25 percent of technology upgrade projects](#) fail outright, while about another fourth don’t show any return on investment for a company. So, the sensible [path to growth and competition](#), which has been suggested by the Organisation for Economic Co-operation and Development, would be for policymakers to help other companies adapt to dynamic markets—not bludgeon the top-performing ones with divestiture.

### *The Cumulative Impact*

Advocates of breaking up tech companies never discuss the intended outcomes of their proposals in any detail because their goals are nebulous. But examining the idea of breaking up the biggest tech companies shows how unworkable it is. When taking an inventory of various regulatory options, antitrust scholar Robert Crandall found the “break ’em all up” method to be the worst among all possible options. As he [explained in a piece](#) for the Brookings Institution,

I conclude that with one exception, the breakup of AT&T in 1984, there is very little evidence that such relief is successful in increasing competition, raising industry output, and reducing prices to consumers. The exception turns out to be a case of overkill because the same results could have been obtained through a simple regulatory rule, obviating the need for vertical divestiture of AT&T.

While breaking up the largest firms might not create more competition or output or even lower prices, both the affected company and the broader industry would change. For firms, being under the watchful eye of the government would cause them to second guess their moves, leading to a decline in innovation. Productivity would drop as teams and technology stacks would be broken. And while more entities would exist, there would be such tight interconnection between the newly separate companies that they might as well be one, as they are now.

The result of splitting up firms would not be more competition or better options for consumers. The result would be a fundamental destruction of value. In the end, it’s not clear how that helps anyone.