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Research
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Retail & Media

Assessing the elephants in the room

Retail and media are two sectors where concentration has risen. Using the Barclays Competitiveness Indicator (BCI), we assess whether increased concentration is a sign of a declining competitive landscape. Competition appears to be healthy in retail, but is more likely impaired in media, where we find evidence of increased market power.

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RETAIL AND MEDIA

Assessing the elephants in the room

- **Retail and media are two sectors where questions are being asked about potential declines in competition, particularly regarding the largest and most prominent firms.** Concentration has risen in each, driven by the emergence of large firms with ever-increasing market share. At the same time, each sector is undergoing disruptions: retail continues to adapt to the rise of e-commerce, and media companies are reacting to new digital channels and new entrants into traditional content.

- **We assess the competitive landscape in each sector using the Barclays Competitiveness Indicator (BCI) methodology.** We developed this in *The rise of market power* by measuring the characteristics associated with a competitive environment: labor share, investment, and job churn.

- **Our analysis suggests that competition in retail remains healthy, despite the rise of e-commerce and the accumulation of market share by several large firms.** New entrants have forced incumbent firms to invest and innovate to remain viable. Although some firms have not managed the transition, the survivors have evolved and are delivering for consumers, in the form of lower prices and better service. Developments in other sectors (such as social media) have enhanced competition in retail by providing new paths to market.

- **The BCI indicates that media, on the other hand, has experienced a steady and significant decline in competition.** While some subsectors resemble retail – with new entrants challenging incumbents through new channels – aggregate competition has declined, possibly due to limited competition in the subsectors that are gaining share, such as social media and search.

- **These results highlight the importance of assessing competition rather than concentration when considering policy responses.** The presence of large and growing firms in a sector is not itself sufficient to demonstrate a threat to competitiveness. Proposals to address market power have not necessarily distinguished between troubling and benign (or even positive) aggregation of market share. We see little cause for intervention in retail, and do not believe that equity valuations are being supported by the accumulation of market power. Media, on the other hand, may warrant the enhanced scrutiny it is receiving, although we see risks that policy responses could further solidify the position of incumbents.

Introduction

In *The rise of market power*, we find strong support linking the rise in corporate concentration in the US economy over the past 20 years to a decline in competition and an increase in the market power of dominant firms. Our analysis suggests that this has contributed to reduced dynamism and innovation in the US, and to troubling macro trends such as a decline in labor's share of output. On the other hand, we also find evidence that, at least in some sectors, concentration may have been driven by an *increase* in competition. Under this "winner-take-all" view, more efficient and profitable companies accumulate market share in an environment that rewards the best firms.

Retail and media are two sectors that embody the trade-offs inherent in the debate about concentration, and serve as interesting case studies. Each is undergoing significant disruption. The continued rise of e-commerce is pressuring traditional brick and mortar retailers, and in media, new channels (such as search and social media) and competition from new content providers have forced incumbents to re-think business models. These sectors are also increasingly concentrated and contain the most obvious and talked-about firms that may have become dominant. Retail includes Amazon, which has accumulated substantial market share in an ever-increasing number of business lines, often to the dismay of incumbents. Media contains Alphabet and Facebook, which control a large portion of the on-line advertising market and have changed the nature of content, as well as Netflix, which has morphed from distributing DVDs into one of the largest content producers globally.

We assess the net effect on competition in each sector using our Barclays Competitiveness Indicator (BCI). The BCI measures the evolution of competition in a sector over time indirectly, via characteristics associated with competition: investment, job churn, and labor's share of output, measured at the company level using accounting data[1]. By using the symptoms of reduced competition, we limit our dependency on including every relevant firm. Excluded firms (such as private or international firms not in our database) influence our measure through their effects on the firms we do include[2]. This is an advantage over analyses based on concentration, which require an accurate and complete list of competing firms.

Our analysis suggests that competition has evolved differently in the two sectors. In retail, the level of competition appears healthy,[3] despite the rise of e-commerce and a notable increase in concentration. The rise of e-commerce is forcing incumbents to invest, and many of the efficiency improvements are getting passed on to consumers in the form of lower prices. Concentrated market share likely reflects scale economies benefiting more efficient firms, rather than the leveraging of market power. Of course, this may not always be the case: for example, if vertical integration by a small number of winners stifles product innovation, then what now looks to be a healthy competitive dynamic could change.

Media is a different story. Our competition metric has declined sharply over time, driven by declines in all three underlying variables. Although competition may be increasing in some parts of the sector, in aggregate the competitive dynamic appears to be deteriorating, which we believe is due to the increased importance of certain digital channels, where large incumbent firms may have achieved dominance.

[1] For more details, see *The Rise of Market Power*.
[2] For example, if the presence of private competitors forces other firms to invest heavily, we will measure that heightened investment even if we do not directly include the private firms. Similarly, these firms would keep wages high (and, thus, lead to elevated labor share) and contribute to job churn.
[3] Competition did decline in the mid-1990s, partially because of a spike in job churn as Sears struggled and sold off assets.

FIGURE 1

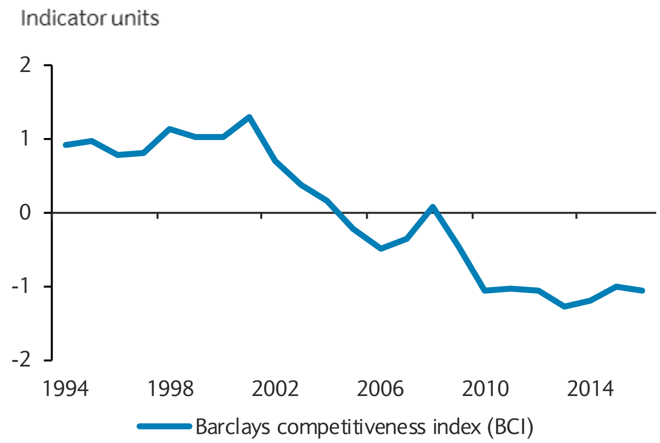
PCA of net investment, churn, and labor share

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 standardizing 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.

FIGURE 2

Our measure of competition has declined since 2000



Note: Principal components are estimated after standardizing 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.

Our results demonstrate the importance of looking beyond concentration when assessing the competitive landscape. The existence of large firms is not sufficient to conclude that they have accumulated market power. At least some industries where concentration has increased may remain competitive; we believe retail is one example. The different conclusions about retail and media also demonstrate how difficult it is to disentangle the various pro- and anti-competitive forces at work directly – our methodology naturally nets these forces out by relying on the symptoms of competition.

Both of these sectors are at risk of increased regulatory scrutiny as policy makers may increase their focus on market power. The recent creation of a Federal Trade Commission (FTC) task force on competition in the tech sector is an example of how these risks may begin to play out. We see little cause for intervention in retail, and believe the concerns about that sector are misplaced, at least for the moment. Media, on the other hand, may merit the scrutiny it has received. However, that is not to say that all parts of media are affected in the same way. That said, unlike in retail, we do believe that some media valuations are supported by the accumulation of market power; this represents a risk in the event policy makers do take steps to remediate it.

Measuring competition

The competition metric we define in *The rise of market power* is a combination of three characteristics: job churn, labor share, and investment (Figure 1). Each variable is available at the aggregate and NAICS three-digit level (or the Bureau of Economic Analysis segment equivalent). However, to understand the competitive dynamics at a more granular level, we must estimate these variables using company-specific data. That allows us to examine the competitive dynamic between any relevant group of competitors.

We compute these for specific industries using Compustat data, according to a methodology outlined in the appendix. We have a general approach that we augment for sector-specific accounting nuances in both retail and media.

Retail

The rise of e-commerce makes retail an interesting case study. On the one hand, e-commerce clearly raised price transparency and put pressure on margins, both directly and through ancillary services such as free delivery. On the other hand, it has led to the emergence of very large, potentially dominant firms that could be abusing their positions.

We construct a retail basket starting with the GICS Industry Group designation "Retailing" (2550). This includes four subcategories: "Internet & Direct Marketing Retail" (255020), "Multiline Retail" (255030), "Specialty Retail" (255040), and "Distributors" (255010). We list the largest five companies in each bucket as of 2017 in Figure 3, along with some statistics about the number of companies in each bucket over time. Of these four subcategories, the first three comprise companies that compete with each other to sell to consumers – what is colloquially referred to as retail. The distributors are mostly suppliers to auto parts and convenience stores; they sell to intermediaries, rather than direct to customers. Therefore, we remove that subcategory from our sample and focus on the first three.

Figure 4 contains the aggregated revenue Herfindahl-Hirschman Index (HHI) for industry concentration in these three subcategories over time, constructed using sales data from Compustat[4]. HHI rose steadily until 2014, denoting increasing concentration, but at a lower rate than the overall economy. This is surprising, since the market share of some of the largest retailers began increasing well before 2014. An offsetting factor was the decline of other large retailers. For example, Sears was so big in the early 1990s that its spinoff of Allstate in 1994 severely distorted the concentration numbers (Allstate is an insurance company, so should not be included). It was losing market share to some of the largest current retailers, keeping the overall concentration stable. In addition, although Amazon has consistently taken a high share of e-commerce sales, it was only recently that e-commerce grew large enough for Amazon to affect the aggregate HHI. Between 2000 and 2014, the HHI for retail advanced 20%. From 2014-2016 it rose nearly 30%.

FIGURE 3

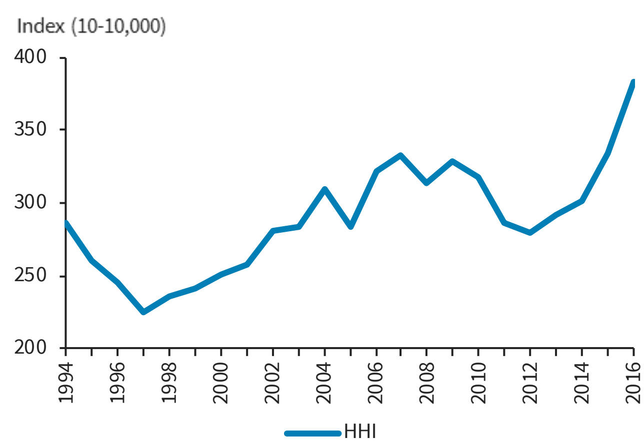
Retail subcategories that we group together for calculation

Subcategory	Top five companies by revenue as of year end 2017	# of Firms (1994)	# of Firms (2017)
Internet & Direct Marketing	Amazon, Booking, Qurate (QVC), Expedia, eBay	27	42
Multiline Retail	Target, Macy's, Sears, Dollar General, Dollar Tree	61	14
Specialty Retail	Home Depot, Lowe's Best Buy, TJX (TJ Maxx), AutoNation	229	105
Distributors (excluded)	Genuine Parts, Core Mark Holding, LKQ Corp, Pool Corp, True Value Co.	124	16

Source: Compustat, Barclays Research

FIGURE 4

The rise in retail concentration accelerated in 2014



Source: Compustat, Barclays Research

4 The HHI is the standard measure of the intensity of competition in the industrial organization literature, and is the go-to measure for merger analysis by the antitrust authorities. We form the HHI for a particular industry by summing squared market shares of all the public firms operating in that industry. Thus, for a monopolist, the index is 10000, whereas for an industry with only atomistic firms the index would approach zero. As in our earlier piece, our estimate of HHI includes only public, domestic firms.

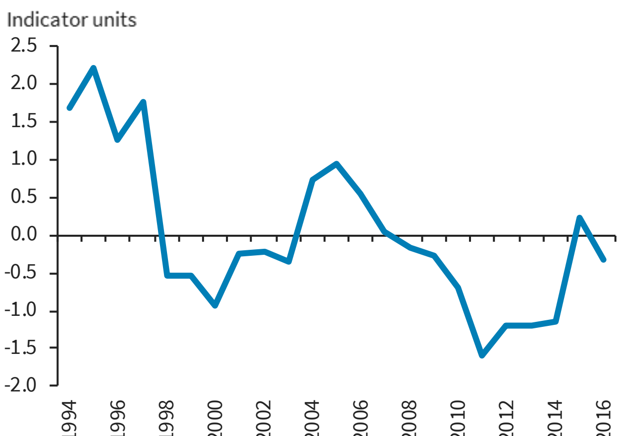
In Figure 5, we present the evolution of the retail BCI, along with the underlying trends for labor share, job churn, and investment (Figure 6). Competition has been remarkably stable since 2000; in fact, there is no discernible effect of the rise of e-commerce on the competitive dynamic. When looking at the underlying components, there is no real trend in either labor share or investment. In fact, both series are fairly stable, such that much of the variation in Figure 5 is driven by our standardization process. Job churn has fallen, especially in the late 1990s, which is why our competition metric was elevated in the mid-1990s. Elevated churn at that time appears to be related to the decline of Sears; subsequently, the decline has been much more muted.

These results suggest that retail has avoided the broad trend towards reduced competition and, indeed, that the rise of e-commerce has been pro-competitive, despite the emergence of a small number of very large firms. It is certainly clear that it has forced innovation on incumbent retailers. Those that could evolve their on-line channel and distribution capabilities have been able to survive at reduced prices/margins, whereas others have failed to do so and been forced out of business. The resulting aggregation of market share is exactly what the winner-take-all hypothesis suggests should happen. This case is further bolstered by the downwards pressure on retail margins. For example, between 2000 and 2018, margins at Target (TGT) fell 60bps, from 9.3% to 8.7%, compared to an increase of 1.5% for the S&P 500 (excluding financials, utilities, and real estate).

Of course, this could change if further increases in concentration allow the winners to abuse their position. At the moment, we do not see signs that this is happening. It is possible that with online retailing, the absolute number of viable competitors necessary to make the e-commerce market contestable could be dramatically smaller than what was required in the old model. Absent outright collusion, the tendency for consumers to default to the cheapest on-line seller could force even the largest firms to maintain price discipline. After all, spot-checking prices requires only a few clicks, as opposed to driving from one store to another.

FIGURE 5

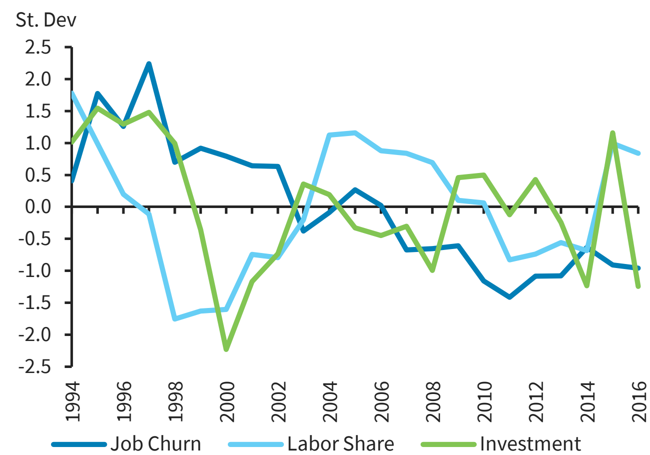
Retail competition is little changed, on balance, since 2000, despite the rise of e-commerce



Source: Compustat, Barclays Research

FIGURE 6

Only job churn has declined, whereas investment and labor share show no obvious trends



Source: Compustat, Barclays Research

We also believe that innovations in other sectors contribute to the competitive dynamic in retail. Historically, one of the greatest barriers to entry for new brands has been marketing, advertising, and securing shelf space at large retailers. However, the introduction of social media platforms has allowed "influencers" with millions of followers to promote and market products to a targeted audience at little to no costs, essentially eliminating both the requirement to secure traditional shelf space at a dominant retailer and the associated advertising spend. This has allowed a very narrow set of platforms (Instagram, Facebook etc.) to be portals for digitally native brand launches that have been taking share from traditional consumer product companies. Indeed, the increasingly monopolistic media landscape (see below) could be giving rise to pro-competitive forces in retail.

One of the most well-known recent examples is Kylie Jenner. In 2015, the influencer launched her own cosmetics line called Kylie Cosmetics, marketed largely through Instagram, Facebook, Snapchat, and Twitter, where she announces and previews new items. Jenner largely showcases products in her kitchen and living room. She has 129 million Instagram followers and is estimated to have close to 200 million followers across the different social media platforms. According to Forbes, last year Kylie Cosmetics generated $360mn in revenue, an increase of 9% y/y (which is well ahead of growth at the traditional cosmetic companies and comes at the expense of declines at Revlon and Coty over the last year-plus). Originally, Kylie Cosmetics sold directly to the consumer only, while outsourcing the manufacturing and packaging, breaking away from the traditional cosmetic company business model. However, similar to other digitally native brands that bridge into retail, the company has recently added a brick and mortar presence, launching in Ulta Beauty stores across the United States.

There are other examples of innovations spreading through the retail sector. For example, fast-fashion retailers helped accelerate several recent changes. Competition from fast-fashion pushed traditional apparel retailers to become more cognizant of inventory management as a means to margin health and to look for ways to create a more responsive supply chain. On the latter point, apparel retailers, most notably department stores, shortened the amount of time that it took for private-branded products to move from concept to shelf by as much as 40%.

In fact, it may be the case that the greater competitive threats will come from vertical, as opposed to horizontal, integration. The data and distributional advantages available to the largest e-commerce players may allow them to cherry-pick profitable opportunities to manufacture goods and sell them through their own channel. While the concept of private-label goods is not new, it is possible that near-hegemony over the e-commerce channel enhances the ability to use private labels (or the threat of them) against suppliers. This could lead to even greater price reductions in the near term, but may eventually reduce consumer surplus in other ways, such as via less innovation and choice. In general, it is possible that manufacturing, rather than retailing itself, suffers from rising concentration in retail, particularly if the dominant retailers maintain a focus on passing through at least some of the price gains to consumers.

Given the negative press that Amazon and other large retailers receive regarding anticompetitive behavior, the fact that our results suggest that the competitive dynamic in retail remains healthy is somewhat surprising. We do not see scope yet for intervention from policy makers, nor evidence that equity prices are being bolstered by market power, as opposed to the benefits of scale economies. This highlights the importance of measuring competition (even if indirectly) rather than concentration. Large firms that accumulate market share do not necessarily pose a threat to competition, even if they force smaller firms out of the market.

Of course, although we do not expect the competitive dynamic in retail to change, it is possible that market-power abuse could emerge if concentration continues to grow. Since the level of concentration began to soar only as the e-commerce share hit critical mass, we may just have not had enough time to see the anticompetitive effects flow through.

What about Walmart?

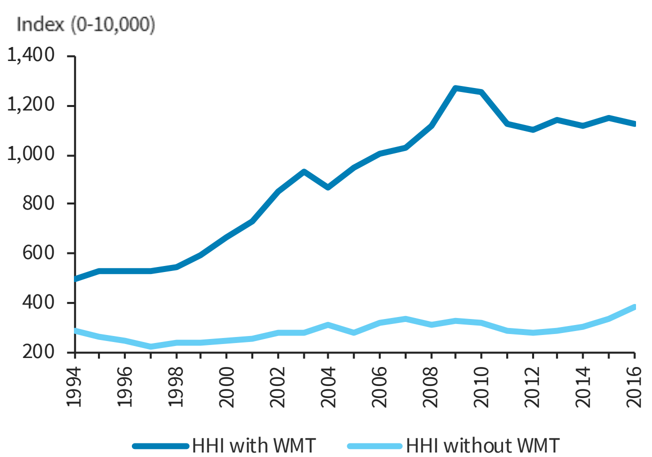
Walmart is notably missing from Figure 3. It is not included in our retail basket because it is classified as a grocer. Although Walmart does clearly compete with other grocery stores, it is a major presence in retail as well, including in e-commerce. This provides a natural test case for the robustness of our competition metric; we can manually include Walmart in our calculations to see the effect on concentration and competition.

Figure 7 contains the new HHI index for retail, including Walmart. Unsurprisingly, the picture is quite different from the one in Figure 4. Concentration has more than doubled since 1998, reflecting the massive scale of Walmart. Of course, this likely overstates its actual effect on retail, since many segments it operates in (such as groceries) are not really competitive with the rest of the retail basket we have constructed. But the sensitivity to just one firm does demonstrate the potential problem of relying too heavily on concentration as a metric: an accurate conclusion depends critically on accurately defining the set of competitors.

On the other hand, the competition metric we construct including Walmart (Figure 8) is almost identical to that reported in Figure 5. This is reassuring: we designed our metric to be robust to an imprecise definition of the market. The effect of Walmart on the sector was indirectly included through its effect on the investment, the labor share, and job churn of the rest of the industry.

FIGURE 7

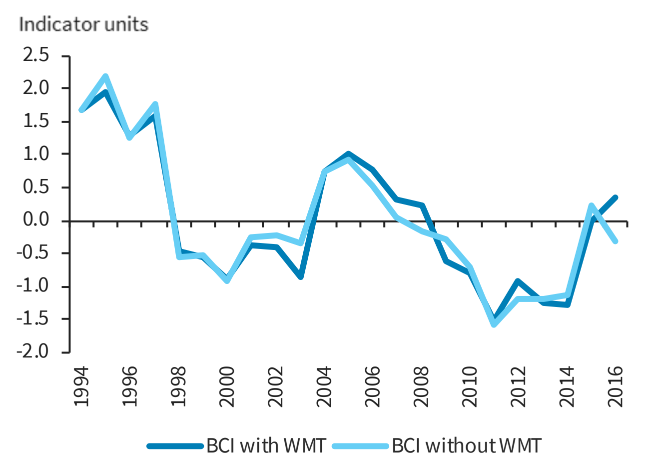
Retail concentration with Walmart looks very different



Source: Compustat, Barclays Research

FIGURE 8

But our competition metric is unchanged when including Walmart



Source: Compustat, Barclays Research

Media

Media is also undergoing disruptive shifts. The way we consume media has changed, as new channels are competing with traditional TV, print, and radio, and there have been a number of new and successful entrants into the content distribution business.

We construct a media basket starting with the GICS "Media and Entertainment" Industry Group (5020). This contains four subcategories, one of which is the broad subcategory of "Media" companies (502010). "Media" includes "Advertising" (50201010), "Broadcasting" (50201020), "Cable & Satellite" (50201030), and "Publishing" (50201040). Of these, we exclude the Sub-Industries "Advertising" (50201010), and "Cable & Satellite" (50201030)[5]. While advertisers work closely with media and entertainment companies, and indeed the competitive landscape in one business group may affect that of the other, they are not competing for revenues with one another. Cable and Satellite providers may have made some high profile purchases of more traditional media companies (Comcast/NBC, AT&T/Time Warner), but this subsector is primarily focused on distribution.

The other broad subcategories, "Entertainment" (502020) and "Interactive Media & Services" (502030), compete more directly with Broadcasters and Publishers for viewers and their associated revenues. Figure 9 contains the top five companies in each subcategory, along with some statistics on the number of companies in each group.

As above, we measure concentration using an HHI (Figure 10). Concentration has increased steadily in media since the mid-1990s; the HHI nearly doubled from 1994 to 2016. This is a materially greater change in concentration than in retail and is larger than the average 60% increase we documented across industries in *The rise of market power*.

The media BCI and the underlying trends in labor share, churn, and investment are shown in Figures 11 and 12, respectively. Unlike in retail, our metric indicates that competition in media has declined markedly since the 1990s, in sync with the rise in concentration. The decline in competition is not driven by any single change in the underlying variables; each has declined on average over the period (albeit with notable volatility in investment and, to a lesser extent, job churn around the time the tech bubble burst).

FIGURE 9

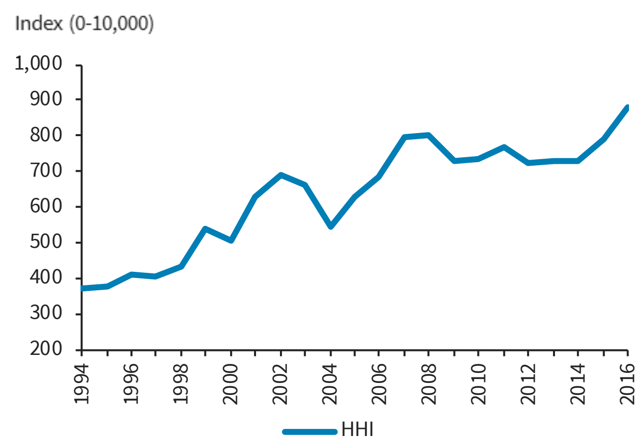
Media subcategories that we group together for calculation

Subcategory	Top five companies by revenue as of year end 2017	Firms (1994)	Firms (2017)
Broadcasters	CBS, Discovery, iHeartMedia, Scripps, Univision	110	23
Publishers	News Corp, Gannett, Scholastic, John Wiley & Sons, Meredith	54	14
Entertainment	Disney, 21st Century Fox, Viacom, Netflix, Live Nation Entertainment	12	38
Interactive Media & Services	Alphabet, Facebook, IAC, Twitter, TripAdvisor	3	45

Source: Compustat, Barclays Research

FIGURE 10

Concentration in media has risen steadily

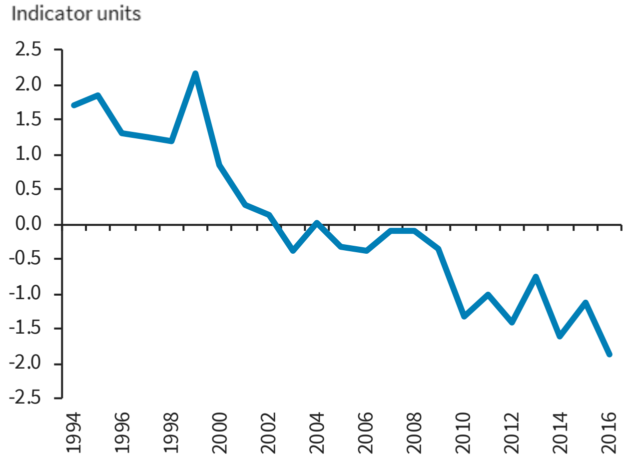


Source: Compustat, Barclays Research

[5] The listed codes reflect the current classification for various media subsectors, post the 2018 changes implemented by MSCI. Our basket also includes the legacy companies in Broadcasting, Movies and Entertainment, and Publishing.

FIGURE 11

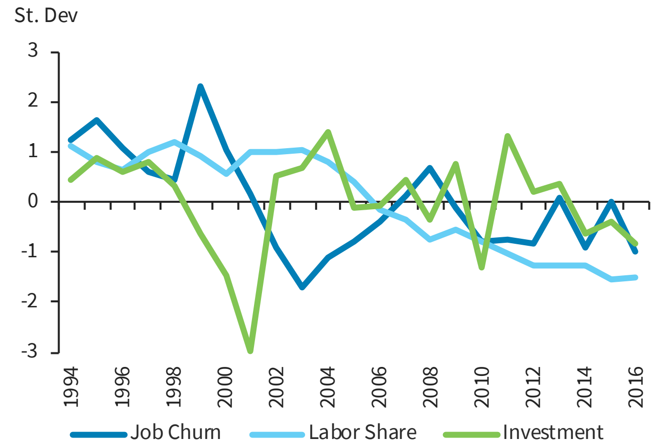
Media competition has declined as concentration rose



Source: Compustat, Barclays Research

FIGURE 12

All three factors contributed to this decline



Source: Compustat, Barclays Research

Although the broad results suggest that media has experienced a sharp decline in competition, we believe this is not uniformly true across all aspects of the sector. We can roughly break the ad revenues generated by media into two segments: traditional and digital (Figure 13). The former largely consists of TV, print, and radio. That segment may well be experiencing different competitive dynamics. First, its share of ad revenue has been shrinking while the digital segment gained share, and we project that trend to continue. Second, there are important new entrants into content generation and dissemination (such as Hulu, Amazon, and Netflix) that are attracting viewers and forcing incumbents to evolve their business models. A scenario of new, innovative disruptors clashing with incumbents over a shrinking pie would be difficult to describe as anticompetitive.

On the other hand, the digital segment has been growing. The two largest sub-segments within digital are Search and Social at 45% and 28%, respectively (Figure 14), and both continue to grow. They are also the domain of the most textbook candidates for dominant firms. Our overall results for media are most likely being driven by the lack of competition in these categories. Since the areas where the competitive concerns are strongest are the ones growing the fastest, it is unlikely that this dynamic will change in the near term.

FIGURE 13

Digital ads have been replacing traditional channels

Segment	$mn (2018)	% Share	2019E %YoY growth
Traditional	93,095	41%	-8.5%
TV	65,170	29%	-7.3%
Print	14,744	7%	-17.8%
Radio	13,181	6%	-4.2%
Digital	105,554	47%	11.3%
Other*	26,820	12%	-3.6%
Total US Ad Market	225,469	100%	1.4%

Source: MAGNA Intelligence, June 2018

FIGURE 14

Search and Social are the largest categories of digital

Digital type	$mn (2018)	%Share Digital	2019E %YoY growth
Search	47,041	45%	11.1%
Video	12,948	12%	19.5%
Social	29,813	28%	20.9%
Display	8,890	8%	-11.4%
Audio	2,572	2%	5.8%
Other	4,290	4%	-15.2%
Total	105,554	100%	11.3%

Source: MAGNA Intelligence, June 2018

This analysis suggests that the competitiveness concerns focused on the largest digitally focused media companies may be well placed. If these segments are the source of the overall trend in the sector, they are not only valid within the main digital segments, but they appear to be strong enough to overwhelm other changes in media that are likely procompetitive.

In the short to medium term, this is likely to be supportive of equity valuations, assuming that the status quo on the regulatory and policy front remains in place. The segments in which these companies operate continue to grow, and accumulated market power should provide them with a buffer against economic shocks.

However, over the long term the risks of a policy response targeted at the largest media companies is growing, particularly given the recent focus on the sector from a number of policy makers and politicians. A well-designed response may reduce the market power that some large media firms may have accumulated, but we believe there is also a risk that regulatory intervention may actually solidify the position of these companies. For example, there may be cause to be sceptical of some M&A activity in media, but that scepticism does not necessarily extend to all M&A in the sector. It is possible that the merger between AT&T and Time Warner would provide the combined entity a better platform from which to challenge the digital leaders. Challenging that type of transaction could limit the emergence of new, more viable competitors.

There is also a school of thought that argues that addressing the market power of today's big internet firms is unnecessary, as the natural evolution of platforms and technology will produce a new group of winners in the future. In this view, the sector benefits over the long term from competition even if at any point in time, a few firms dominate the existing platforms. The very fact that the existing platforms are dominated by incumbents could be the catalyst for innovators to challenge the platforms themselves, rather than try to compete directly on them.

The likes of AOL and Yahoo are examples of firms that were once considered dominant but were supplanted as they failed to adapt to changes in the tech landscape. In fact, there is a viewpoint articulated extensively by Carlota Perez (a renowned researcher and lecturer on technology and socio-economic development) that explains the accumulation of market power through technological revolutions as a form of business cycle. However, some firms have demonstrated the wherewithal and means to absorb companies that might pose an existential threat via innovation (eg, the acquisitions of Youtube and Instagram by Alphabet and Facebook, respectively). Other firms, such as Microsoft (which has itself been accused of anticompetitive practices in the past) have managed to thrive though multiple platform changes. Of course, it does not need to be the case that every incumbent is supplanted for the view that competition remains high despite some firms exhibiting dominance over the existing platforms to be valid.

Appendix: Accounting methodology

We source company level-data from Compustat. Like with our larger study, we restrict our universe to companies incorporated in the US, using the ISO Country Code. While this does not fully account for every company that competes in the US market, we are primarily concerned with how changes in market dynamics have affected US companies, which operate under the same regulatory and political environment[6].

Each of the variables we use must be estimated; none can be computed precisely using company-reporting information. However, companies do report enough information for us to be confident in the aggregate calculations.

Job churn: The job churn statistic reported by the BLS is defined as the absolute value of jobs gained at expanding establishments plus jobs lost at contracting establishments, divided by total jobs. In principle, this is the easiest statistic to compute at the company level, since all companies report their total number of employees annually; if the universe of companies were static, we could compute this exactly.

However, M&A, IPOs, and bankruptcies each distort the calculation. For example, if a company in our dataset acquires another one, it will appear to have a substantial increase in jobs. This would inflate estimated churn, but we are trying to estimate organic expansion and contraction, not change of control among legal entities. An IPO has a similar effect: it appears in our dataset as a new company (since we are restricted to public companies), but obviously most or all of the employees of the newly public company worked there pre-IPO.

We make two adjustments to remedy these issues. First, we exclude the largest 1% of year-over-year job changes at individual companies. While this may have a dulling effect on job churn for instances when companies spontaneously hire a large number of employees, we believe those instances are rare relative to M&A.[7] This adjustment does not change the overall trends in churn that we observe, but it does reduce volatility. Second, we include only firms that have employee data in both years in which we calculate churn, meaning we exclude companies that are new entrants, as well as those that exit the dataset. This is in lieu of assuming that these companies had zero employees when not in our dataset. Although we potentially miss companies that liquidate and go from having some to no employees, large liquidations are rare, and we prefer this error to falsely attributing churn to IPOs or acquired entities involved in M&A.

Labor's share of income. This is defined as the proportion of revenue allocated to employee wages and benefits. For companies that report wages and benefits ("Total Staff Expense" in Compustat), computing labor share is straightforward.

Unfortunately, less than 10% of companies report this statistic, so we must estimate labor share for the remaining firms. To do so, we start by estimating total staff expenses. We compute the ratio of staff costs to the sum of cost of goods sold (COGS) and selling, general and administrative expenses (SG&A) for the companies that do report staff costs. We then use this ratio to estimate staff costs for the remaining companies: we multiply the ratio by the sum of their reported COGS and SG&A. Implicit in this methodology is the assumption that wages represent a stable proportion of costs across firms within the same industry.[8] We then divide these estimated staff costs by revenue to estimate labor share.

[6] Foreign competition will affect the behaviour of domestic firms, which is a better proxy for their impact on competition than the (for example) labor share of those firms, which will be affected by local labor laws and conditions.
[7] Comparing the churn statistics before and after this adjustment confirms that the largest differences are due to M&A.
[8] In the cross-section, we allow for time variation since we compute this ratio every year. We used several other methods, such as extrapolating per-employee costs. The results are similar; our chosen method generates the least volatile labor share series across a number of industry test cases.

Investment. We compute a net investment rate: gross investment, less depreciation, divided by a company's book value. However, because investment opportunities vary over time, we look at the residual of the rate after adjusting for investment opportunities, which we measure using Tobin's Q, the ratio of a company's market value of assets to its replacement costs[9].

This calculation is reasonably straightforward. We add total capital expenditures and research and development costs (to capture intangible investments) and subtract depreciation. We then divide this number by book value to compute the investment rate. We compute Tobin's Q using the same approach as in *The rise of market power*.[10] We estimate the residual investment (ie, the investment not explained by Q) using a regression of the full sample of domestic firms of investment versus Q.

While this is the default approach for calculating each component, we make adjustments based on sector-specific accounting conventions. When calculating the labor share in retail, we use only SG&A and exclude COGS because of the preponderance of non-labor inputs in retail COGS. The media companies on which we are focused do not typically invest in PP&E, so capital expenditures tend to be very low. Investment is contained in different places on the income statement, but most is expensed either immediately or very quickly. As a result, we think measuring investment indirectly through depreciation (as a percentage of book value) is more accurate. In both instances, these adjustments have a minor effect on the results and do not alter the conclusions.

Competition metric. To convert these series into a competition metric, we de-mean and standardize them within each industry. This is necessary because of substantial inter-industry variation in each of these variables, which overwhelms the intra-industry time series trends and renders comparison meaningless. We then use the weights derived through our principal components analysis (Figure 1) to compute a time series of the competition metric (Figure 2).

Defining industries. This calculation can be applied to any group of companies, although it is informative only if they are legitimately competing with each other. As a starting point, and to avoid cherry-picking an ad hoc group of companies, we focus on S&P's GICS sector classifications[11] to define the sectors we wish to analyse. These are more transparent than NAICS classifications, and the resulting groups are more aligned with well-recognized equity sectors.

GICS sector classifications have four tiers in order of granularity; at the most generic level is the "Sector", then "Industry Group", "Industry", and "Sub-Industry," There is also a numerical code that is a sequence of two-digit numbers that matches each classification level, such that every sector has a two-digit code and every sub-industry has an eight-digit code that begins with the two-digit sector code. Because S&P's GICS sector classifications offer this granularity, we are able to exclude subsectors of a broader industry that do not compete with the cohort of businesses we are trying to evaluate, while at the same time avoiding the clumsy and potentially biased task of excluding individual companies from our analysis on an ad hoc basis.[12]

[9] Formally, we regress the computed investment rate against Q for the entire universe of domestic firms. We use the residuals of this regression in the PCA analysis.

[10] Market value of assets is the market value of equity plus the par value of debt, less the market value of financial assets. We divide this by the book value of the firm's nonfinancial assets.

[11] *https://www.spglobal.com/marketintelligence/en/documents/112727-gics-mapbook_2018_v3_letter_digitalspreads.pdf*

[12] Note: we exclude Sears Roebuck & Co. (gvkey 009563) from all retail calculations. The gvkey included data from AllState before the spinoff, which is not retail related. Sears Holding Corp (gvkey 006307) was included, which only included retail revenue, so Sears data were not omitted.

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