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Impact Series

The rise of market power

How an increasingly concentrated corporate America is influencing the US economy

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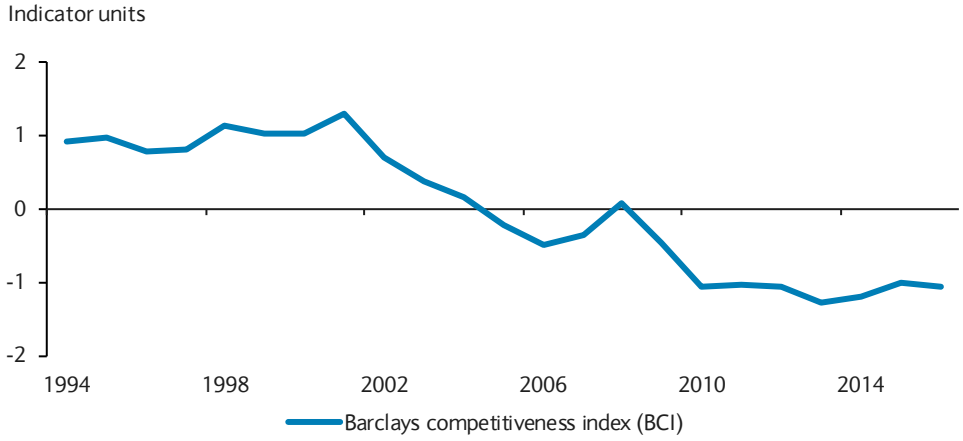
Our key findings

- **Aggregate and industry-level measures of market concentration have risen sharply in the US since the turn of the millennium.** While this is most visible in technology, we found increased concentration in 75% of the sectors we examined.
- **One possible fallout from higher concentration is an intensification of market power and a corresponding reduction in competition**. Companies with market power can extract additional profits by raising prices, suppressing wage growth, and discouraging market entrants. However, competition has not fallen in every sector where concentration has increased. Rising concentration may also be consistent with a winner-take-all narrative, where new technologies enable the most productive firms to capture market share. This highlights one of the dangers of relying too heavily on concentration to measure market power.
- **We introduce the new Barclays Competitiveness Indicator (BCI), which provides a more nuanced view of whether increased concentration is hindering competition within industries.** We document an aggregate decline in competition in the US starting around 2000 (Figure 1). Our metric uses three inputs: investment, labor share, and business dynamism. Each has declined since 2000, in sync with the rise in concentration. Sectors with higher concentration have experienced sharper declines.
- **Rising market power presents a binary risk to equity markets.** On the one hand, it is supportive of equity valuations: it leads to elevated and resilient margins. Left unchecked, companies with market power should continue to outperform. However, concerns about competition have become more prominent among policy makers and politicians recently, raising the risks of intervention. This poses a real risk to companies whose profitability is buoyed by low competition.
- **We believe that policies designed explicitly to revive competition would be more effective at mitigating the ill effects of market power.** We see risks that approaches designed to limit the ability of dominant firms to utilize their position might solidify the position of incumbents. The BCI can distinguish between industries that warrant intervention from those where increased concentration has not led to reduced competition.

FIGURE 1

The Barclays Competitiveness Indicator shows a decline in competition since 2000



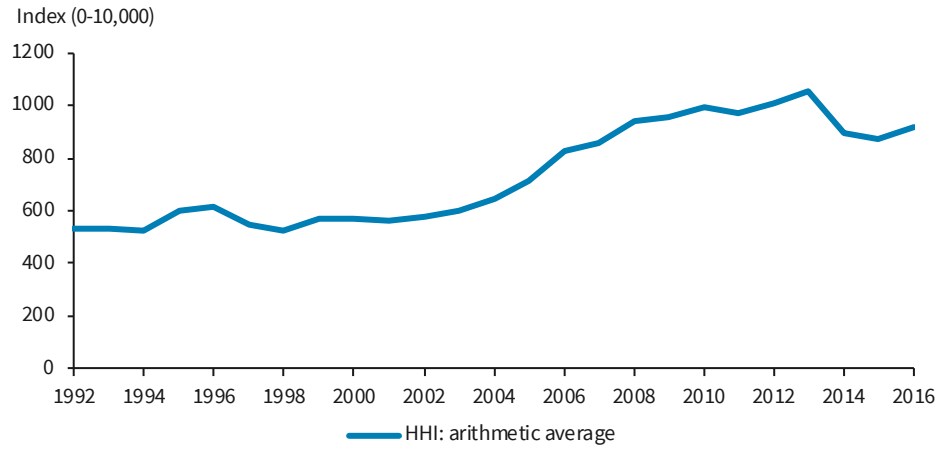
Note: Principal components are estimated after standardising each data series after removing industry means. Sample includes 38 industries, 1993-2016. Source: Barclays Research, using data from the BLS, the BEA and Compustat

US market concentration: Competing narratives

The US economy began to change in a number of ways around the turn of the millennium. One such trend, a gradual and material rise in industrial concentration, has garnered significant attention from academics and policy makers. Concentration is measured in terms of market shares, and across the economy, a smaller and smaller number of firms has come to control larger and larger portions of markets.[1]

This concentration is not limited to the dominant positions enjoyed by a few titans in the technology industry: similar consolidation has occurred across broad swathes of the economy. Since 2000, concentration has increased in nearly 75% of the non-financial sectors we examine. The magnitude of the changes is material; the standard measure of concentration, the Herfindahl–Hirschman Index (HHI), has risen over 60% over the past two decades (Figure 2). For a detailed explanation of how we measure the HHI for a particular industry, see page 7.

FIGURE 2
US industries have become more concentrated, on balance



Source: Barclays Research calculations using company-level Compustat data.

Higher concentration is often associated with a less competitive economy. For example, various US antitrust authorities – the Department of Justice (DoJ), the Federal Trade Commission (FTC), and the Federal Reserve – use measures of concentration to evaluate the implications of proposed mergers. If the association between concentration and diminishing competitiveness is true, these shifts would present a disturbing take on the prevailing direction of the US economy: one in which the private sector is accumulating significant market power. A company with market power has the ability to manipulate prices, including those for the products and services it sells, as well as those that it pays its suppliers and employees.[2] Companies can exploit market power in ways that undermine overall well-being, extracting additional profits by raising consumer prices, price discriminating, suppressing wages, discouraging entry by competitors, or using their influence to tilt regulations and government incentives in their favor.

[1] Our calculations use domestic data from public companies. This is a limited view of concentration, which should also include private companies and international firms. Several academic papers have shown that the conclusions are robust to adjusting for those factors. See, for example, "Investmentless Growth: An Empirical Investigation," Germán Gutiérrez and Thomas Philippon, *Brookings Papers on Economic Activity*, Fall 2017, pp. 89-174.
[2] Technically, a firm can have market power in either or both of the product market or input markets. Power in these markets would not necessarily go hand in hand, but both would generically be related to higher concentration.

However, an alternative hypothesis is that the rise in concentration might reflect an *increase* in competition. According to this winner-take-all narrative, increased concentration is a side effect of intensifying price competition, which forces less efficient firms out of the market. In this view, something (such as heightened price transparency from the internet) has tilted the playing field toward more efficient firms, allowing the most productive firms within a given industry to capture sales from their less efficient rivals.[3]

Macroeconomic and market implications differ sharply

Elevated market power would imply a bleak future for the US, in which crony capitalism at its worst would weigh on the economy's dynamism, innovation and investment in ways that would tend to undermine longer-run growth. With wealth flowing into fewer hands, intensifying concentration would also serve as a significant structural impediment to addressing the problems posed by rising income inequality. Indeed, with companies retaining the power to set product prices, their owners might be able to capture an outsized portion of productivity gains that otherwise would be spread more widely among consumers, wage earners, and other (smaller) producers. Those who benefit from this situation would have incentives to devote resources to sustain the status quo, even if doing so is wasteful from a broader perspective. These and other associated trends would tend to persist absent some effort to check rising market power, such as a major shift in the government's stance towards large dominant firms.

The market power narrative would also pose a binary risk for equity markets. Increases in corporate profits have helped propel significant equity gains over the past decade. If market power is elevated and continues to grow unchecked, profitability and market valuations of incumbent firms will likely continue to grow. At the same time, with the adverse effects of market power attracting greater attention, there are risks that policymakers could take action to limit or reduce this power. Such an outcome could pose risks to equity valuations, especially in sectors where market power has driven gains. While appropriate policy actions to address market power could benefit the economy in the long run, these benefits would take time to materialize, whereas potential fallout on equity prices could be abrupt, particularly for some of the more far-reaching proposals.

By contrast, implications of the "winner-take-all" narrative are seemingly more benign, and perhaps even positive. According to this thesis, the economy is benefiting from super-charged competition, yielding clear gains in terms of efficiency and productivity. Government intervention would not be needed or warranted: with "the invisible hand" disciplining costs and margins, the benefits of innovation would be distributed broadly among consumers, wage earners, and other producers. Moreover, with heightened returns to productivity, incentives to innovate and invest would remain strong and may even intensify. This is because the current crop of "winners" would feel continual pressure to provide better and cheaper products for fear of having their dominant position supplanted by others. Presumably, aggregate data on investment, productivity, and growth would eventually adjust to reflect this new reality.

[3] For example, see "The Fall of the Labor Share and the Rise of Superstar Firms," Autor *et al.*, NBER Working Paper #23396, May 2017 and "Concentrating on the Fall in the Labor Share", Autor *et al.*, *American Economic Review: Papers and Proceedings* 2017, 107(5), 180-185.

Introducing the Barclays Competiveness Indicator

Research approach

We examine rising US concentration, and a variety of its potential economic ramifications that have been highlighted in the literature, using an industry-level panel that encompasses 25 years of data on capital growth, Tobin's Q, labor's share of income, concentration, and business dynamism. Part of our approach is to use this dataset to run panel regressions that examine testable implications that distinguish the two theories. Figure 3 summarizes these regression results, listing a number of trends that have been noted by previous literature, the period when each trend began, and how each correlates with movements in market concentration within industries.[4] The findings corroborate the literature by documenting strong relationships between rising concentration on the one hand and higher corporate profitability, a falling labor share of income, diminished business dynamism, and reduced investment on the other. The timing of these trends appears remarkably consistent: our analysis suggests that the year 2000 represents a structural break for many economic trends, not just industrial concentration. In addition, declines in the labor share, investment, and dynamism were more severe in industries with higher concentration.

Defining the BCI: A new metric of competition

Our new metric of competitiveness – the Barclays Competiveness Indicator (BCI) – moves away from the common interpretation of concentration as a direct proxy for market power. There is a good reason why concentration is commonly used as a metric of competitiveness: it can be estimated for a highly specified market.

However, as the discussion above highlights, from a theoretical standpoint, higher concentration could arise in environments where competitive pressures are very high or very low. Although our analysis provides evidence linking higher concentration with heightened market power, on aggregate, it does not dispel the possibility (or even likelihood) that, in some markets, higher concentration may be a symptom of elevated competition. In other words, one cannot extrapolate conclusions for the overall economy to each sub-sector of the economy where concentration has increased.

Although other measures of competitive pressures – such as the mark-up of prices relative to marginal costs – are cleaner from a theoretical perspective, they are difficult, if not impossible, to measure at a more granular level because companies do not report marginal costs. While a great deal of ongoing work in the economic literature has shown that it is possible to generate plausible aggregate measures of the mark-up, these methodologies are less useful when assessing sub-sectors or specific markets, where appropriate data are difficult to form.[5] This presents a dilemma when working at a more granular market level: clean metrics of competitiveness cannot be readily computed using available data, while the feasible metric (concentration) is theoretically flawed.

[4] The panel regressions that inform the relationships described in Figure 3 all control for industry fixed effects. In other words, for any given variable, we abstract from level differences across industries that persist through time.
[5] These difficulties are apparent when one considers the lack of robustness in measuring firm-level markups highlighted by a comparison of the papers "The Rise of Market Power and the Macroeconomic Implications," Jan De Loecker and Jan Eeckhout, NBER Working Paper #23687, August 2017; "Is Aggregate Market Power Increasing? Production Trends using Financial Statements," James Traina, University of Chicago-Booth New Working Paper Series No. 17, February 2018; and "New Evidence on the Markup of Prices of Marginal Costs and the Role of Mega-Firms in the US Economy," Robert E. Hall, NBER Working Paper #24574, May 2018.

FIGURE 3

Industry panel regressions link important changes in the US economy to rising concentration

Variable	Trend	Relationship to Concentration	Narrative
Corporate profitability	Sharp rise starting in 2000		Both
Labor Share	Decline starting in 2000	More severe in industries with high concentration	Both
Business dynamism	Decline starting in 2000	More severe in industries with high concentration	Market Power
Investment	Decline starting in 2000	More severe in industries with high concentration	Market Power

Labor's share of overall business output has been trending down since the 1970s, but the pace accelerated notably around 2000. Source: Barclays Research

As a remedy, we develop a new measure of competition that employs principal components analysis (PCA). Our PCA explores whether there are common factors that help explain the joint evolution of investment, business dynamism, and labor's share of income. We find that the first unobserved principal component exhibits economic effects consistent with heightened competitive pressures, as it is positively correlated with variables that should be high when market power is low – such as the investment rate, labor's share of income, and business dynamism.[6] Hence, we interpret this component as a new metric of competitive intensity. The BCI methodology paints a picture of aggregate trends in competitiveness that is consistent with the market power narrative (Figure 1). It has declined through time in almost all the broad industry categories we examine. Since the inputs used to construct this factor are generally available at the company level, we can use this approach to create competitiveness metrics for markets composed of a custom basket of companies. In turn, we can use such customized baskets to assess the intensity of competition in market segments that cut across traditional definitions. Unlike concentration-based measures, this metric does not require comprehensive data on the entire set of competitors in a market; the influence of any excluded firms will be felt in data for the firms that we do include. In related research, *Retail & Media: Assessing the elephants in the room*, we examine how the competitive landscape has evolved in different directions across retail and media, despite both sectors showing an increase in concentration. Competition appears to be healthy in retail, but is more likely impaired in media, where we find evidence of increased market power.

A comprehensive industry-level dataset for the US economy

To explore these trends in detail, we collected a comprehensive industry panel dataset using macroeconomic and corporate data from a variety of sources. Figure 4 shows the main variables included in our dataset, the source for each measure, and some information about our underlying calculations (see Appendix A for more details).

Industry definitions differ somewhat across data sources: industry segments used by the Bureau of Economic Analysis (BEA) are somewhat more consolidated than the standard three-digit NAICS classifications used in the Bureau of Labor Statistics (BLS) and Compustat datasets. To impose a consistent sector view, we map from the three-digit NAICS into BEA industry segments.[7] To focus analysis on industries in the nonfinancial, nonfarm business sector with good data coverage, our mapping excludes the financial and utilities sectors, as well as a small number of BEA sectors with insufficient representation in Compustat. Given available annual estimates, the result is a full dataset with 38 industry sectors, with coverage from 1992 to 2016.

[6] We find that this measure is robust when we expand the set of variables in the PCA to include other measurable variables such as productivity growth, Tobin's Q, and the HHI.

[7] More specifically, we borrow the mapping scheme utilized in "Investmentless Growth: An Empirical Investigation," Germán Gutiérrez and Thomas Philippon, *Brookings Papers on Economic Activity*, Fall 2017, pp. 89-174.

FIGURE 4
US industry-level panel dataset, 1992-2016

Variable	Source	Series	Calculations	Level of aggregation
Concentration	Compustat	Sales by segment	Compute market share for each company Compute HHI as sum of squared market shares across companies in each industry	NAICS-3
Tobin's Q	Compustat	Market value of equity Book value of equity Preferred stock Total Debt	Ratio of market value to sum of book value of equity, total debt, and preferred stock	Publicly traded companies
Investment rate	BEA	Growth rate in capital stock	Adjusted for inflation	BEA segments
Labor share	BLS		Nominal labor compensation within industry divided by industry GDP	BEA segments
Business dynamism	BLS	Net jobs added at new or expanding establishments Net jobs lost at closing or contracting establishments	Sum of net jobs added and net jobs lost, divided by total employment	NAICS-3

Source: Barclays Research

Constructing the Herfindahl–Hirschman Index for a particular industry

Throughout our analysis, we measure market concentration using a simple version of the HHI, which is the standard measure of the intensity of competition in the industrial organization literature and is the main measure for merger analysis by the antitrust authorities. (That said, for reasons explained below, we believe it is at best an imperfect indicator of competition.)

We form the HHI for a particular industry by summing squared market shares of all the public firms operating within it. Thus, for a monopolist, the index is 10000, whereas for an industry with only atomistic firms, the index would approach zero. Annual sales shares for each firm are formed using sales data reported in Compustat. Figure 2 shows the average sales share across the 38 industries in our panel. According to this measure, concentration was relatively stable through the 1990s, began increasing in 2000, and levelled over the past several years. All told, the cross-industry averages show that the average HHI increased 60% between 1992 and 2016, with all of the rise occurring after 2000. Qualitatively, this uptrend is also apparent within the vast majority of sectors: 75% of the sectors we examine were more concentrated in 2016 than in 1992.

We make several simplifying assumptions in our HHI calculation. First, we include only domestic firms, leading us to overestimate concentration in domestic industries with significant import penetration (and/or less significant export content). Since the post-millennial period includes the emergence of China as a major manufacturing center, it is likely that import penetration increased for some industries (mostly within manufacturing) even as some domestic firms exited. In principle, this could cause our dataset to overstate the intensification of measured concentration, after accounting for competition from overseas competitors.[8] Second, since Compustat includes only publicly traded firms, our

[8] There are some attempts in the economic literature to adjust for import penetration (such as "Globalization, markups and U.S. welfare," R.C. Feenstra, and D. E. Weinstein. *Journal of Political Economy*, 2017), but such approaches are complex and require several ambitious assumptions. Despite the possibility that our approach biases our results, our conclusions are qualitatively similar to those that make these adjustments.

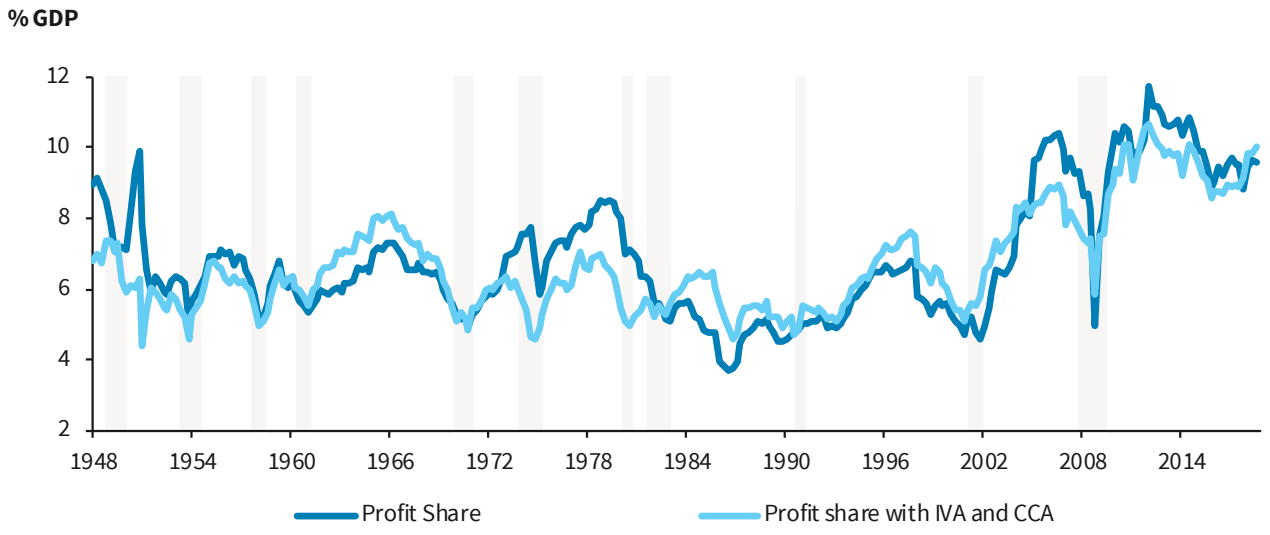
measure accounts for public companies only and therefore may skew the evolution of concentration. Despite these potential sources of bias, we find that our measure is qualitatively similar to those from other studies that attempt to adjust for such influences.[9]

A final note of caution in interpreting our HHIs – and measures of concentration more generally – is that they are computed for a specific market or sector and therefore depend both on an accurate definition of what constitutes a market and an accurate categorization of firms within that market. Defining markets can be difficult because the business and consumer landscape evolves rapidly. For example, not long ago, very few would have anticipated that Netflix and Amazon would venture outside of their traditional online business segments to compete with movie studios in producing content. It is almost certain that the BEA segments used in our analysis do not fully reflect this blurring of lines within and between relevant markets.

The link between concentration and market power

There is a sound theoretical basis underpinning economists' focus on increased concentration as a sign of decreased competition. With a limited number of competitors, a company is more likely to be able to dictate terms; the lack of alternatives disrupts the normal disciplining effect of market forces. A company can have power over its product market, its input markets, or both; in the limiting cases with a single seller or buyer, the former is called a monopolist and the latter a monopsonist. Economic analyses usually perceive low concentration as a sign that companies lack market power. That is, as the number and scale of competitors faced by a company increases, it loses the ability to influence prices: if it charges too much for its products, its customers move to a competitor, and if it pays its suppliers or workers too little, they will tend to move to competitors. In other words, the supposition is that with low levels of concentration, market forces will dictate terms, rather than the company itself.

FIGURE 5
After-tax corporate profits have risen as a share of GDP since 2000



Source: Bureau of Economic Analysis, Haver Analytics, Barclays Research

[9] In particular, our measures are similar to those shown in "Investmentless Growth: An Empirical Investigation," Germán Gutiérrez and Thomas Philippon, *Brookings Papers on Economic Activity*, Fall 2017, pp. 89-174.

All else equal, one would expect companies with market power to be more profitable. By boosting prices relative to competitive levels, companies raise their margins, even if doing so means somewhat lower sales volumes. Profitability can also derive from market power in input markets, which allows firms to pay their suppliers less for inputs, pay workers less, or both. Large companies may also use their influence to tilt the regulatory environment in their favor or to gain tax incentives from local jurisdictions. The ability of large firms to pull such levers may help explain why corporate profits have risen sharply as a share of income since 2000, just as concentration began to increase (Figure 5).

However, while concentration is consistent with a rise in market power, elevated corporate profitability is hardly conclusive evidence; in fact, a number of critiques have challenged the claim that market power has risen. Here, we address three: the apparent disparity between supposed pricing power and subdued inflation; the perception that many of the largest and most dominant firms are also the most innovative and dynamic; and the claim that the linkage between concentration and competition may actually go in the opposite direction. Of these critiques, we believe only the third poses a meaningful challenge that warrants deeper exploration.

Lack of inflation

It seems natural to reason that inflation would be a consequence of elevated market power. Dominant firms can take advantage of their position by charging higher prices, which, if widespread enough, ought to show up in aggregate price statistics. Yet inflation has remained subdued, despite years of accommodative monetary policy.

This critique ignores at least two factors. First, aggregate inflation statistics are affected by a number of confounding influences. Particularly important among these are effects from productivity growth and low-cost import penetration, which tend to reduce costs over time. These pressures differ substantially across sectors, often in ways that may be unrelated to market power. For example, cross-sector differences in productivity growth and import penetration are a key reason why consumer goods inflation is generally very low (or even negative) while services inflation is positive. Despite this discrepancy, it is quite possible that firms in both sectors have market power and are able to sustain sizeable margins after taking account of differences in the evolution of their costs of inputs and production. To assess the role of market power, a careful analysis would need to account for these influences.

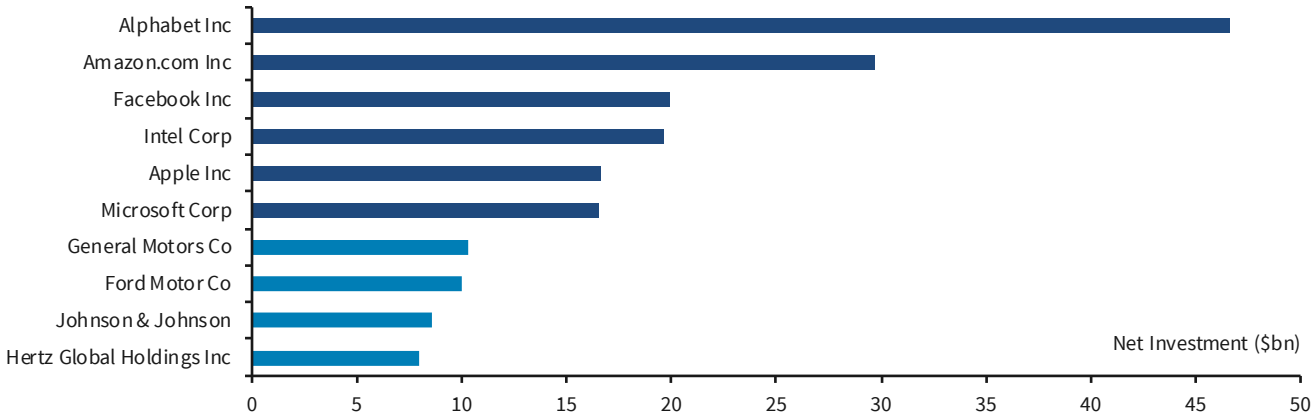
Second, exercising market power brings risks – chiefly regarding antitrust enforcement – since abusing a dominant position is illegal in the US.[10] The principal lens that antitrust authorities look through when investigating potential antitrust abuses is consumer prices; specifically, a rise in prices is potential evidence of an abuse of market power. As a result, entities have incentives to exercise power through other means. For example, they can utilize their leverage on suppliers and workers to limit cost increases, thereby allowing them to sustain – or even raise – mark-ups without drawing the ire of the authorities. Indeed, given the emphasis that antitrust authorities place on prices, rather than margins, it is no surprise that dominant firms have found alternative ways to profit from their power.

Dominant firms tend to be the most innovative and dynamic

Another critique of the market power narrative is that the most obvious firms that may have dominant positions – the biggest technology companies – are also the most dynamic and innovative. In fact, among the ten companies in the S&P 500 with the highest absolute levels of capital expenditures, the top six are high-tech (Figure 6). It seems natural to question how companies driving the most impressive technological advancements could be responsible for undermining competitiveness and efficiency.

[10] Amazon's Antitrust Paradox, Lina M. Khan, *The Yale Law Journal*, January 2017.

FIGURE 6
Tech giants dominate the list of the top 10 S&P companies in terms of capital expenditures



Note: Net of depreciation and amortization, includes outlays on research and development. Source: Compustat., Barclays Research

Our response is that one cannot assess the overall economy's dynamism using just a handful of firms, as the effects of market dominance are likely felt more broadly. In other words, if dominance by several large firms is depressing aggregate investment and technological innovation, the magnitude of investment and innovation by those large firms is beside the point. Indeed, these dominant firms may be investing and innovating just enough to keep at bay prospective competitors that would otherwise enter, invest, and innovate. To assess the broader consequences of market dominance, we must rely on larger industry trends, rather than outputs of individual companies.

Winner take all: A heightened competition alternative

The most credible critique of the claim that market power has intensified is that it usually proceeds from observed measures of concentration, which is a flawed proxy for the intensity of competition. This flaw exists, in part, because a market must be contestable in order to reap the benefits of competition, regardless of its concentration. Indeed, even if a firm has no competitors, it may still lack power if the threat of entrants prevents it from abusing its position.

The idea that market concentration need not entail market power is closely associated with the winner-take-all narrative. In this view, concentration is a symptom of heightened competition, which is driving out the least efficient firms in many industries.[11] This theory relies on differences in productivity and profitability across firms, which is a well-established fact in many industries.[12] Customers tend to migrate to firms that can provide similar products and services at lower prices. Moreover, once a winner-take-all dynamic takes shape, it can become entrenched by other self-reinforcing advantages that can accompany size and scope, such as scale economies, network externalities, and enhanced ability to collect and exploit customer data.

The key insight of the winner-take-all narrative is that markets may be becoming more contestable precisely because potential gains from even small advantages have increased.

[11] For example, see "The Fall of the Labor Share and the Rise of Superstar Firms," David Autor *et al.*, NBER Working Paper #23396, as well as "Concentrating on the Fall in the Labor Share," David Autor *et al.*, *American Economic Review*, 2017, 107(5), 180-185.
[12] For example, see "Firming Up Inequality," J. Song *et al.*, *The Quarterly Journal of Economics*, 134(1), February 2018 and "The Best versus the Rest: The Global Productivity Slowdown, Divergence across Firms and the Role of Public Policy." D. Andrews *et al.*, OECD Productivity Working Papers No. 5, 2016.

These gains may owe to greater price transparency, which unleashes a dynamic that allows firms to better exploit their advantages, regardless of source.

One example of scale economies is the effect that online shopping has had on the retail landscape. In a world with greater price transparency, smaller electronics stores compete on an even weaker footing with the likes of Amazon and Best Buy, which benefit from various scale economies such as the ability to buy in bulk, exploit loss leaders, and draw upon national shipping capabilities. However, firms could also gain dominance by making process innovations, developing more efficient supply chains, and using new forms of technology. Regardless of how these advantages are derived, the outcome of this dynamic would be both an increase in concentration – as the less efficient firms lose market share – and enhanced incentives to invest and innovate. Ideally, the pernicious effects of low competition would not manifest, as firms in even the most concentrated markets must constantly guard against prospective new entrants.

This narrative seems consistent with at least some of the macro phenomena discussed above. Among other things, corporate profitability would tend to rise in a winner-take-all economy because the largest and most profitable firms capture greater market share, while the persistence of low inflation could indicate that at least some efficiency gains are being passed on to consumers through prices.

The two narratives may not be mutually exclusive

Although these narratives have very different macro and market implications, differentiating between them is difficult, in part because they both appear to contain elements of truth. Recent debates, such as well-publicized concerns about the privacy of data for customers in the technology sector, have highlighted the omnipresent nature of the largest companies in our lives. While the expanding footprint of dominant companies may be less obvious in other sectors, such concerns are not limited to big tech. Indeed, they are all the more obvious when one considers the limited options available to consumers in some markets and the anecdotal evidence that dominant companies are using (or abusing) their position to disadvantage competitors or suppliers.

At the same time, the trend toward price transparency and heightened price competition emphasized by “winner take all” is evident in a number of sectors where competitive dynamics appear to have intensified. Signs of heightened price competition in these sectors – readily apparent to anyone who shops online – are difficult to square with traditional notions of how firms wield market power. Indeed, in some sectors – such as ride sharing – large firms have risen to prominence precisely because they have been able to disrupt entrenched interests.

It is important to recognize that these two narratives need not be mutually exclusive. Companies are not born with market power; they have to acquire it. Shocks to the competitive landscape may reward the most productive firms, which then find themselves in a dominant position that they may subsequently seek to defend and exploit in ways that undermine collective well-being. At any given time, different industries may be in different stages of this transition, meaning that both phenomena could be occurring simultaneously.

Concentration, labor share, dynamism, and investment

To help differentiate between these narratives, we examine the relationship between concentration and three important economic trends of the past 20 years: the decline in labor's share of aggregate income, the decline in business dynamism, and the decline in the investment rate (or rate of increase in the capital stock).

We choose these trends for several reasons. First, they are of concern to the US economy, suggestive of an environment with more limited opportunity and innovation. Second, they can all be linked to rising market power on theoretical grounds – each is a characteristic we would expect in industries composed of increasingly dominant firms. Finally, they are measurable at multiple levels of granularity; that is, we can measure them (reasonably) cleanly across the entire US economy, at the industry level, and even at the company level. The industry level is particularly important in the current context, as it allows us to sidestep aforementioned problems in interpreting concentration measures for specific markets by examining the cross-sectoral relationship between these trends and changes in concentration. The fact that these variables can be measured at the company level is important for assessing competitive pressures at the sub-sector level, something we do in our companion report, *Retail & Media: Assessing the elephants in the room*.

Both narratives speak to declines in labor's share of total income

In the market power case, labor share tends to decline, for two reasons. The first is that firms with power in product markets can charge prices above marginal costs and, thus, earn excess profits. The second is that firms with pricing power in a given input market (including the labor market) can pay less for that input than it will contribute to marginal revenue.[13] In both scenarios, a greater share of a firm's income would flow to shareholders, on aggregate. In the winner-take-all case, a greater proportion of overall activity shifts to more efficient firms, which, empirically, tend to distribute more of their income to shareholders. The outcome of this compositional shift is a decline in labor's share of aggregate income, albeit for different reasons.

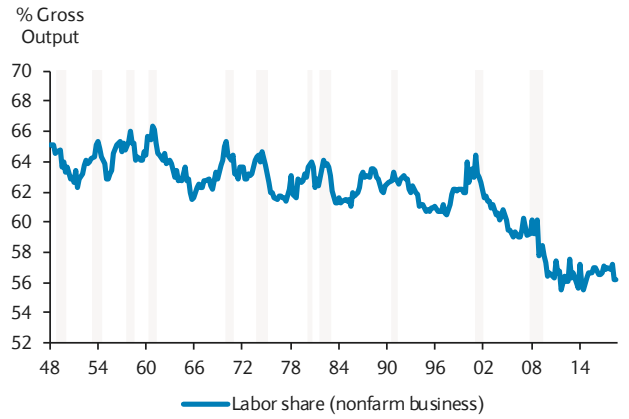
Figure 7 shows trends in the labor's share of aggregate income (GDP) in the nonfarm business sector.[14] To form this share, we use the measure of labor compensation from BEA industry data for the nonfarm business sector, which includes overall wages and salaries as well as bonuses and employer-provided benefits.[15] It is apparent from these aggregate data that the labor share began to fall after 2000, from a peak of 64% in 2000 to just 56% in 2016. This sharp decline is well outside the bounds of available experience: prior to that decline, the share had never fallen below 60% of income since the 1940s. Most of the recent decrease occurred between 2000 and 2010, whereas over the past several years, the trend has flattened. A similar trend is evident across most of the industries in our panel: two-thirds of the industries had a lower labor share in 2016 than in 1993.

Figure 8 examines how the trend in the labor share relates to the trend in concentration. We run panel regressions of this share on our measure of concentration (the HHI), with additional controls for industry fixed effects (which account for unobserved effects from fixed industry variables).

[13] It is not obvious that a dominant position in product markets necessarily leads to monopsony power in labor markets. However, some studies document declines in the number of employers in various labor markets (by industry, region or commuting area), indicating that both types of market power may be occurring.
[14] The portion of pretax income that does not flow to labor includes returns to capital, economic profits, and indirect taxes. Economic profits are defined somewhat differently than accounting profits: the latter include all returns to capital, whereas the former are returns over and above the market cost of capital ("rents"). While accounting profits have clearly risen, there is debate in the literature about whether this reflects higher rents.
[15] Among other things, this would incorporate higher benefit costs, such as the increased cost of employer-provided healthcare.

FIGURE 7

Labor's share of nonfarm business income has been consistently lower since the early 2000s



Source: Bureau of Labor Statistics, Haver Analytics, Barclays Research

FIGURE 8

Regression of labor share against lagged concentration and fixed industry effects

Dependent Variable: Labor Share of Income			
Variable	**Coefficient**	**Std Error**	**t-value**
Post 2000	-0.034	0.003	-9.78*
HHI	-0.051	0.026	-1.94*
HHI	0.029	0.029	0.99
Post 2000	-0.033	0.004	-9.08*

Note: All regressions control for industry fixed effects. HHI is lagged when included as an explanatory variable. For t-values, * signifies statistical significance of at least10%. Sample includes 38 industries, 1993-2016. Shaded rows separate different specifications.
Source: Barclays Research, using data from the BEA and Compustat

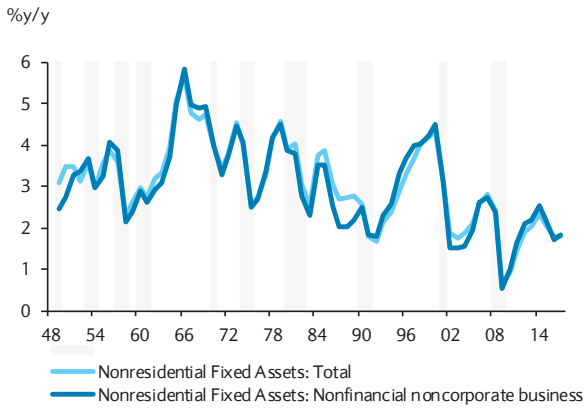
The results show that higher concentration has been associated with declines in the labor share and confirm that the latter intensified around 2000. When we run this regression with only the HHI and industry fixed effects, the estimated coefficient on concentration is negative and statistically significant, indicating that higher concentration tends to be associated with a lower labor share. When we add a post-2000 dummy to the regression, the estimated coefficient on concentration is not significant. This suggests that there is insufficient independent variation in concentration within industries to disentangle it from other aggregate influences on the labor share after 2000. Indeed, many economists suspect that other influences contributed to declines in the labor share over this period, such as waning unionization, the penetration of Chinese manufactured imports, cyclical influences in the aftermath of the Global Financial Crisis (GFC), and various technological advances (robotics, machine learning, big data) that substitute for labor.[16]

Slower investment rates are consistent with the market power narrative

The two narratives diverge in their implications for investment. Under market power, investment rates should fall as concentration increases: since dominant firms hold back production, they have less incentive to invest.[17] Firms in markets with less intensive competitive pressures also do not need to spend as much on R&D and other types of investment because they are unlikely to lose share if their products or processes grow stale. On the other hand, the heightened competition in a winner-take-all environment should boost investment because even the most productive firms need to defend their advantage against remaining competitors and prospective entrants.

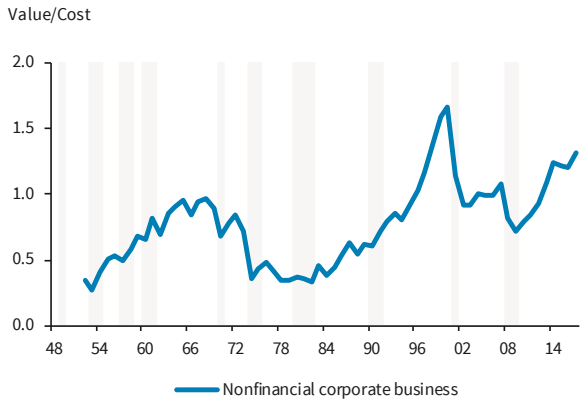
[16] For the last example, see *Macroeconomics of the Machines* from our 2018 Equity Gilt Study.
[17] Although most models of market power imply a negative relationship between market power and investment, this is not true of all of them. Some models suggest firms with market power actually invest more, in order to retain their dominant position, much like in the winner-take-all hypothesis. Empirical work suggests that the standard implication is more likely.

FIGURE 9
Capital accumulation has slowed…



Source: Bureau of Economic Analysis, Haver Analytics, Barclays Research

FIGURE 10
…even though Q is elevated by historical standards.



Source: Flow of Funds Accounts, Bureau of Economic Analysis, Haver Analytics, Barclays Research

Figure 9 shows that capital growth has slowed in the US business sector over the past two decades. To be sure, aggregate growth rates should vary over time, rising when companies perceive that there are many potentially profitable opportunities to exploit and declining when they do not. The standard measurement of the investment opportunities available to a company is Tobin's Q, which is effectively the ratio of market value of a company's existing capital to its replacement cost (Figure 10).[18] The logic is that investors should expect a company with a high ratio of market-to-replacement value to have significant investment opportunities, as otherwise it would not generate sufficient earnings growth to trade at such a premium. At an economy-wide level, it is clear from Figure 10 that even though Q fell following the stock market bust in 2000-01, it has remained elevated by historical terms. Indeed, Q has ascended to levels since the GFC that should, according to the standard theory, be consistent with robust capital accumulation.

This combination of low aggregate investment and high aggregate Q makes sense in the context of market power, as firms that can exploit their power to sustain outsized profits should have both elevated market values and little incentive to expand aggressively. It is harder to reconcile with the heightened competitive pressures envisioned by the winner-take-all narrative.

Figure 11 shows the results of a number of panel regressions that explore the relationship between investment, Q, and concentration across industries. We start with a simple specification on the post-millennium dummy, which shows that there was a clear slowing of net investment (that is, the growth rate of capital) at the turn of the millennium: versus the 1990s, the net investment rate in the typical industry fell 2pp from 2001 onwards.[19] This is a substantial decline: net investment averaged 3.5-4% during the 1990s, so the rate of capital growth fell by about one-half.[20] The second specification is a standard regression of the net investment rate on Tobin's Q in each industry, with controls for industry effects.[21] The slope on Q is positive, as expected: industries with higher Q invest more. To assess whether investment has been low relative to fundamentals, the third specification regresses

[18] As we outline in the appendix, we measure this replacement cost using book values.
[19] Investment declined sharply in 2009, in the aftermath of the financial crisis. As a robustness check, we ran both regressions with data for 2009 omitted and obtained qualitatively equivalent results.
[20] We also document that controlling for industry concentration does not diminish the magnitude of the post-2000 dummy, either with or without controls for Tobin's Q.
[21] We measure the net investment rate by dividing investment by the previous period's capital stock, then deducting the rate of depreciation. This is equivalent to the rate of increase in the capital stock.

net investment rates against Q, industry effects, and a dummy for the post-2000 period.[22] These estimates continue to show a marked decline in investment within industries starting in 2000, even after controlling for Q.

FIGURE 11

The post-2000 slowing of capital growth seems to be linked to the rise in concentration

Dependent Variable: Capital stock growth			
Variable	**Coefficient**	**Std Error**	**t-value**
Post 2000	-0.019	0.002	-8.88*
Q	0.026	0.003	8.75*
Q	0.025	0.003	8.84*
Post 2000	-0.019	0.002	-8.82*
HHI	-0.081	0.021	-3.94*
Q	0.025	0.003	8.41*
HHI	-0.066	0.020	-3.29*
Q	0.025	0.003	8.7*
Post 2000	-0.019	0.002	-8.14*
HHI	-0.021	0.021	-1.00

Note: All regressions control for industry fixed effects. HHI and Q are lagged when included as explanatory variables. For t-values, * signifies statistical significance of at least10%. Sample includes 38 industries, 1993-2016.
Shaded rows separate different specifications. Source: Barclays Research, using data from the BEA and Compustat

The final two specifications in the table consider the role industry concentration has played in the slowdown of capital formation. As shown in the fourth specification, capital growth within industries is negatively associated with intensifying industry concentration. The effect is economically meaningful as well, implying that we would expect capital growth in industries with the largest increases in concentration to decline nearly 2pp – again, a substantial drop relative to average capital growth during the 1990s. When we include concentration as an explanatory variable alongside Q, the coefficient on concentration remains negative and significant. When we also add the post-2000 dummy as an explanatory variable, the coefficient on concentration remains negative, but loses its significance and a good portion of its magnitude, suggesting that other aggregate influences may be playing a role in the broad slowdown of capital growth.

An alternative explanation for the decline in investment is that companies are investing in intangibles, which may not be well reflected in official estimates of capital growth. As the US economy has migrated away from manufacturing and towards services, it is possible that the nature of investment has shifted away from factories and equipment, and into IT, intellectual capital and management skill. This is one reason why we use BEA investment data, rather than a measure that aggregates capital expenditures across firms: BEA estimates ostensibly include many categories of intangibles, whereas capital expenditures reported in Compustat have more variation in scope.[23] To be sure, investments in intangibles are hard to measure, so it is possible that even the BEA investment estimates are biasing downward over time.

[22] This regression is based on a "Investmentless Growth: An Empirical Investigation," Germán Gutiérrez and Thomas Philippon, *Brookings Papers on Economic Activity*, Fall 2017, pp. 89-174. We use lagged Q and lagged HHI in all regressions. The industry dummy variables strip out the substantial inter-industry variation in many of these variables. We omit reporting of fixed effect coefficients throughout. Gutiérrez-Philippon use year dummies and report that these change from positive to negative after 2000. We replicate this result using year dummies and then collapse to the post-2000 variable for ease of exposition.

[23] Another rationale is to capture investment across the entire sector, rather than just the publicly traded firms reported in Compustat. Although we compute Q by taking weighted averages across Compustat firms, we implicitly assume it is a good proxy of sector Q.

Declines in business dynamism are also suggestive of market power

The US has historically been a dynamic economy, with an entrepreneurial streak and a flexible and mobile workforce. While it may remain dynamic relative to other parts of the developed world, measures suggest that it has become less dynamic relative to its own history. There is no standard measure of economic dynamism; instead, economists focus on a broad-based decline in a wide set of metrics that captures aspects of how an economy responds to opportunities and challenges. These include the rate of new business formation, the geographic mobility of workers, the quantity of IPOs, and the rate of employee churn. While none of these is a perfect measure, each indicates that the US is becoming less dynamic: fewer new businesses are being started, people are moving across geographic regions less frequently, fewer companies are being taken public, and workers are switching jobs less frequently.

Heightened market power tends to reduce dynamism through its effects on new business formation and workers. Dominant firms can utilize their power in a number of ways to keep emerging competitors at bay. One example is predatory pricing, where incumbents temporarily undercut new competitors' prices of goods and services to induce operating losses that force them out of business. While this may imply short-term pain for the dominant firm, predators likely retain sufficient resources to withstand even extended periods of losses, so long as they expect to return to a highly profitable position once competition has receded.

Dominant firms could also use market power in one product market to steer customers toward their other products. While this type of behavior is not isolated to technology firms, a number of examples are noteworthy from this industry. For instance, Microsoft was accused in the 1990s of using its dominant position in the operating system market to direct PC users to Internet Explorer. More recently, the EU accused Google of something similar – using its dominant position in internet search to steer customers towards its shopping services, thereby gaining an advantage over other on-line vendors.[24] Finally, even if a start-up does gain traction and begins to challenge a dominant firm, the sheer profitability and scale of the latter can allow it to buy out its competition. In the tech sector, Google's purchase of YouTube and Facebook's buyout of WhatsApp just two of many examples. At the end of the day, all of these behaviors – indeed, even the threat of them – would have the effect of discouraging entrants.

The implications of market power on job switching are obvious. With fewer firms competing, workers in industries with dominant firms have less choice of where to work, and fewer firms compete for them. This tends to result in less job churn. These effects can manifest in obvious ways – such as a one-factory town where the workers have no other options – or less obvious ones, such as non-compete agreements in which franchisees for a given fast-food brand agree not to poach each other's workers.[25] The latter effectively reduces the set of all operators into one large employer, thereby substantially reducing employment options for existing workers. And this phenomenon does not apply just to lower skill workers. In 2010, the DoJ brought an action against five technology and internet companies for agreeing not to poach each other's employees.

By contrast, the winner-take-all narrative is likely to result in higher dynamism, at least temporarily. For example, industries experiencing this effect would be characterized by

[24] Although the theoretical viability of predatory pricing is debatable, there is at least anecdotal evidence that it occurs. The "Chicago School" argues that this is not a viable long-term strategy and that the examples we see areexplained by economies of scale.

[25] Among other places, the trend toward non-compete agreements has been documented in, "A Proposal for Protecting Low-Income Workers from Monopsony and Collusion" by Alan B. Krueger and Eric A. Posner, Policy Proposal 2018-06, The Hamilton Project (Brookings Institute), February 2018.

elevated job churn, from both the winners expanding as they take share, and lesser competitors shrinking or exiting the market.

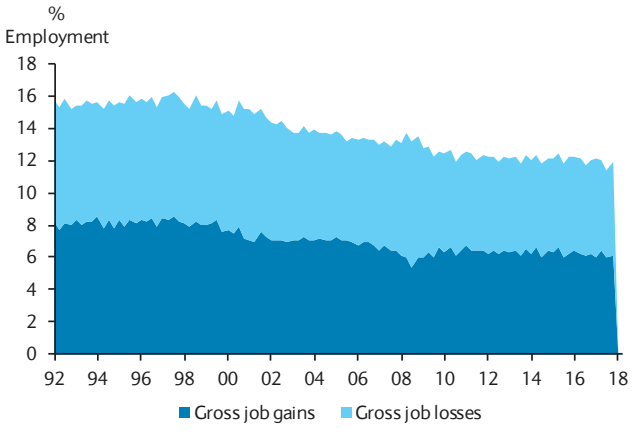
We focus on job churn as a measure of business dynamism. Churn data are available at the sector level from the BLS's Business Employment Dynamics. In our measure, churn in a given industry is defined as the sum of gross job gains in new or expanding establishments plus gross job losses in closing or contracting establishments, divided by total employment.[26] In a more dynamic sector, many businesses will be expanding and contracting, consistent with high rates of churn.

As with investment, job churn has fallen sharply, beginning around 2000 (Figure 12). In this case, the decline is smooth and clearly starts then. The quarterly churn rate was stable at about 15% throughout the 1990s, and is currently about 12% – a decline of over 20%. To be sure, there was a one-time increase in job losses around the time of the GFC that momentarily interrupted the downward trend. However, churn quickly fell back to trend and resumed its steady decline.

All of the 38 industries in our panel had lower churn rates in 2016 than in 1992. However, the extent of these declines varies. As with labor share and investment, panel regressions (Figure 13) link the decline in dynamism to concentration: industries with higher concentration had particularly sharp reductions in job churn. Although this cannot explain all of the post-2000 reduction in churn (the post-2000 indicator retains explanatory power even after including concentration), its effect remains significant.

As with the other economic trends we document, we must be careful not to over-emphasize the potential role that increased concentration is playing on dynamism. This phenomenon likely has other causes as well, particularly since every industry in our panel experienced a decline in churn. An important factor is demographics. One would expect an economy with an aging population to have lower churn, as older workers are less likely to change industries or move regions. In fact, some researchers have argued that demographics could be responsible for the majority of the reduction in job churn and have played an important role in lower new-business formation and declining labor share[27].

FIGURE 12
Job churn has steadily diminished



Source: Census Bureau, Haver Analytics

FIGURE 13
Higher concentration is associated with diminished dynamism

Dependent Variable: Labor churn rate			
Variable	**Coefficient**	**Std Error**	**t-value**
HHI	-0.840	0.074	-11.40*
Post 2000	-0.209	0.006	-32.12*
HHI	-0.357	0.051	-6.97*
Post 2000	-0.199	0.007	-30.35*

Note: All regressions control for industry fixed effects. HHI and Q are lagged when included as explanatory variables. For t-values, * signifies statistical significance of at least10%. Sample includes 38 industries, 1993-2016. Shaded rows separate different specifications. Source: Barclays Research

[26] We choose this metric because it is available from the BLS at the NAICS three-digit level. These data are disaggregated into separate rates of job gains and job losses, which we sum to compute our overall proxy for job churn. An alternative measure, also from the BLS, is the rate of establishment creation and destruction, which yields similar results.

[27] "From Population Growth to Firm Demographics: Implications for Concentration, Entrepreneurship, and Labor Share", Hopenhayn, Neira, Singhania, NBER Working Paper No. 25382, December 2018.

Other influences could include the effect that skills gaps and the rise of two-income households have had on regional mobility. IPOs may have declined because of certain regulatory reforms, such as Sarbanes-Oxley, that made going public less attractive.[28] Although the trend in the churn measure could easily reflect these and other influences, results of our panel regressions indicate that effects from concentration are also at play.

The Barclays Competitiveness Index in action

Although the results above indicate that concentration is linked to several troubling economic trends, they are hardly conclusive regarding a decline in competition, given all the other factors likely at play. An attribution of these trends to reduced competition would be more compelling if the same industries were responsible for each trend, rather than if the trends were more disparately spread through the economy. To address this, we develop the Barclays Competitiveness Indicator, which is premised on measuring the ill effects of competition: we examine the joint evolution of slowing investment, diminished dynamism, and low labor shares across the industries in our sample. We extract this information using a PCA analysis of our industry panel.

Figure 14 shows factor loadings and explained variation from a PCA that includes our industry data for net investment (after accounting for Tobin's Q), job churn, and the labor share.[29] The loadings for the first of these three components line up well with what one would expect from a "competitiveness" metric. That is, holding other factors constant, an increase in such a metric should be associated with increases in all three variables in our system. Stated in terms consistent with an intensification of market power, a reduction in such a metric for any given industry should be associated with diminished job churn, a lower labor share, and a slower capital growth in that industry.

We name this first factor the BCI. Qualitatively, the BCI allows us to examine the trend in competition over time, either in aggregate or for specific industries[30]. We compute it by applying the factor loadings from Figure 14 to the (standardized) investment, churn, and labor share for a given industry. A decline in the BCI over time suggests that the level of competition has decreased, and vice versa.

[28] For example, see "The Sarbanes-Oxley Act and Exit Strategies of Private Firms" by F. Bova et al, *Contemporary Accounting Research*, 31(3), July 2013.

[29] Prior to computing our principal components, we standardized each variable after removing industry fixed effects because we are not specifically interested in explaining differences in the relative magnitude of variation in each of our data series. On the contrary, we do not want our PCA to overemphasize variations in these more volatile series. Similarly, we remove fixed effects because our focus is on time trends in the data series, not relative differences across industries that persist through time.

[30] Quantitatively, if the BCI for a given industry goes from 1 to 0.5, the effect on all three of the variables for that industry (labor share, capital growth, dynamism) is half its initial magnitude.

Aggregate patterns in the BCI are broadly consistent with the market power narratives. Figure 15 shows a time series of the first and second principal components, averaged in each year across the 38 industries in our panel. The first "competitiveness" component – that is, the BCI – follows a clear downward trajectory similar to those of the underlying variables discussed earlier: it was steady until about 2000, dropped rapidly through 2013, then stabilized. Figure 16 compares the distribution of the BCI across industry segments in 1994 to the distribution in 2016. This shows a clear leftward shift in the BCI from 1994 to 2016, with values for the more competitive segments in 2016 generally coinciding with those of the least competitive segments in 1994.[31]

By comparison, loadings for a "winner-take-all" measurement would affect net investment and the labor share in opposite directions. This is the case for the second component in Figure 14, which has a large positive loading for investment, a negative loading for the labor share, and almost no loading for churn. The second winner take all component trends up gradually until the eve of the GFC, spikes upward with the surge of investment in the initial stages of the recovery, then moves sideways (Figure 15).

These results support the view that market power has increased in aggregate in the US economy. The first factor is aligned with the indirect effects of competition; the decline in this factor, therefore, in sync with the rise in concentration, is further evidence that the ill effects of reduced competition are weighing on the economy. However, we cannot extrapolate this to every industry, nor even to every industry that has experienced a rise in concentration. By applying the BCI to specific markets, we can distinguish between cases where concentration is leading to either diminished or elevated competition.

FIGURE 14

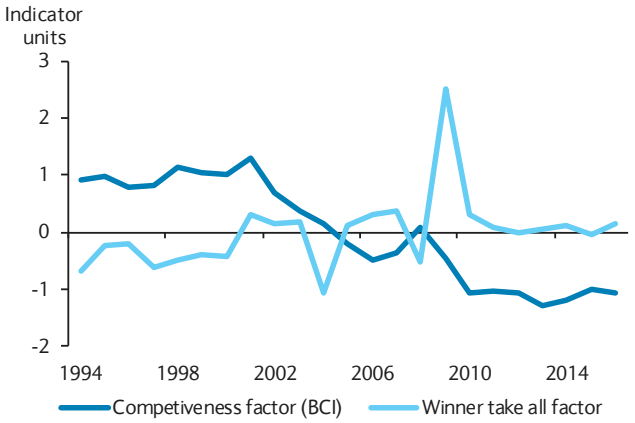
PCA of net investment, churn, and labor share

Variable	Loading for component		
	1	2	3
Job churn	0.71	0.05	0.70
Labor share	0.68	-0.29	-0.67
Net investment	0.17	0.96	-0.24
% of overall variance explained	45	34	21

Note: Principal components are estimated after removing industry means from each data series and standardizing. Sample includes 38 industries, 1993-2016.
Source: Barclays Research, using data from the BLS, the BEA and Compustat

FIGURE 15

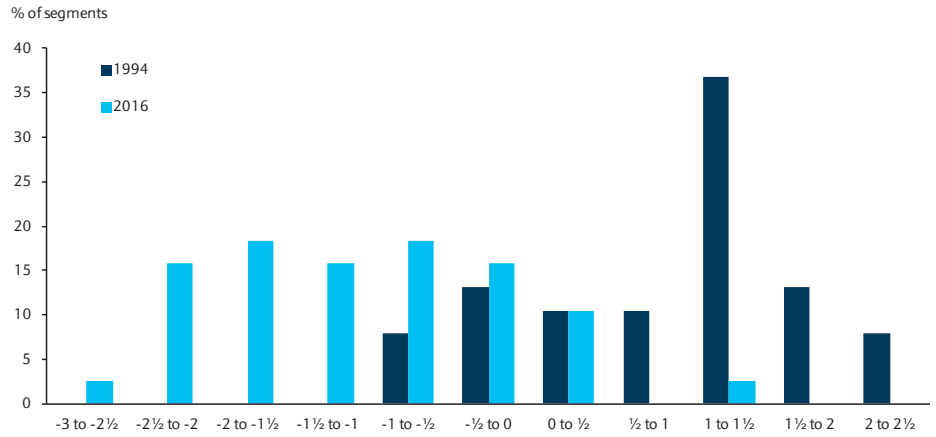
Our measure of competition has declined since 2000



Note: Principal components are estimated after removing industry means from each data series and standardising. Sample includes 38 industries, 1993-2016.
Source: Barclays Research, using data from the BLS, the BEA and Compustat

[31] As a robustness check, we ran separate PCAs with the set of variables in our baseline specification expanded to include concentration (HHI), industry Q, and capital growth (as opposed to the residual of capital growth after accounting for Q). The results are similar to those above, both qualitatively and quantitatively, with a first principal component that can be reasonably interpreted as a measure of competitiveness, and that declines over time (Figure 15). Also as in our basic specification, the second component has loadings for investment and the labor share with opposite signs, and therefore can be interpreted as a winner-take-all factor. We prefer our more parsimonious system discussed above, in part because one can easily compute these three variables for individual companies, which makes it feasible to use microdata to compute competition metrics for more narrowly defined markets or even ad hoc groups of companies.

FIGURE 16
Distribution of competiveness metric across segments



Note: Principal components are estimated after removing industry means from each data series and standardising. Sample includes 38 industries, 1993-2016. Source: Barclays Research, using data from the BLS, the BEA and Compustat

Macroeconomic and policy implications

Intensifying market power could help shed light on a number of economic puzzles in the US. Among these is the still-sluggish rate of wage inflation despite data that point to historically tight labor markets. Without hindsight from recent experience, many economists and policy makers would have expected wages to be accelerating much more rapidly at present, given the low unemployment rate. Indeed, in late 2010, estimates of the natural unemployment rate by most FOMC participants varied from 5% to 6%, which the economy has overshot since late 2015. For nearly a year now, the unemployment rate has been at or below 4%, yet wage growth remains close to 3% y/y.

To be sure, economists have offered many possible explanations to explain this lack of acceleration. Among the simplest is that the natural unemployment rate had been overestimated, with more recent estimates placing it closer to 4.5%. Another is nominal wage rigidities, which may have kept real wages higher than otherwise in the earlier stages of the recovery, thereby discouraging some wage gains later on. Yet even after accounting for these possibilities, many view the acceleration of wages to date as surprisingly modest. This opens the door more to structural influences, such as limited union membership, competition from foreign or outsourced workers, and capital-biased technological change.[32]

Increased market power should be included in this list of potential structural explanations, our analysis shows. This would gradually boost employers' bargaining power at the expense of workers. With fewer alternatives, workers – especially less-skilled ones – would have little choice but to accept lower wage gains, which could plausibly help explain why real wage gains have failed to keep pace with productivity, on aggregate. This hypothesis suggests that wage gains may continue to underwhelm despite strong payroll gains.

[32] With regard to technology, please see *"Robots at the Gate: Humans and technology at work"* from our 2018 Equity Gilt Study.

Market power may also help explain other puzzles, such as why profit margins for many companies have been so durable in the face of cost pressures from tariffs, currency movements, and other factors. Companies with market power would have greater scope to pass at least some of these pressures onto consumers and workers through higher prices and slower wage increases. Although such an environment would clearly have negative implications for the well-being of consumers and workers, this may also help us understand why profits (and economic activity more broadly) appear to be more insulated from cyclical pressures than in the past.

Policy responses and potential ramifications for equity markets

Policy makers may begin to respond to the threat of intensifying market power. In fact, a number of proposals have recently been floated.

We believe that proposals – both macro and industry specific – that are explicitly designed to promote competition are more likely to be effective. On the macro side, these include policies to address some of the ill effects of market power, such as reduced job churn, as well as enhanced scrutiny of mergers.

Although some industry-specific approaches are pro-competitive, we see risks that proposals designed to limit the ability of dominant firms to exploit their position could solidify the position of incumbent firms, by raising fixed costs and other barriers to entry. Regardless, we believe that industry-specific proposals should be limited to cases where our BCI indicates that market power has increased. It is not sufficient that concentration has risen, nor that large firms are aggregating share at the expense of smaller firms – policies should be targeted at industries that are suffering from the ill effects of market power.

Pro-competitive macroeconomic policies

One set of potential remedies is supply-oriented macroeconomic policies that encourage new entrants and enable the migration of resources. For example, investment tax credits could counterbalance some of the disincentives to invest faced by prospective new entrants to an industry characterized by dominant incumbent firms. Another example is the immediate expensing of investment, which was included for many types of equipment in the 2018 Tax Cuts and Jobs Act.

Similarly, policy makers could take steps to address the significant, economy-wide decline in job churn. Various influences that restrain the ability of workers to migrate to new jobs play into the hands of dominant firms and help suppress wage growth. Solutions that have been floated include improving the portability of employer-provided health insurance or easing zoning laws in highly productivity cities where high housing costs often deter worker inflows.

These approaches require neither industry-specific rules, nor the identification of specific pockets of market power. That said, they also have limitations. Studies suggest that investment tax incentives have had mixed effectiveness and may be difficult to design in a way that bolsters the comparative position of entrants. Moreover, poorly designed policies could bolster the position of incumbents in unexpected ways, such as by increasing the costs of insuring workers or by subsidizing existing capital expenditure plans of incumbents, rather than stimulating new investment by entrants.

Enhanced regulatory scrutiny of mergers

One obvious step to address market power would be to tighten standards for merger approval. This could come in two forms. The first would be to implement tighter standards for approving horizontal mergers. There are a variety of legislative tools already in place that prohibit monopolistic business practices, such as the Sherman Antitrust Act (1890) and the Clayton Antitrust Act (1914). These laws include specific prohibitions of certain anticompetitive practices such as price-fixing, tying and exclusive dealing, as well as prohibitions on M&A that satisfy legal standards for being anticompetitive. Enabled by this legislation, antitrust authorities can – and occasionally do – object to horizontal mergers that increase market concentration in ways that raise competitive concerns.

However, the courts have substantially raised the legal thresholds that antitrust authorities must demonstrate to apply these laws, reflecting the emergence of the Chicago School approach in the 1970s. Under this, the legal standard shifted from antitrust protecting small businesses to a broader focus on fostering economic efficiency – that is, overall consumer welfare. In principle, this involved not just effects on prices, but also considerations such as quality, overall innovation, and product evolution. However, in legal application, these more nuanced criteria are difficult for antitrust authorities to demonstrate, and the courts have tended to hone in on whether a given action raises prices. This narrowing occurred, in part, because effects on prices are much easier to quantify than other, more abstract, considerations, such as how specific business practices might affect consumer welfare through potential innovation.

One critique of the Chicago School approach that has emerged is that it raises the bar for antitrust authorities to provide evidence of economic harm, generally with a narrow focus on prices. As mentioned above, it is possible, or even likely, that dominant firms learn to exploit their market power to boost profits in ways other than by indiscriminately raising prices. For instance, large companies can use various practices designed to leverage advantages in size and scope, such as via suppliers and workers, orienting research and investment toward activities that galvanize their dominant position without benefiting consumers, or influencing the legislative process to tilt the regulatory playing field in their favor. Such practices may at least help explain the surprising decline in antitrust enforcement that has accompanied the intensification in industry concentration (Figure 17); companies may have learned how to avoid scrutiny.

The second, and more controversial, step to address market power would be enhanced scrutiny of *vertical* mergers. The school of thought that emerged in the 1970s holds that such mergers do not pose competitive concerns. The theoretical grounding is that it makes little economic sense for a company with power in one market to use those profits to price out competitors in another.[33] Consistent with this thinking, no vertical mergers were contested by antitrust authorities from 1979 to 2018, when the DoJ unsuccessfully challenged the proposal to merge AT&T with Time-Warner (TW). However, a new school of legal thought – the Brandeis School – has begun to challenge the assumption that vertical integration is harmless, based on economic arguments and evidence.[34] Indeed, some have argued that Amazon is a counterexample, as it clearly uses profits from some segments to

[33] The skepticism included a view that government action was more likely to do harm than good – specifically, that the lost efficiency gains from inappropriate challenge of mergers that benefited consumers would outweigh any benefits from blocking bad mergers. (For example, see Robert Bork, *The Antitrust Paradox, 1978*.) As is evident for the proposed ATT and TW merger, concerns about blocking "good" mergers remain valid in the eyes of the court, even though recent research pointing to negative economic effects of intensifying concentration suggests that thinking on the part of economists has become more nuanced.

[34] See "The Rise, Fall, and Rebirth of the Antitrust Movement," M. Stucke and A. Ezrachi, *Harvard Business Review*, December 15, 2017.

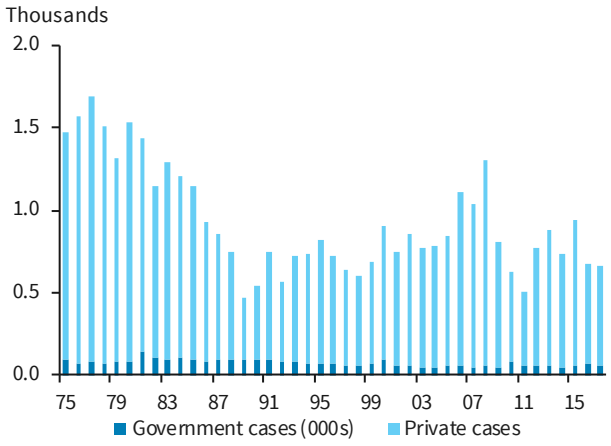
subsidize investments in others.[35] Of course, this cross-funding need not itself be anticompetitive, as Amazon would need to be creating dominance and then abusing it.

In principle, antitrust measures to limit mergers could help address competitive concerns. Elevated M&A volume (Figure 18) has likely been one channel through which companies have accumulated market power. Scrutiny of vertical mergers in particular would be new and could address a previously unrecognized (or ignored) competitive threat. However, there are also challenges associated with this approach. First, in the short run, some mergers may actually enhance competition if the resulting entity is better able to compete with existing or growing incumbents. One possible example is the DoJ's aforementioned challenge of the AT&T-TW merger. The proposal had been challenged on the grounds that AT&T (a content distributor through DIRECTV and U-verse) could use its ownership of TW (a content creator) to place competing distributors at a distinct disadvantage in terms of negotiating content. An alternative narrative is that the merger creates another viable competitor within a market whose competitive makeup has been disrupted by the emergence of non-traditional entities such as Amazon, Netflix, and Hulu, which have placed single-market entities such as TW and AT&T at a disadvantage by pairing content creation and delivery. This is an example where disruptive entrants are at least perceived by incumbents to be a threat, perhaps forcing them to reorganize their own business models to address disadvantages. In such an environment, indiscriminate regulatory scrutiny of vertical mergers may be misplaced, inadvertently strengthening the dominant position of vertically integrated incumbents.

The second challenge to the antitrust approach is that evaluating a merger requires an accurate definition of a market or set of competitors, a task made all the more difficult by the rapidly evolving nature of many high profile industries (such as media). But this is exactly the type of issue that our BCI is designed to address. It does not require identification of every competitor, but instead extracts information about competitiveness from firm outcomes.

FIGURE 17

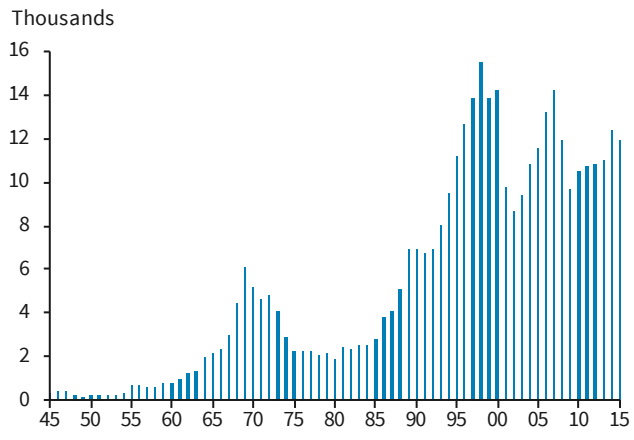
Antitrust case filings have fallen off since the 1970s



Note: Government totals include civil and criminal cases involving the government as a plaintiff or defendant. Data for 1975-1991 are for the 12-month period preceding June of that year. Data for 1992-2000 are for the fiscal year, and 2001 onward are for the calendar year. Source: United States Courts, Sourcebook of Criminal Justice Statistics

FIGURE 18

Corporate mergers and acquisitions have been elevated for some time



Source: Institute for Mergers, Acquisitions, and Alliances

[35] This is among the arguments that features in "Amazon's Antitrust Paradox," Lina M. Khan, *The Yale Law Journal*, January 2017.

Finally, more intense regulatory scrutiny of mergers would not help alleviate market power issues posed by existing dominant firms, or at least not immediately. Over time, limiting mergers could allow competitors to emerge that otherwise might have been subsumed within the incumbent firms. Although a more immediate remedy would be to attempt to break up these existing firms, this would be extremely difficult to execute and would require a degree of certainty regarding the competitive landscape that would be very difficult, if not impossible, to achieve in practice.

Enhanced regulation to limit dominant firms' ability to abuse their positions

An alternative approach is to enact regulations designed to limit business practices in ways that prevent dominant firms from abusing their position. This would involve a set of industry-specific rules that apply to all firms or the largest ones within that industry, targeting a set of practices identified as problematic.

There are few, if any, recent examples of sweeping rules targeting competition to use as examples. But there have been a number of industry-specific regulations adopted recently motivated by other concerns, that have limited or changed existing business practices. These are useful to consider as they can help illustrate the difficulty of using this approach to mitigate competitive concerns. One example is the US adoption of enhanced banking regulations following the Global Financial Crisis, which were enacted to improve the safety and soundness of the financial system. Those rules were set out in the Dodd-Frank Act (2010), which included specific measures that apply to only the largest banks, such as enhanced capital requirements, heightened merger scrutiny, and prohibitions on proprietary trading. Europe's General Data Protection Regulation (GDPR) is another example, designed to address burgeoning privacy concerns.

There are two critiques of using rules to limit specific business practices in a competitive context. First, these detailed, industry-specific rules take years to develop and are exceedingly complex. In practice, the time it takes to craft them can render them irrelevant or even counter-productive. Further, complexity can often lead to unintended consequences, which can often cause severe issues of their own. For example, initial limits on bank leverage in Dodd-Frank appeared to place unnecessary pressures on repo markets in the US – so much so that they were subsequently revised.

Second, we believe such rules could risk cementing the position of incumbent firms. This is because complying with this type of regulation is expensive, which presents a significant barrier to entry. Even if such rules do mitigate existing anticompetitive behavior, regulatory overhead can boost fixed costs in ways that tend to discourage competition, thereby thwarting new entrants and reducing the competitive threat to incumbents. As an example, the number of new FDIC-insured commercial bank charters, which had averaged about 170 per year from 2005-07, has slowed to about one per year since the 2010 passage of Dodd-Frank. While there may be other reasons why new banks are failing to form, costs associated with ongoing regulatory disclosures and other rules have almost surely contributed. This is not a critique of Dodd-Frank – it was designed for macroprudential reasons, not to enhance competition – but it does help illustrate the relevance of regulations when considering barriers to entry.

New regulatory frameworks designed to harness competitive forces

An alternative approach would be to introduce rules designed to increase competition, rather than eliminate abusive behavior. An example is Europe's Revised Payment Services Directive (PSD2), a set of retail banking rules meant to change the ownership structure of consumer banking data. In the old regime, a customer's banking data were owned by his or her bank, at least by default, if not explicitly by rule. Banks faced no impetus to make these data (credits and debits, credit card payments, mortgage payments, etc.) available either to its competitors or to the customer.

PSD2 changes the ownership structure by making them portable: consumers can migrate their data to other financial institutions. A consumer's financial data are a key determinant of his or her credit quality and, thus, serve as a key input to lending decisions. By allowing consumers to migrate their data (and to aggregate data generated through interactions with multiple financial institutions), PSD2 could, in theory (we don't comment here on whether or not it is working), allow customers to obtain more competitive terms for loans and other financial services. Unlike the old regime, where an initial choice of deposit institution tended to lock consumers into one banking relationship, consumers could use the data they generate at one institution to attract competition from others. Indeed, by limiting the fixed costs associated with acquiring depositors and building long data histories, PSD2 could allow new entrants (such as online banks) to compete with traditional incumbents.

The US high tech industry is one example where this type of approach could be considered. There is an ongoing debate about who owns data generated as a by-product of consumer on-line activities. In the US, it is clearly the case that such data are owned by the company that engaged in the online interaction with the consumer. However, with issues surrounding data ownership already evolving in Europe, a steady drumbeat of concerns with data collected by Facebook and other online entities has thrust this into the spotlight in the US.[36] With adjustments to ownership rights along the lines of the PSD2, consumers could have more control over how their data are monetized, and companies could be forced to compete for access to these data in ways that could improve the range of services available to consumers.

Another example of competition-enhancing rules is infrastructure sharing. These can be especially promising for industries that require a large and costly infrastructure (such as telecommunications networks), which tends to yield "natural monopolies" with a single, vertically integrated firm with a dominant position in the downstream product market. Infrastructure sharing severs the layers of this natural monopoly by creating "common carrier" obligations that allow competitors to access the company's infrastructure on same terms as its own downstream operation.

Infrastructure sharing has been applied by many European countries following late-1990s EU directives requiring wholesale liberalization of telecoms. One such idea is Local Loop Unbundling (LLU), which requires telecommunications incumbents (telephone, cable, and internet) to physically disconnect their exchange lines from their networks in order to enable connections by new entrants. Similarly, mobile telephone networks are required to offer access on a wholesale basis to mobile providers at a fair price. These competition-friendly measures have led to some very desirable outcomes: for instance, facilitating the transition of the French telecommunications industry from a single, government-controlled incumbent (France Telecom) to a highly competitive market where private providers offer a broad range of quality services at comparatively low prices.

[36] For example, the "right to forget" that is imposed on internet search providers clearly awards some rights to the data to individuals.

Another similar example is the US experience with the deregulation of energy markets prompted by various federal legislative and regulatory initiatives.[37] In this case, regulators of participating states facilitated the breakup of vertically integrated utility monopolies by requiring local distributors to open their lines to private electricity generators that, depending on the jurisdiction, could either sell electricity in competitive wholesale markets or distribute directly to customers for end-use.

One potential downside of infrastructure sharing is that it may not provide sufficient incentives for owners to maintain a high-quality network. This boils down to setting a regulated access price that adequately compensates owners for their capital costs of maintaining networks. Identifying such a price may be easier said than done. However, if done right, such mechanisms may be an effective way to encourage competition in industries with natural scale economies while sidestepping the entry barriers (and waste) associated with replicating costly infrastructure. To be sure, such mechanisms tend to work well in markets with homogeneous products, such as the electricity or data transmission examples above. However, similar ideas might be adapted to enhance competition in other industries where concerns about vertical integration are becoming more prominent, such as media and internet commerce.

Approaches designed to harness competitive forces along these lines have some of the same downsides as approaches aimed at limiting abuses of market power; they require detailed industry-specific rules. The benefit is that this approach can enhance competition directly, rather than trying to limit the abuse of market power. This alternative could also avoid imposing large fixed costs that might discourage new entrants.

[37] These initiatives include the Public Utility Regulatory Policies Act (1978), which required utilities to buy power on a wholesale basis from unaffiliated producers, and the National Energy Policy Act (1992), which, among other things, created various incentives to facilitate the development of deregulated energy markets. Another key impetus was 1996 orders by the Federal Energy Regulatory Commission (FERC) designed to eliminate abusive price-setting practices by, among other things, establishing a system of transmission tariffs that allow generators to access utilities' transmission services on the same terms as the utility itself and requiring open access to real-time transmission information. See "*Evolution of Electric Industry Structure in the U.S. and Resulting Issues*," Navigant Consulting, report prepared for the Electric Markets Research Foundation, 2013.

Appendix A: Details about the construction of our industry panel dataset

As noted in the main text, our industry-level data for investment rates and labor's share of income are sourced from the BEA's industry-level GDP and capital stock estimates, data on business dynamism are from the BLS's Business Employment Dynamics survey, and data for Tobin's Q and industry-level concentration are formed using data on publicly traded companies from Compustat.

Compustat estimates for each were formed by aggregating across publicly traded firms within each three-digit NAICS industry. To form the HHI for each industry in each year, we first take the dollar value of gross sales for each firm, then form a sales share by dividing this sales figure by the sum of sales for all firms in the industry. We then square these sales shares (stated in percentage terms) across all firms in the industry to obtain an HHI measure. To the form Tobin's Q, we first compute the market value of each firm's outstanding equity and debt securities, then deduct the market value of its financial assets. To convert this market value to a measure of Q, we divide it by the book value of the firm's nonfinancial assets as reported on the balance sheet. To form an industry-level aggregate, we weight these firm-level Q measures using the same sales shares used for the HHI.

The BLS reports quarterly estimates by industry of job gains at opening and expanding establishments and job losses at closing or contracting establishments, both as levels and as a percentage of average industry employment in the current and preceding quarters. We form our annual estimates by first summing the level estimates of job gains and losses by industry in each quarter, then converting these estimates to annual flows. To express this total industry flow of job gains and losses as a percentage of employment, we divide it by the industry's average level of employment in the preceding year (which we back out from the second- and fourth-quarter estimates from the previous year).

Industry-level estimates from the three data sources are combined so that industry definitions are consistent for all variables. This step is necessary because industry source data from the BEA are organized by BEA industry segments, while the source data from the BLS are reported as three-digit NAICS, and our Compustat-based estimates are aggregated within each three-digit NAICS code. The BEA industry segments are somewhat more consolidated than the NAICS categories, so we can easily map from NAICS to BEA industries, but not the other way around. Hence, to impose a consistent sector view, we map from the three-digit NAICS into BEA industry segments.[38] To focus analysis on industries in the nonfinancial nonfarm business sector with good data coverage, our mapping excludes the financial and utilities sectors, as well as a small number of BEA sectors with insufficient representation in Compustat.[39] Given available annual estimates, the result is a full dataset with 38 industry sectors, covering the period from 1992 to 2016.

[38] We borrow this mapping scheme from "Investmentless Growth: An Empirical Investigation," Germán Gutiérrez and Thomas Philippon, *Brookings Papers on Economic Activity*, Fall 2017, pp. 89-174.

[39] The excluded BEA sectors are 230: Construction, 420: Wholesale Trade, 513: Broadcasting and Telecommunications, 514: Data Processing, Internet Publishing and Other Information Services, 531: Real Estate, 532: Rental and Leasing Services and Lessors of Intangible Assets, 550: Management of Companies and Enterprises, and 624: Social Assistance,

Appendix B: Interpretation of Principal Components Analysis

The goal of a PCA analysis is to find a set of unobserved factors that explains the joint variation in a set of variables. To summarize briefly, our PCA projects a system of observed variables $y_{i,t}^{p}$, (for $p = 1, \ldots, P$ variables, $n = 1, \ldots, N$ industries, for period t) onto a set of *P* unobserved factors $f_{n,t}^{1}$ for each industry n and period t:

$$\begin{bmatrix} y_{n,t}^{1} \\ \vdots \\ y_{n,t}^{P} \end{bmatrix} = \begin{bmatrix} \bar{y}_{n}^{1} \\ \vdots \\ \bar{y}_{n,t}^{P} \end{bmatrix} + \begin{bmatrix} b_{1}^{1} & \cdots & b_{P}^{1} \\ \vdots & \ddots & \vdots \\ b_{1}^{P} & \cdots & b_{P}^{P} \end{bmatrix} \begin{bmatrix} f_{n,t}^{1} \\ \vdots \\ f_{n,t}^{P} \end{bmatrix},$$

where $\bar{y}_{n}^{p}$ is a fixed effect for variable *p* in industry *n*. The set of factor loadings $(b_1^p, \ldots\ b_P^p)$ for each variable *p* are fixed across industries and through time and are fitted such that the first factor explains the maximum amount of variation in the entire system across all industries and year, the second factor explains the maximal amount of variation after accounting for the first factor, and so on. The unobserved factors, by construction, are uncorrelated.

Prior to computing our principal components, we removed industry effects and standardized each variable. This normalization is motivated by our interest in explaining differences in the relative magnitude of variation in each of our data series. On the contrary, we do not want our PCA to overemphasize variations in these more volatile series. Similarly, we remove fixed effects because our focus is on time trends in the data series, not relative differences across industries that persist through time. In addition, to focus on variations in capital growth that are unrelated to fundamentals, we replaced capital growth in our system with residuals from a regression of capital growth on Tobin's Q.

For interpreting the fitted components, the same system can be represented equivalently with the signs on the factors and factor loadings for each variable flipped. Hence, the signs on each factor, and the corresponding factor loadings in Figure 11, are arbitrary. The important consideration for interpreting the factors is whether the effects work in a direction consistent with the given relationship. In this case, based on a combination of theoretical considerations and empirical findings, we posit that our competition factor should affect the three variables in our baseline PCA specification in the same direction. In fact, we find that all of the loadings for that factor have the same sign (positive or negative), consistent with that interpretation. Conversely, considerations suggest that a winner-take-all metric would affect labor's share of income and capital growth work in opposite directions (reflecting our discussion in the text, we take no strong view on how a winner-take-all factor affects dynamism). This interpretation is consistent with the loadings on the second factor in Figure 11.

To test robustness, we repeated our PCA analysis using a number of other specifications that include a broader set of economic variables, such as a time series of the HHI for each industry, industry-level productivity growth, and Tobin's Q. In all cases, we found that we were able to uncover a competition metric with characteristics similar to the one we show for our baseline specification. Our results are also qualitatively similar when we exclude from our PCA data for 2008, the time of the Global Financial Crisis.

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