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A new look at the declining labor share of income in the United States

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In brief

A new look at the declining labor share of income in the United States

Labor's share of national income—that is, the amount of GDP paid out in wages, salaries, and benefits—has been declining since the 1980s in a number of countries, and notably the United States. This has raised concerns about slowing income growth, inequality, and loss of consumer purchasing power. Discussion about the decline has largely focused on the rising power of companies vis-à-vis workers—whether from new technology, globalization, the hollowing out of labor unions, or market consolidation.

In this paper, we look at the relative importance of different factors in the United States through a focus on the complement of the labor share decline—that is, the rise in capital share of income. We decompose this into the role of depreciation, capital-to-output ratios, and returns on invested capital and link them to a microanalysis of 12 sectors. While our findings confirm the relevance of the most commonly cited factors, they also suggest that other trends often absent from the current debate played an even more central role. Key findings:

— The labor share of income in the US private business sector declined by about 5.4 percentage points between the periods 1998 to 2002 and 2012 to 2016. Without such a decline since 1998, average worker pay might be about $3,000 higher per year in real terms. The decrease between 2000 and 2016 accounts for three-quarters of the overall decline in the US labor share of income since World War II. Our analysis finds that the fall accounts for 18 percent of the gap that opened between median wage growth and historical productivity growth. Weak productivity growth explains 50 percent of the gap, while disproportionate distribution of income gains to highly paid workers accounts for 19 percent.

— Twelve sectors that make up about one-third of employment and 44 percent of economic output explain the overall decline in labor share or increase in capital share. These tend to be more globalized, more digitized, and more capital-intensive than the overall economy, but also include high-employment services like wholesale and retail. Eight of the 12 sectors experienced faster-than-average wage growth, in most cases supported by above-average productivity growth. Nevertheless, almost all of these sectors have experienced a decline in labor share of more than five percentage points.

— In analyzing the various hypotheses behind the labor share decline across these sectors, we find that a set of supercycle and boom-bust effects appears as the main driver, accounting for one-third of the total decline since 1998. The commodity supercycle notably increased profits in the mining sector, while the real estate boom temporarily increased capital stocks in the sector and its weight in the total economy.

— The second-most important factor (26 percent of the decline) is rising and faster depreciation, due to higher capital stocks and a shift to intangible assets with shorter life cycles. For example, computer and electronics manufacturing raised the share of assets from intellectual property products in total capital and, with it, depreciation. Pharmaceuticals and chemicals also used more intangible capital and experienced higher depreciation.

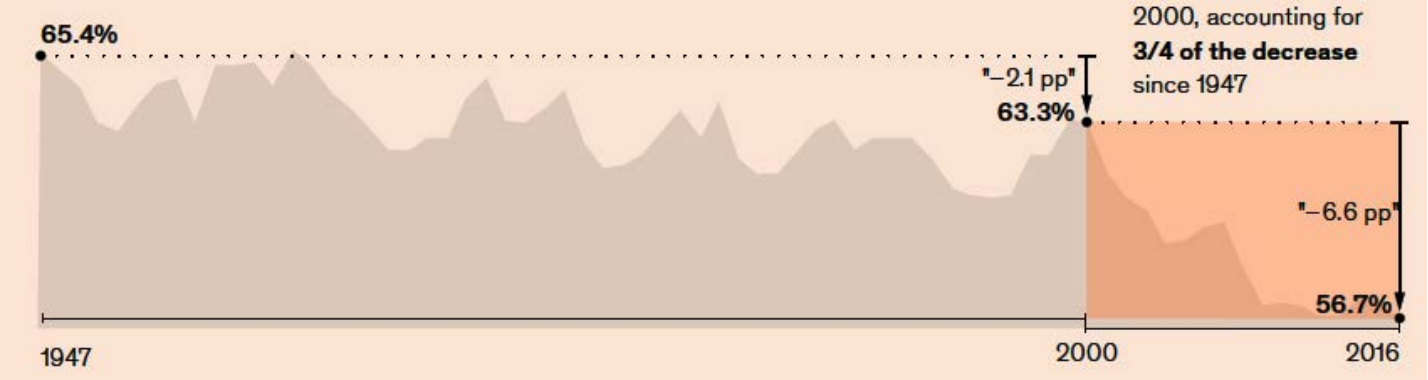
— Superstar effects—which see a small proportion of large firms capturing a disproportionately larger share of economic profit than their peers—along with industry consolidation appear to explain about 18 percent of the decline, including in sectors such as telecommunications, media, and transportation. Capital substitution of labor and automation could underpin 12 percent of the labor share decline, according to our estimates. Globalization and decreased labor bargaining power, which affected the automotive sector among others, account for the remaining 11 percent.

— While further research will be needed to confirm and refine these findings, they already highlight some trends and implications. First, it is clear that economic context matters and a decline in labor share is not, per se, "bad." For instance, while the shift to intangibles has negatively affected the labor share, it can raise productivity. Our research highlights the importance of driving productivity growth as the most important determinant of wage growth. Improving human capital will also be essential. Raising investment rates could have a much higher positive effect on productivity and wages than the historically smallish negative impact of capital deepening on the labor share.

— Our research suggests that labor share declines could continue but at a slower pace. Commodity cycle effects should taper off, and offshoring for reasons of labor-cost arbitrage is declining. The ongoing shift to intangibles will likely continue to raise depreciation, however. Superstar effects also have grown stronger, although policy changes or hypercompetition might alter the trajectory. Capital substitution and technology deployment look set to continue or accelerate, with significant uncertainty around the elasticities of labor substitution versus complementation as a critical determinant of whether that will be good or bad for the labor share. Our research on automation suggests that more occupations will be complemented than substituted.

The declining labor share of income in the United States

The decline of labor's share of income in the US accelerated since 2000, accounting for **3/4 of the decrease** since 1947



We focus on **12 sectors** that account for most of the decreasing labor share and provide a mapping of the **5 leading explanations**

- Highly relevant
- Relevant
- Not main driver

	1 Supercycles and boom-busts	2 Rising and faster depreciation	3 Capital substitution and automation	4 Superstar effects and consolidation	5 Globalization and labor bargaining power
Weighted total contribution to labor share decrease	33%	26%	18%	12%	11%
Cyclical sectors					
Mining and quarrying Construction	Highly relevant	Not main driver	Not main driver	Relevant	Not main driver
Real estate	Highly relevant	Not main driver	Not main driver	Not main driver	Not main driver
Coke and refined petroleum	Highly relevant	Not main driver	Not main driver	Not main driver	Not main driver
Selected manufacturing sectors	Highly relevant	Not main driver	Relevant	Not main driver	Not main driver
Motor vehicles	Not main driver	Relevant	Not main driver	Highly relevant	Highly relevant
Pharma and chemicals	Not main driver	Not main driver	Not main driver	Relevant	Not main driver
Computer, electronics, and optical	Not main driver	Relevant	Not main driver	Highly relevant	Relevant
Tech-related services Publishing, audiovisual, and telecom Computer services	Not main driver	Not main driver	Relevant	Not main driver	Not main driver
Information services	Not main driver	Not main driver	Not main driver	Not main driver	Highly relevant
Other services	Not main driver	Relevant	Not main driver	Relevant	Not main driver
Wholesale and retail Transportation and storage	Not main driver	Not main driver	Not main driver	Not main driver	Not main driver

Source: BLS; OECD STAN; McKinsey Global Institute analysis

1. The declining labor share of income

Labor's share of national income—that is, the amount of GDP paid out in wages, salaries, and benefits—has been declining in developed and, to a lesser extent, emerging markets since the 1980s.[1] The shift represents a marked change in many countries, where labor's share of income held steady for decades in the postwar era. The decline of labor's share has broad economic implications and is often cited as a contributor to the stagnation of middle-class wages.[2] The resulting concern about a "fair" allocation of economic gains to labor versus capital has been a topic of extensive research.[3] Declines in labor share have been cited in support of calls to protect workers from globalization, automation, and hollowing out of unions, as well as in discussions about a future need for universal basic income derived from capital returns and even about the very sustainability of capitalism.[4]

To better understand the pertinence of those arguments, we aim to provide a quantitative assessment of which drivers are at play and how strongly they impact the aggregate labor share, as a complement to a growing literature that often focuses on investigating individual effects and their specific channels. To complement the many existing econometric approaches—and a strong heterogeneity of relevant factors across sectors—we apply a "micro-to-macro" approach that includes a decomposition of the underlying drivers behind the rise in capital income grounded in insight on sector dynamics. We focus our analysis on the United States, where the decline has been particularly rapid since the turn of the millennium. Our findings suggest that factors such as globalization and technology adoption typically referred to in the literature and emphasized in the public debate all apply, but their relative importance may differ from common perception.

The labor share of income has declined across many economies but with varying patterns

The labor share of income in a large sample of 35 advanced economies fell on average from around 54 percent in 1980 to 50.5 percent in 2014, a loss of 3.5 percentage points or about 6.5 percent.[5] In some advanced economies, labor income shares reached the lowest level of the past half century just before the global financial crisis of 2008, although the patterns in individual countries varied (Exhibit 1). Germany, for example, experienced a steady, long-run decline from the early 1980s through the financial crisis, and has since recovered slightly. In France, the labor share dropped sharply in the 1980s and 1990s before stabilizing in the early 2000s and, as in Germany, slowly increased after the financial crisis. The United Kingdom

1 See, for example, "Understanding the downward trend in labor income shares," in *World Economic Outlook: Gaining Momentum?,* International Monetary Fund, April 2017; Loukas Karabarbounis and Brent Neiman, "The global decline of the labor share," *Quarterly Journal of Economics*, February 2014, Volume 129, Issue 1.

2 See, for example, Barry P. Bosworth, *Sources of real wage stagnation*, Brookings Institution, December 22, 2014; Jay Shambaugh and Ryan Nunn, "Why wages aren't growing in America," *Harvard Business Review*, October 24, 2017; and "Decoupling of wages from productivity: What implications for public policies?," in *OECD Economic Outlook*, Organisation for Economic Co-operation and Development, Volume 2018, Issue 2, 2018.

3 See, for example, Michael W. L. Elsby et al., *The decline in U.S. labor share*, Brookings Papers on Economic Activity, Fall 2013; David Autor et al., *The fall of the labor share and the rise of superstar firms*, IZA discussion paper number 10756, May 2017; David Autor and Anna Salomons, *Is automation labor-displacing?: Productivity growth, employment, and the labor share*, Brookings Papers on Economic Activity, March 2018.

4 See, for example, Richard V. Reeves, *Capitalism is failing. People want a job with a decent wage—why is that so hard?* Brookings, April 29, 2019.

5 Weighted by nominal GDP, from "Understanding the downward trend in labor income shares," in *World Economic Outlook: Gaining Momentum?,* International Monetary Fund, April 2017.

has been an exception: its labor share, while volatile, has been increasing since the end of the 1990s, with relatively stable values in recent years.[6]

Developing economies have also experienced the same phenomenon, albeit to a lesser extent. Available studies suggest that the labor share of income fell from 39 percent in 1993 to 37.4 percent in 2014, a drop of about 4 percent.[7] In China, for example, despite the enormous gain in GDP and parallel reduction in poverty since 1990—more than 700 million people have been lifted out of extreme poverty—the labor share of income has declined by almost three percentage points.[8]

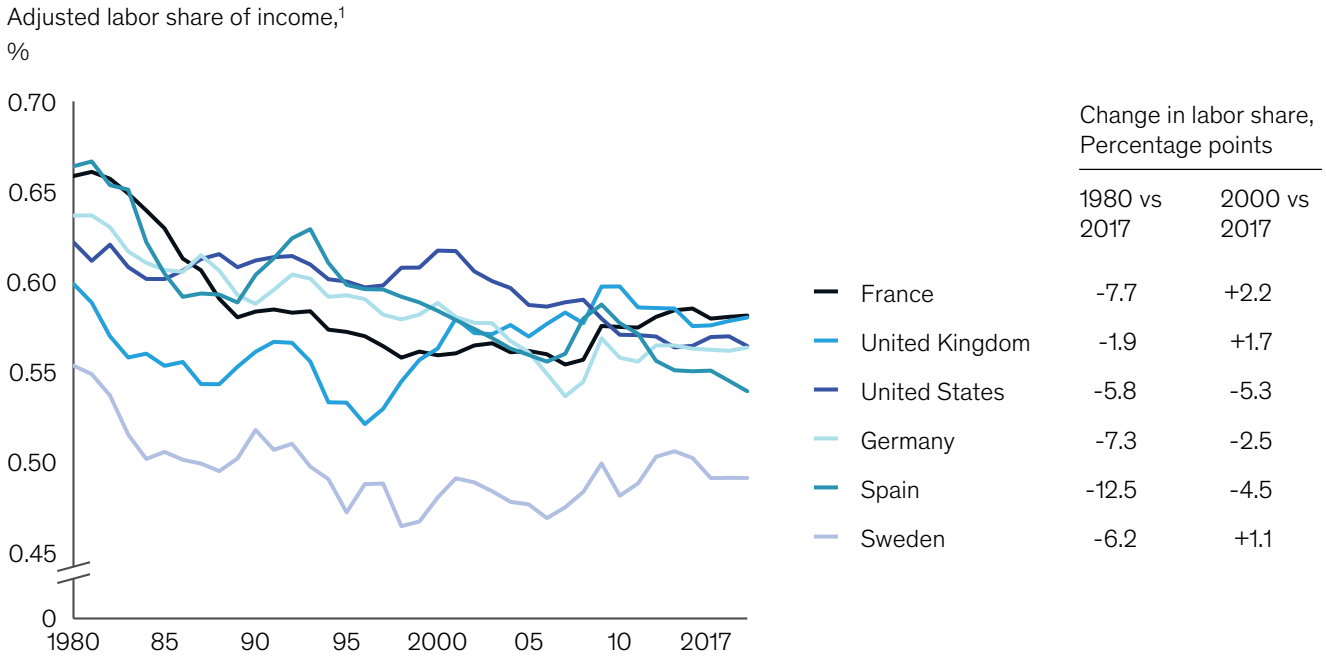
The decline in labor share of income in the United States since the turn of the millennium has been particularly marked and is the focus of our analysis. The varying trends across countries suggest that the underlying drivers behind the decline in labor share, and their relative importance, could look different across countries, and explanations for the decline are best identified using a micro-to-macro approach rather than an economy-wide analysis. Official data from the Bureau of Labor Statistics (BLS) suggest that, while the labor share had already started to decrease in the 1960s, three-fourths of the entire post-1947 decline occurred between 2000 and 2016 (Exhibit 2).[9] The steepest part of the decline—from 63.3 percent in 2000 to 56.7 percent in 2016—followed a moderate downward drift in the 1980s and early 1990s, and a slight recovery in the late 1990s.

[6] Most industries in the United Kingdom experienced a modest increase in labor share, counteracted by a strong decrease in the information and communication, professional, business, and the financial services sectors.
[7] Sample of 54 economies in "Understanding the downward trend in labor income shares," in *World Economic Outlook: Gaining Momentum?*, International Monetary Fund, April 2017.
[8] *IMFBlog*, "Drivers of declining labor share of income," blog entry by Mai Chi Dao et al., April 12, 2017, blogs.imf.org/2017/04/12/drivers-of-declining-labor-share-of-income/.
[9] Michael D. Giandrea and Shawn Sprague, "Estimating the U.S. labor share," *Monthly Labor Review*, US Bureau of Labor Statistics, February 2017.

Exhibit 1

Declines in labor share across advanced economies have been widespread but not uniform.

Labor share in several advanced economies since 1980



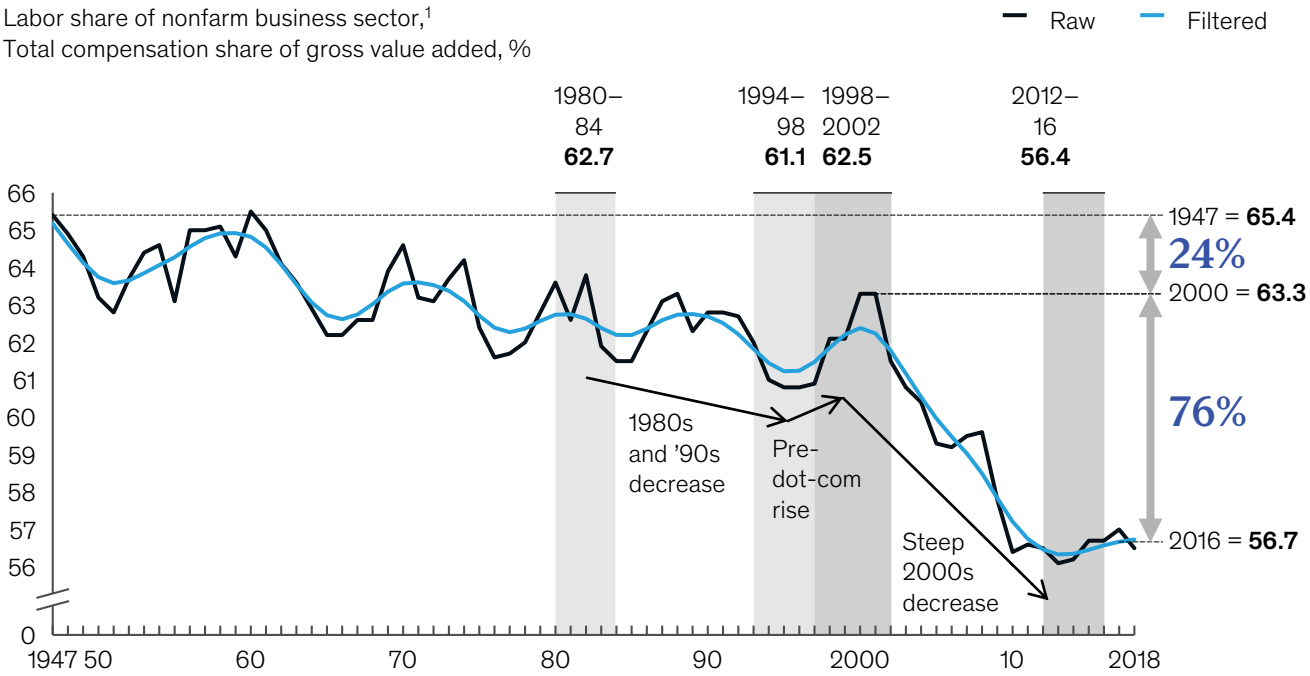
[1] Adjusted labor share for total economy over GDP at market prices from AMECO, based on ratio of total compensation of employees to GDP multiplied by the ratio of total employment to the number of employees (salaried people). This helps account for income of self-employed households assuming that their wage is similar to salaried households.

Source: AMECO (November 2018 release); McKinsey Global Institute analysis

Exhibit 2

Three-fourths of the decrease in labor share in the United States since 1947 has come since 2000.

The accelerating decline in labor share in the United States



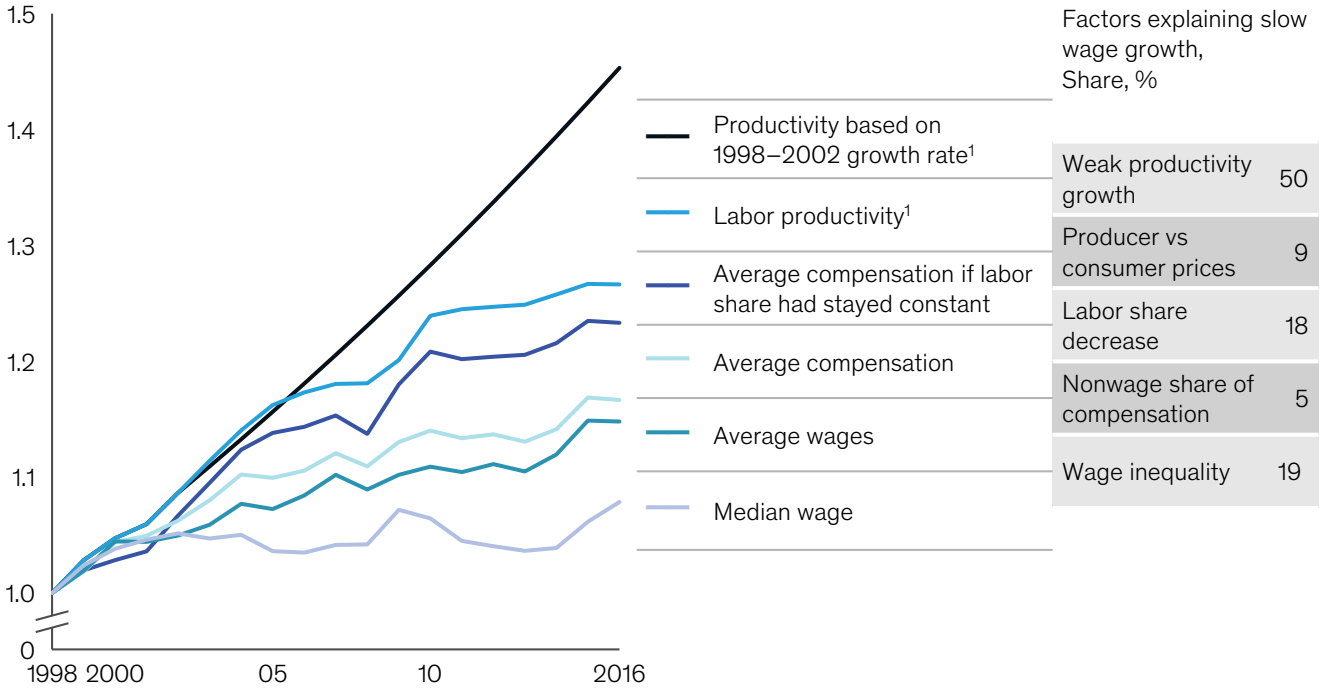
[1] Detrended using Hodrick-Prescott filter (restriction parameter = 6); adjusted for self-employed income (non-farm business sector, 75% of total economy), from Labor Productivity and Costs database, Bureau of Labor Statistics.

Source: BLS (March 2019 release); McKinsey Global Institute analysis

Exhibit 3

Weak productivity growth is the biggest cause of slow wage increases.

Contributors to the productivity-and-wages gap for the total US economy, Index: 1998 = 1



[1] Productivity figures per person employed (total number of workers).

Note: Figures may not sum to 100% because of rounding.

Source: OECD STAN; OECD; BLS; McKinsey Global Institute analysis

The declining labor share of income is a moderate contributor to median wage stagnation

While the decline of labor's share of income influences workers' compensation, our analysis suggests that it is not the only factor driving slow income growth and the growing gap between median wages and labor productivity observed in the United States. To better understand the phenomenon, we break down the gap between historical productivity growth and median wage growth (Exhibit 3). We estimate that declines in the labor share of income explain 18 percent of the gap between median wages and historical productivity growth rates. Weak productivity growth was the most influential factor, accounting for half of the gap. The disproportionate distribution of income gains to highly paid workers, reflected in a growing gap between average and median wages, accounts for 19 percent of the gap, a similar contribution to the labor share's (and some of the drivers underneath might well be the same as for changes in the labor share of income).[10] The growing wedge between prices of consumption and production accounts for roughly 9 percent of the gap.[11]

Nonetheless, the decline in labor share remains a sizable factor for income. As an illustration, had it remained at the levels of 1998, all else being equal, average worker pay in real terms might be higher by roughly $3,000 per year today. The future trajectory of the labor share is also a cause for concern in a new era of digitization and artificial intelligence.

Five main reasons typically cited for declining labor share

The academic literature has put forward a range of reasons for the decline in labor's share of income (see Box 1, "Literature on the decline in labor's share of income," for a general summary, and Appendix A for more detail). We cluster the main drivers into the following five broad categories:

— **Capital deepening, substitution, and automation.** Improvements in technology, such as more powerful computers and industrial robots, are reflected in lower prices for investment goods; this increases the incentive to substitute capital for labor, perhaps enough to make automation and the displacement of labor economical in the first place. If labor plays less of a role in production, for example through declining need for labor as a factor of production and hence lower rates of employment, its share of income can decline.

  It is important to note that the transmission channels from capital deepening and automation are complex. Technology can substitute labor and compress its share, but it can also complement labor, raise output and productivity, and set the foundation for wage rises.[12] Furthermore, technology can also make capital deployment more efficient, for example by increasing asset utilization or lifetime, and thus potentially compressing the capital share of income. A majority of academic research suggests that technological change has augmented labor more than capital, while showing that a decreasing

[10] The divergence between median and average wage only partially captures the growing wage inequality in the United States, and data suggest that the end of the income distribution is driving the gap, with the top 10% share of pretax national income growing from 34% to 47% between 1980 and 2014. Source: World Inequality Database based on Thomas Piketty, Emmanuel Saez, and Gabriel Zucman, "Distributional national accounts: Methods and estimates for the United States," *The Quarterly Journal of Economics*, May 2018, Volume 133, Issue 2.

[11] One factor that started to matter in recent decades for the disconnect between productivity and wage growth is the difference between the growth of producer prices, which are used to calculate real output and productivity changes, and of consumer prices, which are used to compute real wages (consumer prices are used to compute wages because they reflect consumers' ability to purchase everyday products and services). Such effects have stabilized more recently. Producer and consumer prices diverged for several reasons. For instance, on the consumer side, rents increased, mostly due to a scarcity of land and housing stock, without a strong link to underlying production prices. A detailed discussion is beyond the scope of this paper. See Josh Bivens and Lawrence Mishel, *Understanding the historic divergence between productivity and a typical worker's pay*, EPI Briefing Paper, September 2015, and James Sherk, *Productivity and compensation: Growing together*, The Heritage Foundation, July 2013, for an analysis of discrepancies in methodology and coverage between the price of wages and production.

[12] Recent theoretical modeling of automation shows that it reduces the labor share, with the most threatening technologies being the ones that don't lead to major productivity breakthrough (low positive spillover effects) but are good enough to be implemented. See Daron Acemoglu and Pascual Restrepo, *Modeling automation*, National Bureau of Economic Research (NEBR) working paper number 24321, February 2018.

labor share is possible even with an elasticity of substitution lower than unity.[13] Capital substitution may have led to declining labor shares if it raised nominal capital-to-output ratios (or returns on capital), which would increase capital returns relative to output and thus the capital share. These are metrics that our decomposition allows us to observe directly. We then use sector insights to understand whether changes appear to derive from capital substitution or other effects such as offshoring.[14] In an automating world, human capital also matters: If capital and labor skills are complementary, a stagnation in the level of accumulated human capital caused by the recent productivity slowdown can generate a decline in labor's share of income.[15]

— **"Superstar" effects and consolidation.** Recent research has shown that superstar firms are reaping rising shares of profits and value added. This is particularly the case in knowledge-intensive sectors, so that more value goes to capital owners relative to labor, despite strong wage growth.[16] Such consolidation and rise of superstars can also go together with lack of competition, particularly in highly regulated sectors or in domains where intellectual property gives companies a competitive edge, for example due to strong patents.[17] Where these companies deploy more capital or earn higher returns on invested capital, whether for good or for anticompetitive reasons, the labor share declines. Recent MGI research has found that superstars exist among firms, sectors, and cities but that many suggested explanations of the superstar effect, such as productivity growth, technological or regulatory advantage, and intangible investments, do not fully account for the phenomenon (See Box 2, "What we know about superstar firms and superstar sectors"). Our research has also suggested that it is competitive among superstars, given the churn and fall-out rates.

— **Globalization and labor bargaining power.** Increased trade competition from imports made in lower labor-cost countries and the threat of offshoring (exporting jobs to such countries) can put pressure on wages and employment.[18] In some sectors, the erosion of labor market institutions such as unions weakens the bargaining power of workers as well. The transmission channels from bargaining power to labor share are complex. As a first-round effect, rising wages might be paid out of company profits, with a direct effect on labor share. In the longer run, however, companies will often pass on some of that cost to consumers, inflating prices and output, and thus dampening the labor share increase. Theoretically, stronger centralized bargaining could tie the transmission of productivity gains to wages within the industry—although this could potentially reduce flexibility in wage setting of companies and productivity growth in the long term.[19] While a higher

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[13] Economists are divided on the question of whether the elasticity of substitution between capital and labor is above 1 (substitution of labor with capital) or below 1, and results seem to be dependent on the sample and methodology used. For an overview of the literature and estimations at the industry level, see Robert Z. Lawrence, *Recent declines in labor's share in US income: A preliminary neoclassical account*, Peterson Institute for International Economics, working paper number 15-10, June 2015.

[14] We focus on capital-to-output ratios on the simplifying assumption that, in the long run, competition—where it is working—should bring returns back to "normal" levels commensurate with the amount of investment undertaken. Where competition does not play in that regard, we focus on superstar effects rather than capital substitution.

[15] See Gene M. Grossmann et al., *The productivity slowdown and the declining labor share: A neoclassical exploration,* NBER Working Paper 23853, September 2017.

[16] Recent MGI research documents and characterizes high and increasing concentration of income at the company, sector, and city levels; see *Superstars: The dynamics of firms, sectors, and cities leading the global economy*, McKinsey Global Institute, October 2018.

[17] Among others, *The Economist* argued that a widespread lack of competition in key US sectors necessitates reforms of intellectual property rights, a revamp of regulations affecting barriers to entry, and new antitrust laws and institutions, "The next capitalist revolution," *Economist,* November 2018.

[18] While our methodology does not systematically differentiate whether a labor share decline is primarily driven by a change in employment or wages, we provide additional evidence on real wage growth and employment figures for selected sectors when relevant. The discussion of whether adjustments in employment or wages are predominant and their consequence in terms of underlying modeling (optimal contract versus labor supply model) is exemplified in John M. Abowd and David Card, "Intertemporal labor supply and long-term employment contracts," *The American Economic Review*, March 1987, Volume 77, Number 1.

[19] The link between the strength of institutional labor and competitiveness is not straightforward, and countries relying on innovation, cooperative, and centralized labor relations, as well as better social protection, are not necessarily at a disadvantage compared with those putting more emphasis on low labor costs and minimal social programs. See William Milberg and Ellen Houston, "The high road and the low road to international competitiveness: Extending the neo-Schumpeterian trade model beyond technology," *International Review of Applied Economics,* April 2005, Volume 19, Number 2.

minimum wage or stronger bargaining power can raise the labor share in the short run, it can also accelerate capital substitution in the longer run.[20]

— **Higher depreciation (including due to a shift to more intangible capital).** Production processes in recent decades have undergone changes, particularly toward a greater use of capital for assets in the form of intangibles and intellectual property products (IPP), such as patents, R&D, and software, which have faster depreciation cycles than buildings and machines.[21] Furthermore, the economy is working through a capital overhang—an increase in capital-to-output ratios—that stems from the investment boom and capital misallocation before the financial crisis and the output collapse that followed. Both of these factors increase the depreciation share of income, which reduces the amount available to either labor or capital (in net terms).

— **Supercycles and boom-bust.** Parts of the global economy, particularly the energy and minerals sectors, are susceptible to price supercycles. Rapidly rising commodity prices tend to increase profits (and investment) and reduce labor's share of income. Other sectors such as real estate and construction have exhibited pronounced boom-bust sequences that also led to shifts in capital—and hence labor—share of income. For some sectors, for example tech services, the initial years of our sample capture an industry-specific contraction phase, and following years show a progressive recovery.

The literature finds evidence for all of these factors, primarily using cross-country or cross-sector panel regressions, firm-level microdata, and theoretical models of automation. We provide a summary of the key literature by driver in Appendix A, with a particular focus on papers that were foundational for a category of explanations or that try to test the explanatory power of various theories of why the labor share has decreased in developed economies.

The literature diverges, however, on which factors and mechanisms matter most in explaining the labor share decline. This is the motivation for adding a new perspective to the debate.

[20] For a summary of effects of labor market policies on the labor share, see "Decoupling of wages from productivity: What implications for public policies?," in *OECD Economic Outlook,* Volume 2018, Issue 2, 2018. For an extensive analysis of the effect of labor market settings on wage and productivity dispersion, see *The Great Divergence(s),* OECD Science, Technology and Industry Policy Papers, number 39, May 2017.

[21] In 2013 the BEA decided to consider R&D expenses as contributing to value added and fixed asset investment retrospectively to 1998. They had been treated as an input, thus decreasing value added. While our sample contains only revised data, the revision tends to reduce the labor share and make its long-run decline more pronounced. See Robert Z. Lawrence, *Recent declines in labor's share in US income: A preliminary neoclassical account*, Peterson Institute for International Economics, working paper number 15-10, June 2015.

Box 1

Literature on the decline in labor's share of income

A growing body of academic literature in recent years is devoted to explaining the declining labor share of income. This in turn has given rise to a burgeoning number of nonacademic articles in the media that frequently highlight three of the factors, namely the rise of automation, the spread of globalization, and the impact of market power. We list some of the main works on the topic in the bibliography at the end of this paper and summarize key studies in Appendix A.

Several papers are foundational for a specific category of explanations. Rognlie (2015) argues that the housing sector played a particular role in the recent increase in the capital share due to imputed rents to homeowners. These rents are influenced by neither globalization nor technology but are the result of the limited quantity of available residential land and the rising cost of residential investment.[1] Koh, Santaeulàlia-Llopis, and Zheng (2016) show that the long-run decline in labor share is driven in part by the transition to an economy that is more capital-intensive and focused on intellectual property products (IPP). IPP depreciation and rising net IPP capital income account for most of the decline in the labor share, according to this analysis.[2] Karabarbounis and Neiman (2014) show that a decrease in the relative price of investment goods due to IT and digitization encouraged companies to shift away from labor toward capital. This accounts for about half the decline in labor share and dominates other effects such as increasing profits, capital-augmenting technology growth, and the changing skill composition of the workforce.[3]

Other studies test various hypotheses simultaneously. The IMF, in its 2017 *World Economic Outlook,* confirms the importance of the decline in the price of investment goods, which it uses as a proxy for technological progress. In advanced economies, this factor accounts for about half of the decline in the labor share, it finds. Industries with a higher exposure to automation experience a more pronounced decline. The IMF also finds that participation in global value chains and financial integration had a significant impact, accounting for about one-fourth of the labor share decline in advanced economies. Other factors, including corporate tax and unionization rates, had only a small negative effect on the labor income share.[4]

Elsby, Hobijn, and Sahin (2013) find that offshoring was the leading explanation of the decline, with some limited evidence for institutional factors such as union coverage rate, as a proxy for labor bargaining.[5] Results from recent research for OECD countries find both investment price declines and the rise in global value chains to be relevant, and confirm the sensitivity of institutional settings: labor share tends to be more robust in countries with competition-friendly product market policies and lower minimum wages, but the effect of centralized labor bargaining is inconclusive.[6] However, recent sectoral research from the IMF estimates that deregulation of job protection accounted for about 15 percent of the average labor share decline in a sample of 26 advanced economies.[7]

At the firm level, the OECD confirms the emergence of strong "winner takes most" dynamics and superstar firms,

1 Matthew Rognlie, *Deciphering the fall and rise in the net capital share: Accumulation or scarcity?,* Brookings Papers on Economic Activity, Spring 2015.
2 Dongya Koh, Raül Santaeulàlia-Llopis, and Yu Zheng, *Labor share decline and intellectual property products capital*, Barcelona Graduate School of Economics, working paper number 927, February 2016.
3 Loukas Karabarbounis and Brent Neiman, "The global decline of the labor share," *Quarterly Journal of Economics*, February 2014, Volume 129, Issue 1.
4 "Understanding the downward trend in labor income shares," in *World Economic Outlook: Gaining Momentum?,* International Monetary Fund, April 2017.
5 Michael W. L. Elsby, Bart Hobijn, and Aysegul Sahin, *The decline of the U.S. labor share*, Brookings Papers on Economic Activity, Fall 2013.
6 "Decoupling of wages from productivity: What implications for public policies?," in *OECD Economic Outlook,* Volume 2018, Issue 2, 2018.
7 Gabriele Ciminelli, Romain A Duval, and Davide Furceri, *Employment protection deregulation and labor shares in advanced economies*, IMF working paper number 18/186, August 2018.

a composition effect previously discussed in Autor et al. (2017).[8] Barkai (2016) disentangles capital costs—driven by capital stock and required rate of return on capital—from pure profits and finds that both the labor share and capital costs share have been decreasing in the United States, with the strong rise in profit share related to higher concentration in various industries, which can be understood as a gauge of this decline.[9] Gutiérrez (2017) systematically tests potential drivers of the labor share, integrating the methodology developed in Barkai.[10] Capital-biased technical change, a prominent factor in the labor share debate, is found to be relevant only for some specific sectors, such as manufacturing. Aggregate patterns for the United States are consistent with both rising firm markup and concentration, because of either increasing market power or growing importance of scale efficiency. While the analysis is not able to size their relative contribution, Gutiérrez favors rising market power. This is based on Gutiérrez and Philippon (2017), who show that total factor productivity growth ceased to be related to concentration after 2000 but should continue to be related, if consolidation leads to higher productivity. They also note that concentration primarily increased in the 1990s and early 2000s, before the acceleration of the labor share decline.[11]

Recent studies such as Bergholt et al. (2018) innovate in that they combine a theoretical model of structural changes, structural vector autoregressive process (S-VAR), and data simulation in order to evaluate the size of the respective hypotheses for the decline in labor share. They find that automation has been the main driver of the labor share decline since the early 2000s, with a rise in price markup (for example, due to lower competition and higher concentration) becoming increasingly prominent following the global financial crisis. Contrary to some of the earlier studies, investment in capital-biased technology helped stabilize the labor share.[12]

Finally, in a series of recent publications, Acemoglu and Restrepo (2018) model the implications of automation for the labor share: there is a balanced growth path where automation replaces workers but creates new versions of existing occupations where labor still has a comparative advantage over machines. In another paper, they confirm that the use of machines instead of labor could lead to a reduction in labor share, labor demand, and wages. Technologies most threatening to the labor share are ones that do not lead to major productivity breakthroughs, so that their positive spillover effects on productivity and wages are limited.[13]

Our research methodology distinguishes itself from the typical approach used in the literature. First, we focus primarily on an analysis of the United States (versus a cross-country comparison) to ensure that we are building country-specific insights. Second, we build a micro-to-macro perspective by looking at all sectors in the economy, determining their relative importance for economy-wide effects on the aggregate capital share (rather than a perspective built on the labor share only). Third, we explore and contrast the importance of many factors discussed in the literature, instead of laying the focus on the transmission mechanism of a specific one. And finally, our approach involves an analysis of the dynamics within each sector to highlight observable components of the labor share and insights behind them, rather than an approach using econometric models and regressions. We hope that such an approach offers an interesting and useful perspective on the debate.

8 David Autor et al., *The fall of the labor share and the rise of superstar firms*, IZA discussion paper number 10756, May 2017.
9 Simcha Barkai, *Declining labor and capital shares*, working paper, University of Chicago, 2017.
10 Germán Gutiérrez, *Investigating global labor and profit shares*, working paper, October 2017.
11 Germán Gutiérrez and Thomas Philippon, *Declining competition and investment in the U.S.*, NBER working paper number 23583, July 2017.
12 Drago Bergholt, Francesco Furlanetto, and Niccolo Maffai Faccioli, *The decline of the labor share: New empirical evidence*, working paper preliminary draft, December 2018.
13 Daron Acemoglu and Pascual Restrepo, "The race between man and machine: Implications of technology for growth, factor shares and employment," *American Economic Review*, June 2018, Volume 108, Number 6; and Daron Acemoglu and Pascual Restrepo, *Modeling automation*, NBER working paper number 24321, February 2018.

Box 2

What we know about superstar firms and superstar sectors

The emergence and rapid growth of very large global companies have sparked much discussion about "superstar" firms and "superstar effects," including the potential impact on the labor share of income as they generate particularly high returns to capital. MGI's research on this phenomenon follows a broad approach, analyzing the effect from the perspective of firms, sectors, and cities. While a variety of definitions exist, we define superstar as a firm, sector, or city that has a substantially greater share of income than peers and is pulling away from those peers over time.[1] In the following, we summarize main findings at the company and sector level that are relevant to the decline in labor share of income and rise in capital share of income.

— **The superstar firm effect is real.** Among the world's largest companies, economic profit is distributed unequally along a power curve, with the top 10 percent of firms capturing 80 percent of economic profit.[2] We label these superstar firms.[3] This distribution of economic profit has become more unequal over the past 20 years. After adjusting for inflation, today's superstar firms have 1.6 times more economic profit on average than superstar firms 20 years ago. The increasing concentration of economic profit is also accompanied by larger and more concentrated losses at the other end of the distribution.

— **The superstar effect has also been seen among sectors, many of which tie to the sectors identified in this research.** We analyze 24 sectors of the global economy that encompass all private-sector business establishments.[4] A superstar sector is identified based on the share of gains in income—measured as gross value added and gross operating surplus—accruing to business establishments in G-20 economies over time. We find that 70 percent of gains in gross value added and gross operating surplus have accrued to establishments in just a handful of sectors over the past 20 years. This is in contrast to previous decades, in which gains were spread over a wider range of sectors. While the superstar effect is not as strong for sectors as it is for firms, what we have identified as superstar sectors include financial services, professional services, real estate, and two smaller (in terms of gross value added and gross operating

1 *Superstars: The dynamics of firms, sectors, and cities leading the global economy*, McKinsey Global Institute, October 2018.
2 Chris Bradley, Martin Hirt, and Sven Smit, *Strategy beyond the Hockey Stick: People, Probabilities, and Big Moves to Beat the Odds*, Hoboken, NJ: John Wiley & Sons, 2018.
3 To better understand firm dynamics, we analyzed nearly 6,000 of the world's largest public and private firms, each with annual revenues greater than $1 billion, that together make up 65 percent of global corporate pretax earnings (EBITDA) over the period from 1994 to 2016. Our metric for superstar firms is economic profit, a measure of a firm's invested capital times its return above the cost of capital. We focus on economic profit because it reflects the economic value created by a firm's operating activities and investments.
4 Sectors such as agriculture, public administration, social services, and defense are excluded.

surplus) but rapidly gaining sectors: pharmaceuticals and medical products, and internet, media, and software (without telecom). Of these, real estate, pharmaceutical and chemical products, computer services, and information services are also identified in our research as driving the decline in labor share and the rise in capital share. Other sectors, for example transportation services, automobiles and parts, and natural resources, while not being superstar sectors, significantly gained in terms of share of gross operating surplus in most G-20 countries and are among the key sectors in our analysis.[5]

— **Superstar sectors increasingly rely on R&D and intangibles rather than labor and tangible capital inputs.** Today's superstar sectors and firms share one or more of the following attributes: fewer fixed capital and labor inputs, more intangible inputs—for example R&D—and higher levels of digital adoption and regulatory oversight than other sectors. The gains in gross value added accrue more to corporate gross surplus and capital holders rather than labor, flowing to intangible capital such as software, patents, and brands. This phenomenon of lower reliance by superstars on labor and tangible capital inputs has been increasing over time, with superstar firms and sectors less labor- and tangible capital-intensive today than those 20 years ago. Superstar effects could thus also overlap with the rise in depreciation from a shift to intangibles that we observe as an important component of labor share declines and, due to their technological edge, possible substitution of labor with capital.

— **Superstar status among firms remains achievable: the odds of becoming one—or remaining one—are unchanged.** Superstar status remains highly contested, and despite the increasing concentration of economic profit, it is easy to fall from the top. We found nearly half of superstars lost their status in every business cycle. This churn rate has remained unchanged over the past three business cycles going back more than 30 years. This indicates continuing competitive churn for firms. We have found in our productivity research that rising concentration does not seem to be a major factor in the productivity growth slow-down of the last decade.[6]

Our analysis so far raises questions for further research. For instance, we find that many suggested explanations of the superstar effect, such as productivity growth, technological or regulatory advantage, and intangible investments do not fully account for the phenomenon.

[5] Differences in findings originate from the country coverage (G-20 versus United States), sector definition, and the methodology used.
[6] *Solving the productivity puzzle: The role of demand and the promise of digitization*, McKinsey Global Institute, February 2018.

2. Our approach: A micro-to-macro sector approach and DuPont decomposition

We take a micro-to-macro approach to analyzing the labor share of income. This brings out strongly different patterns by sector. We lay the focus on the mirror image of the labor share—the capital share—because it lends itself to further decomposition into fundamental drivers to better understand its change over the last few decades. Anything that drives the capital share up will equivalently drive the labor share down. Our approach combines a decomposition of the total contribution of each sector with a DuPont-type decomposition of the drivers of the capital share and deep microeconomic sector insights to understand the many influences at play. We then relate those drivers to main explanations in the literature. We use the broadest possible scope for labor share (see Box 3, "Our definition of labor share and the scope of this analysis").

First, we identify which industries have contributed most to the increase in capital share, quantifying a "mix" effect (the importance of each sector in terms of relative value added) and a "within" effect (the rise of capital share within an industry). For more details on the methodology, see Appendix B.

Second, we investigate which fraction of gross operating surplus is an actual increase in net profits and which fraction is attributed to depreciation.[22] We can use the calculated increase in depreciation directly to assess that effect and understand from sector deep dives the factors that drove it.

Third, to help us distinguish between rising returns versus capital deepening, we adapt a DuPont decomposition typically used in finance to further break down net operating surplus into its underlying components: returns on invested capital—or net operating surplus over net capital stock, which can be broken down further into profit margins on sales and capital turnover—and capital-to-output ratios (Exhibit 4). We use that decomposition to gain a better understanding of the forces that might be at play in each sector to depress the labor share. A rising capital-to-output ratio would be a strong indicator of substituting capital for labor, or offshoring labor-intensive tasks, which we can corroborate with a sector understanding of when, where, and how that may have happened.[23] Rather than defining metrics of capital deepening, including nominal or real changes in capital-to-worker ratios, and trying to econometrically assess the impact on the labor share, we start with what we can observe as a metric that directly affects the labor share, the capital-to-output ratio, and interpret whether that is related to capital substitution or other effects based on sector insights. These could

[22] The measure of net profit used in this report is net operating surplus, which contains corporate, household, and government profits, including interest and taxes, net housing income (with imputed rents of homeowners), net interest income, and part of proprietors' income. Since the start of our sample in 1998, the share of net interest income has been decreasing, while the share of housing income and corporate profits has been rising. For a more detailed discussion, see Alan Cole, *A walkthrough of gross domestic income,* Tax Foundation, Fiscal Fact number 467, May 2015.

[23] Often, economists would use capital per hour worked ratios to assess capital deepening, but there is an impact on the labor share only if an increase in that ratio also entails increases in either capital-to-output ratios or return on invested capital.

Box 3

Our definition of labor share and the scope of this analysis

We apply the common definition of labor share as total labor compensation divided by GDP (or gross value added at basic prices at the sector level), in line with BLS, among others. Note that this starts from a gross metric for income, while one might arguably rather discuss net income shares adjusted for depreciation. We choose this approach to align with the majority of the literature and the public policy debate, and to be able to showcase the relevance of shifts in capital structure on the labor share. We apply a typical adjustment to the labor share for mixed income of self-employed workers, in line, for instance, with the OECD. We then take a full economy perspective, notably including the public, real estate, and energy sectors that are sometimes excluded in the literature due to their specific characteristics. Our approach aims to make the impact of each individual sector fully transparent, so we start from the broadest possible basis.

include decreases in output from compressing labor compensation and labor offshoring. We look at returns on invested capital (ROIC) as an additional driver of labor share declines. We interpret increases in ROIC as a potential marker of cycle or supercycle effects or rising superstar effects, which we can, again, test via deeper sector reviews.

Finally, we use a micro sector lens to understand the dynamics across and within sectors, combining the above analysis with additional sector data and industry expertise (see section 4 for a detailed review of the sectors). We then use those insights to map sectors to the five leading explanations for the decrease in labor share identified in the literature. For each sector and each of the five explanations, we conduct a simple assessment to designate them as "limited," "relevant," or "highly relevant" and use that to allocate the sector's contribution to the overall labor share decline to those explanations.[24]

While our decompositions are mathematically precise, the relevance we assign to each driver in each sector is based on informed judgments and our knowledge of the respective industry.

[24] A sector's contribution to the total net capital share increase is split across the factors identified as "relevant," with a weighting of 1, and those identified as "highly relevant," with a weighting of 2. For example, if we mark supercycles and boom-bust as "highly relevant" and capital substitution as "relevant" in the mining sector, the former will account for two-thirds of the sector's contribution to the net capital share increase, and the latter one-third. The role of depreciation is calculated across all sectors of the economy.

Exhibit 4

We use an adaptation of the DuPont decomposition to identify industries and economic variables driving the decline in labor share.

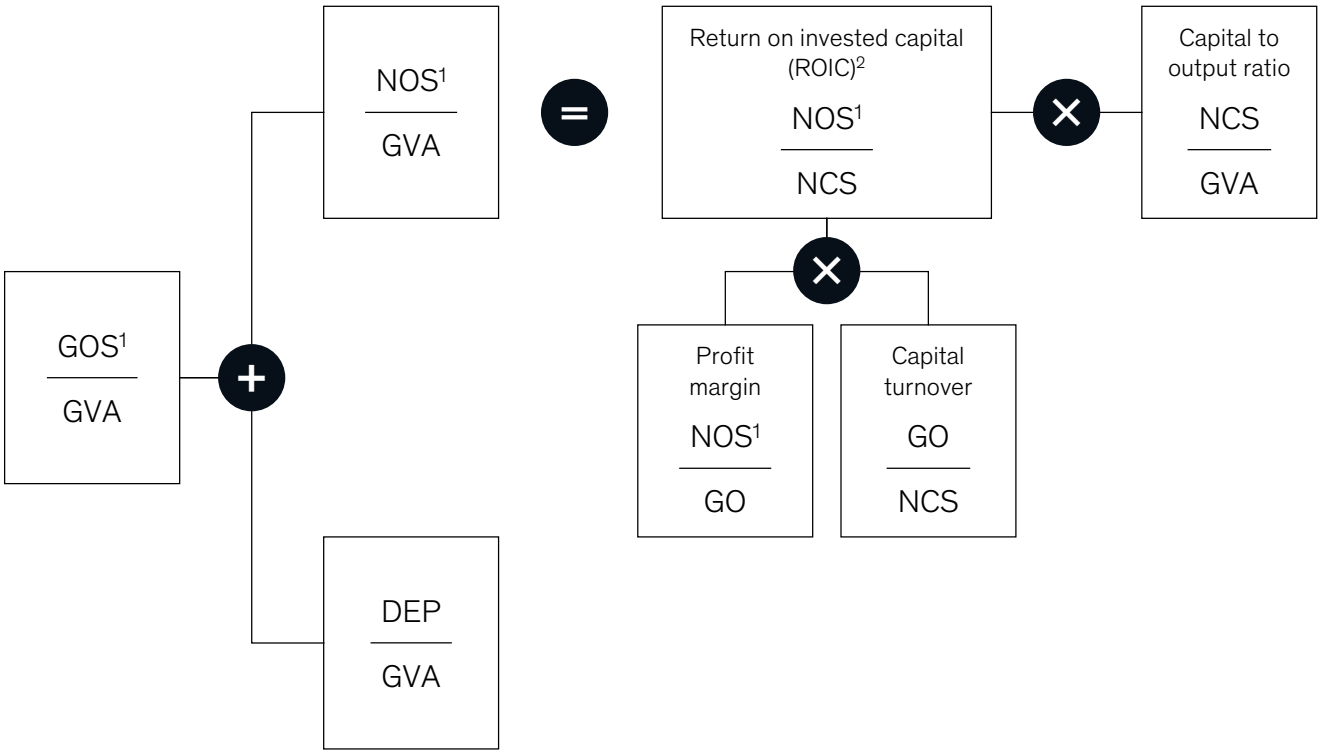
Overview of our decomposition methodology

COMP Total compensation of employees	**DEP** Depreciation	**GO** Gross output (sales)	**GOS** Gross operating surplus	**GVA** Gross value added (at basic prices)	**NOS** Net operating surplus	**NCS** Net capital stock	**TAX** Taxes less subsidies on production

Labor share

$$\frac{\text{COMP}^{1}}{\text{GVA}} = 1 - \frac{\text{TAX}}{\text{GVA}} - \frac{\text{NOS}^{1}}{\text{GVA}} - \frac{\text{DEP}}{\text{GVA}}$$

Adapted DuPont capital share decomposition



[1] Adjusted for self-employed income: COMP/GVA is multiplied by total employment/employees at the most granular industry level. It assumes that self-employed and employed workers earn the same wage. GOS and NOS also are affected by this adjustment.

[2] Note that ROIC typically includes the impact of taxes; however, we refrain from including it here since trends for taxes and subsidies on production are roughly similar across industries and are therefore not an important source of variation by industry.

Source: DuPont methodology attributed to Donaldson Brown (unpublished, 1912); featured in most corporate finance textbooks, eg, Eliot H. Sherman, *A manager's guide to financial analysis*, AMA Self-Study, September 2015; McKinsey Global Institute analysis

3. Our findings: The sectors and factors driving capital share increases

We compare the period between 1998 and 2002, the beginning of our data sample, with the period between 2012 and 2016, a stable period marking the transition from crisis recovery to expansion.

In that span, the US labor income share for the private business sector alone declined by an exceptionally large 5.4 percentage points, according to the Bureau of Labor Statistics, or 3.5 percentage points for the total economy, according to the Organisation for Economic Co-operation and Development (OECD).[25]

We quantify the total increase in depreciation across all sectors in the economy and then focus on 12 sectors that account for most of the increase in net capital share (Exhibit 5).[26] These industries are representative of sectors across the United States economy, with cyclical businesses, selected manufacturing sectors, technological services, and other services such as retail and transport. It is worth noting that some sectors experienced a decrease in capital share over the period.[27]

While there is a high heterogeneity in the relative size and contribution of the sectors to the change in labor share, we find that the main driver behind the increase in capital share was an increase in capital share within each sector rather than the effect of a mix shift of the economy toward sectors with higher capital share (Exhibit 6).

For each of these sectors, we outline the impact played by depreciation versus an increase in net capital share. This allows us to outline potential drivers behind the capital share increase, as highlighted in the next section.

Ranking the main reasons for the decline in labor share

We find that that the main drivers for the decline in the labor share of income since 1999 are as follows, starting with the most important: supercycles and boom-bust (33 percent),

[25] BLS Labor Productivity and Costs database (June 2018 release); OECD Structural Analysis Database (OECD STAN, July 2018 release). The difference of approximately 1.8 percentage points is due to different sector coverage between the BLS and the OECD and, to a lesser extent, definition and methodology. We chose to use OECD data, since it helps enable compatibility of data and replication to other countries in further research. It also allows us to use harmonized OECD measures of net capital stock at the industry level. We adjust the labor share for self-employed income following the literature by multiplying it with total employment over number of employees at the most granular industry level. This assumes that self-employed and employed workers earn the same wage.

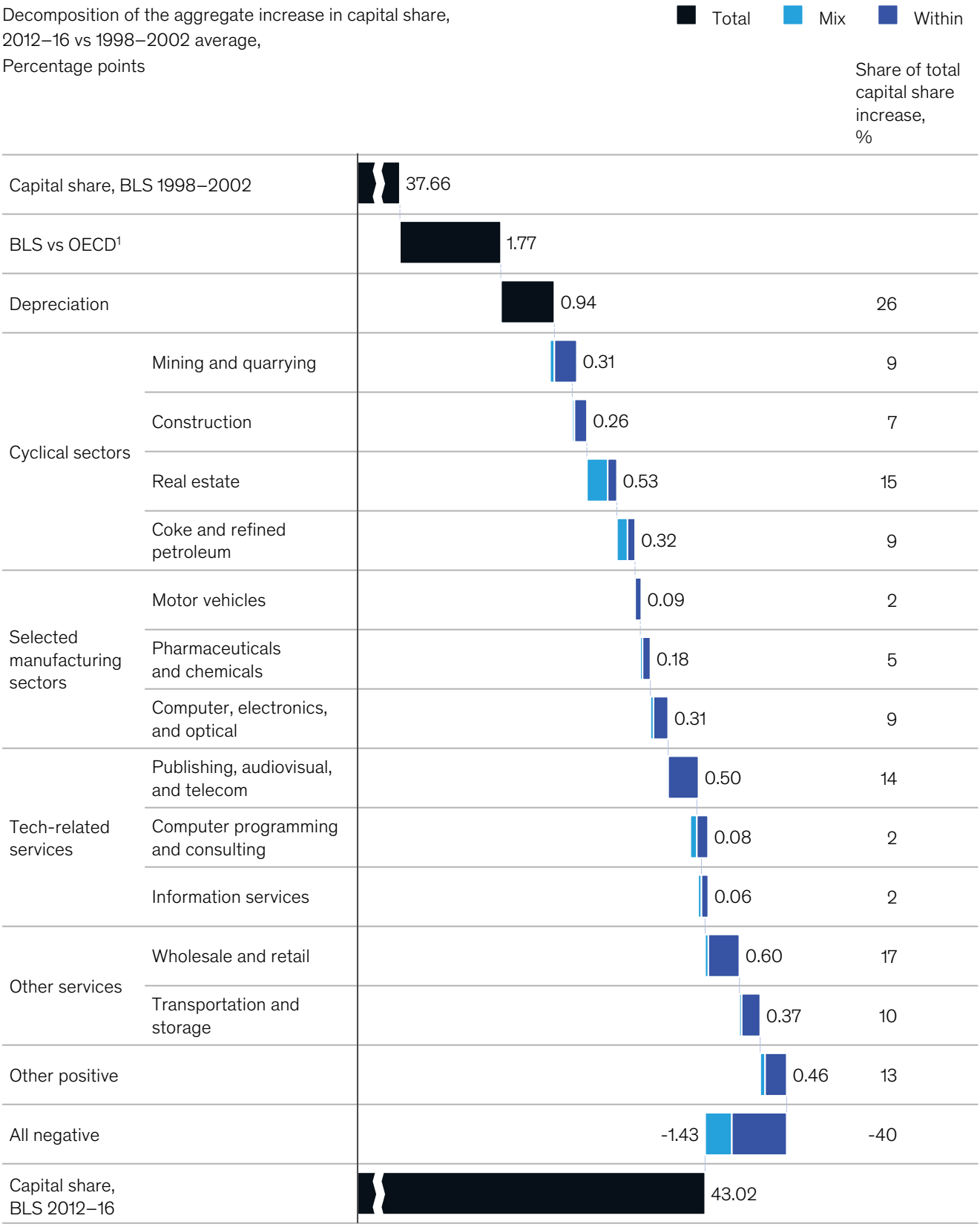
[26] Together, they account for 101 percent of the total increase, with an additional 13 percent in sectors not considered here but having an increase in capital share as well, compensated by a set of sectors experiencing a decline in capital share. While not all manufacturing sectors are among the 12 selected sectors, it is worth mentioning that total manufacturing is among the main drivers of the recent capital share increase (35 percent excluding depreciation). For a detailed discussion of manufacturing in the United States, see *Making it in America: Revitalizing US manufacturing*, McKinsey Global Institute, November 2017.

[27] Among them, the largest contributors were professional, scientific, and technical activities (–8.0 percent), human health (–7.2 percent), and public administration, defense, and social security (–6.8), with a total of –40 percent across all negative sectors (–1.43 percentage points).

Exhibit 5

Twelve sectors account for most of the increase in capital share.

Decomposition of the aggregate increase in capital share, 2012–16 vs 1998–2002 average, Percentage points



[1] Difference due to industry coverage (BLS only covers non-farm business sector while OECD covers total economy) and methodology (value added type, adjustments for self-employed income). OECD data used to conduct decomposition due to data availability.

Note: Figures may not sum to 100% because of rounding.

Source: OECD STAN (July 2018 release); BLS (June 2018 release); McKinsey Global Institute analysis

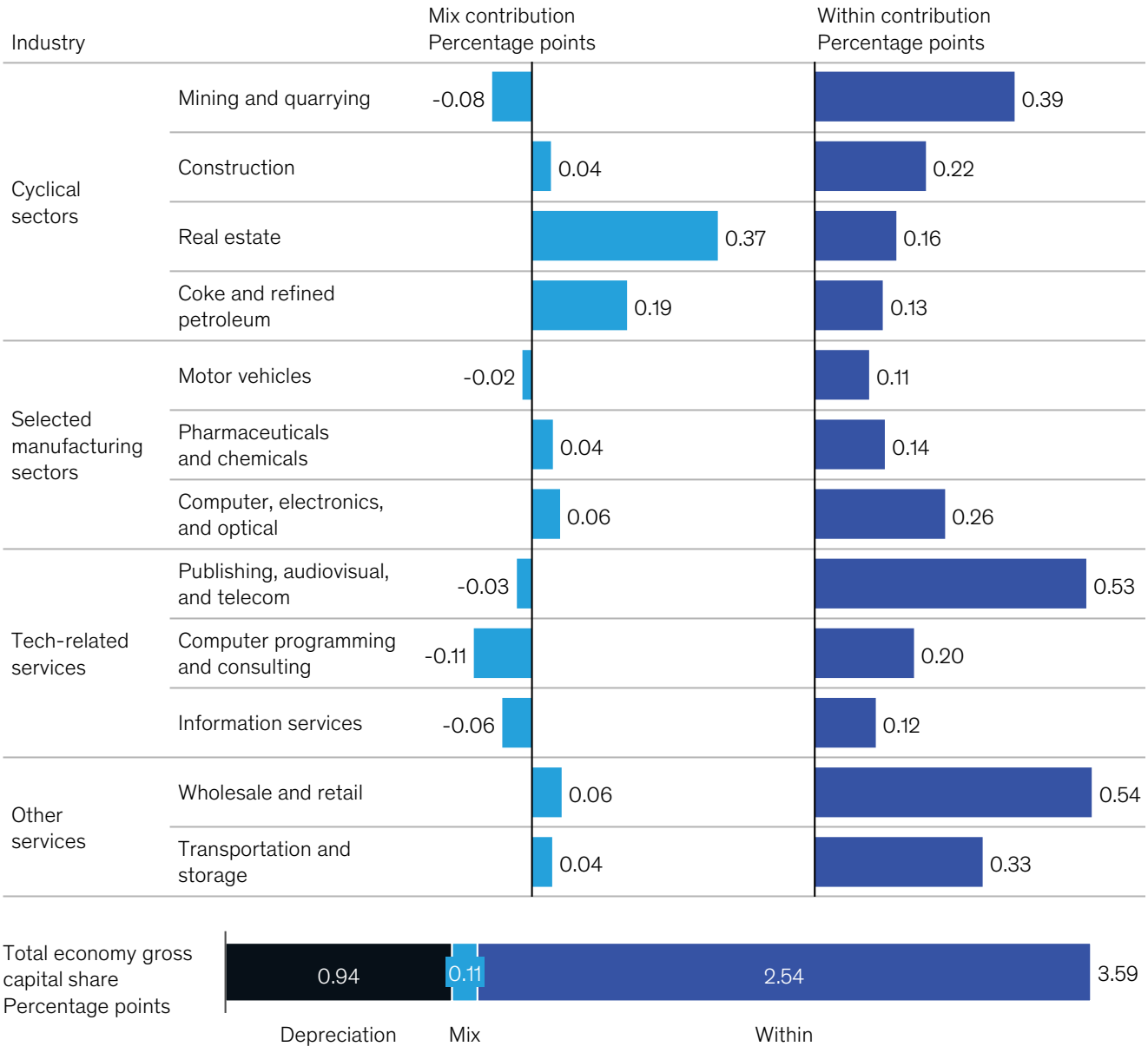
rising depreciation and shift to IPP capital (26 percent), superstar effects and consolidation (18 percent), capital substitution and technology (12 percent), and globalization and labor bargaining power (11 percent) (Exhibit 7).

Supercycles and boom-bust effects: Even after adjusting for depreciation, we estimate that supercycles and boom-bust effects—particularly in extractive industries and real estate—account for one-third of the surge in gross capital share since the turn of the millennium. In two sectors, mining and quarrying and coke and refined petroleum, capital share increases were led by increased returns on invested capital and higher profit margins during a sharp and prolonged rise in prices of metals, fuels, and other commodities fed by China's economic

Exhibit 6

Net capital share increase within sector was the main driver of the fast drop in labor share.

Mix and within effect by sector, 1998–2002 vs 2012–16

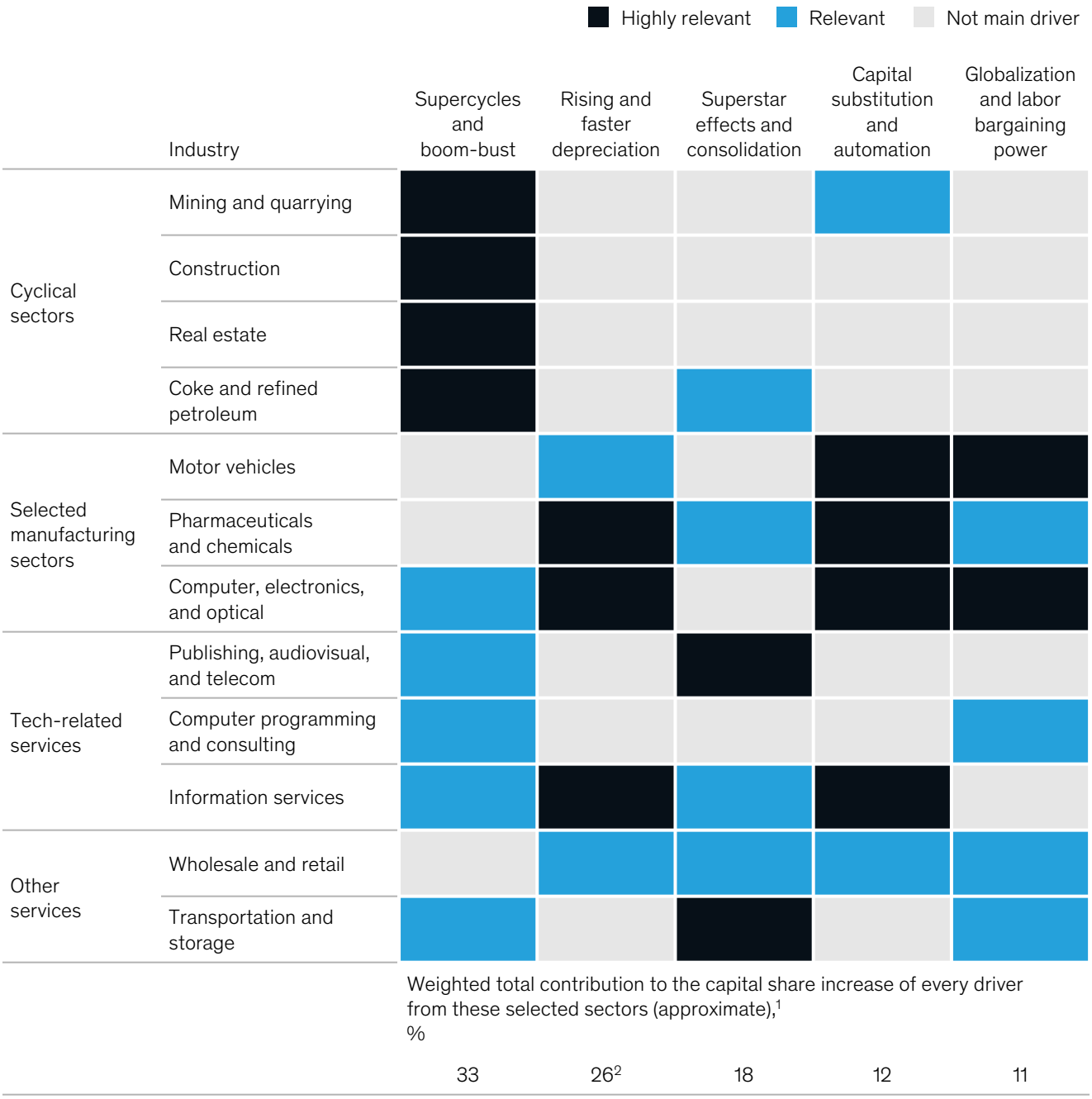


Source: OECD STAN; McKinsey Global Institute analysis

Exhibit 7

Five leading forces drove the recent capital share increase.

Main drivers of the capital share increase by sector, 1998–2002 vs 2012–16



[1] Sum over selected sectors assuming a weight of 1 for "relevant" and 2 for "highly relevant," rebased to sum to 100%.
[2] Total economy.
Note: Figures may not sum to 100% because of rounding.
Source: OECD STAN; McKinsey Global Institute analysis

expansion in the 2000s.[28] Technological advances then buffered some of the impact of the later decline in oil prices on profitability. Energy prices and cycles have affected other sectors, but to a lesser extent. This includes firms in the transportation and storage sector, such as truckers, shippers, and airlines, where profits are correlated with economic cycles.

Housing-related industries also contributed. The capital-intensive real estate sector grew in importance in terms of gross value added during the bubble, leading to a substantial mix effect raising the capital share of income. Financial liquidity eased the recovery in investment and prices after the bubble burst. Profit margins for construction companies have been recovering from the lows of the global financial crisis. Both the tech manufacturing and the information and communication sectors recovered from the lows of the dot-com crisis in the early 2000s toward returns on investment in line with long-run historical values.

Rising depreciation and shift to intangible capital: Higher depreciation is the second-largest contributor to the increase in gross capital share, accounting for roughly one-fourth (26 percent) of the total. Depreciation matters for labor share analyses, because the baseline, GDP, is a "gross" metric before depreciation; if more capital is consumed during the production process, there is less net margin to be distributed to labor or capital. This fact, which receives little attention in the literature, is particularly visible in manufacturing, the public sector, primary industries, and infrastructure services.[29] One reason depreciation has become such a large factor in driving up the capital share is the increase in the share of intellectual property products capital—software, databases, and research and development—which depreciates faster than traditional capital investments such as buildings. The increase has been substantial: the share of IPP capital rose from 5.5 percent of total net capital stock for the total economy in 1998 to 7.3 percent in 2016, an increase of almost 33 percent.

Another factor driving higher depreciation is a "capital overhang" from the investment boom and ensuing output bust. Slightly elevated capital-to-output ratios (net capital stock over value added) mean that there is also, in historical terms, more capital relative to output that depreciates and therefore higher depreciation shares of output.[30]

Superstar effects and consolidation: We estimate that superstar effects contribute about one-fifth of the capital share increase. We base this estimate on analyzing which industries actually saw an increase in ROIC as a direct driver of capital share increases and where the increase goes hand-in-hand with (and may partially result from) rising consolidation or rise of superstar firms. Such patterns seemed particularly pronounced in several industries, and for each of them, superstar effects were marked as a "highly relevant" or "relevant" driver. Telecommunications, media, and broadcasting, for instance, experienced significant rises in returns. The transportation and storage industry went through another round of airline consolidation and recovered from the crisis to ROIC levels that are high by historical standards. The pharmaceutical and chemicals as well as information and computer services sectors are also known for superstar effects.[31] Finally, wholesale and retail as well as refining also went through a spurt in returns and consolidation. While rising concentration could affect not only labor share but also productivity, MGI research found that incentives to improve operational performance and innovate were still strong across sectors.[32]

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[28] Globally, mining and oil and gas producers experienced decreasing ROIC and declining productivity due to rising costs and capital expenditure during the upward cycle of the energy price rise. Recent patterns for the United States differ, as the country benefited from the improving efficiency of the shale oil and gas boom. For a discussion of global patterns, see *Beyond the supercycle: How technology is reshaping resources,* McKinsey Global Institute, February 2017.

[29] The secular increase in depreciation is not limited to the 12 sectors we selected. Together, they contributed to one-third of the total increase, a share considerably lower than their contribution to the net capital share increase. This is because our sample includes a few sectors that were exceptions to this trend: telecom, audiovisuals, and computer programming and consulting had a decrease in depreciation over the period, as we discuss in section 4.

[30] Note that we account only for effects net of depreciation in the four other drivers.

[31] See *Superstars: The dynamics of firms, sectors, and cities leading the global economy*, McKinsey Global Institute, October 2018.

[32] *Solving the productivity puzzle: The role of demand and the promise of digitization,* McKinsey Global Institute, February 2018.

Capital substitution and technology: The fourth-most important factor driving the increase in capital share of income appears to relate to a substitution of capital for labor, through factors including decreasing technology prices and better capabilities of machines. We estimate that this effect accounts for 12 percent of the increase in capital share in the industries we analyzed.[33] For this estimate, we note this driver as "relevant" or "highly relevant" for those industries that experienced a notable increase in capital-to-output ratios (as a direct driver of capital share increases), and where industry interviews suggest that such increases are partially driven by investment including in technology.[34] This pattern seemed most pronounced in computer and electronics and motor vehicles (automation of production), pharmaceuticals and chemicals (drug manufacturing), information services (investment in data processing and stocking facilities), and, to a lesser extent, wholesale and retail trade (digitization of sales channels and supply chains) as well as mining and quarrying (rapid productivity improvements in shale oil and gas extraction).[35]

Globalization and labor bargaining power: One of the most discussed reasons for labor's declining share of income—the weakening of labor bargaining power under pressure from globalization—is, in our analysis, not as important as other factors for the total economy in the time frame we focus on. It explains 11 percent of the overall decline. To arrive at this estimate, we mark this effect as "relevant" or "highly relevant" in sectors that saw profit margin increases (for example through pressure on costs and exit of less competitive firms) or capital deepening alongside comparatively weak employment, low wage growth, and a rapid decline in the rate of employees covered by union contracts. We then corroborated these indicators with industry interviews. Globalization and labor bargaining power did have a very large and visible impact in a few of our selected sectors. A prime example is automobile manufacturing, where declining union coverage and falling wages as production shifted to the southern United States and Mexico increased the capital share. However, the overall economy effect is limited due to the relatively small size of this industry (approximately 2 percent of the total increase in capital share of income is related to motor vehicles). To a lesser extent, the computer and electronics sector, which contributed 9 percent to the total increase in capital share, was also affected by growing globalization of supply chains and offshoring, although other factors played an important role for this sector. Finally, the numerous remaining smaller manufacturing industries not among the 12 sectors we extensively analyze have probably been affected by globalization, and more specifically by the rise of China as a major trade hub since its accession to the World Trade Organization in 2001.[36]

While these findings might be sensitive to chosen time frames, we find somewhat similar dynamics at play for earlier periods of labor share declines (See Box 4, "Long-run patterns in capital share").

[33] The limited impact we see from automation and capital substitution on the labor share of income does not mean labor substitution through technology is limited. Yet the impact of such displacement on labor shares is less than direct. If a firm invests in automation software to displace administrative workers, the compensation of those administrative workers would disappear. Part of that may be balanced out by additional compensation for IT workers delivering the automation solutions. Some of the remaining labor cost savings would, in competitive markets, be passed on to customers and reduce nominal gross value added, the denominator of labor share, further mitigating its impact. What is left in terms of labor share impact should then be visible in rising capital-to-output ratios, so we use that as the core metric to determine the impact of capital substitution and automation on the labor share of income when we analyze sectors.

[34] Note that technology can also lead to higher ROIC instead of (or in addition to) capital deepening. We account for that effect mostly in the "superstar" bucket, under the simplifying assumption that, in a competitive industry, such increases should be at least partly competed away in the long run.

[35] Researchers such as Lawrence (2015) argue that capital substitution is not the reason for decline in labor share, but rather a weakness in (labor augmenting) investment. Our paper similarly suggests that capital substitution is not a primary driver of the aggregate labor share decline. We observe that variations in investment rate as a share of value added in sectors are not necessarily reflected in capital-to-output ratios. Real estate, for instance, experienced a drop in investment rate from about 50 percent of value added between 1998 and 2007 to below 30 percent in 2008–16 on average, but experienced stable net capital stock per value added. Yet we do observe that some sectors have seen nominal investment rates and capital-to-output ratios increase in parallel with waves of production automation, notably in automotive and information services, and allocate part of the labor share decline in these sectors to capital substitution (alongside many other effects at play).

[36] Together, basic manufacturing (such as food, textiles, and metal products) and equipment manufacturing (machinery, electrical equipment) account for around 11 percent of the increase in capital share. To a lesser extent, they may also have been affected by capital substitution.

Box 4

Long-run patterns in capital share

We extend the sample to before 1998 to see whether our main results hold for the longer-run development in capital share.[1] We find that the same sectors mostly drove the recent and the longer-term increase. An exception, as one would expect, is supercycle and boom-bust effects: mining and quarrying made a negative contribution in the earlier period, and tech-related sectors experienced a decline in capital share during the dot-com bust whose recovery played a role since the turn of the millennium. Also, mix effects played a stronger role in the 1980s and '90s than more recently.

1980–84 versus 1994–98 capital share increase

We first focus on the initial decrease in labor share between 1980–84 and 1994–1998. In this period, the net capital share increased by 1.42 percentage points in total.[2] Similar to the 1998–2002 to 2012–16 period, manufacturing (65 percent) and real estate (43 percent) account for the bulk of the total increase. While the within effect, or the rise of capital share within an industry, still dominates, the mix effect—the importance of each sector in terms of relative value added—drove approximately 0.62 percentage point (43 percent of the total effect). This is higher than for the more recent period on which we focus in the main text (only 4 percent of the total effect).[3] We find that most of our selected industries for the more recent period also played a key role in the increase in net capital share in the 1980s and 1990s. For example, in labor-intensive services, wholesale and retail accounted for 35 percent, while transportation and storage reached 24 percent. Within the manufacturing sector, computer and electronics was 18 percent of the total, behind basic manufacturing (for example, food, textiles, and paper) at 27 percent, a sector that played a minor role in our main analysis in later years. Smaller sectors that contributed to the recent decline in labor share are found to be relevant, too, including motor vehicles (8 percent) and telecommunications (10 percent). The main difference in this earlier sample is the negative contribution of mining and quarrying—in line with the supercycle pattern—and the insignificant weight of the nascent high-tech services and digital industry (media, computer programming and consulting, and information services).

1994–98 versus 1998–2002 capital share decrease

Toward the end of the 1990s, the labor share experienced a sharp recovery. The net capital share decreased by 1.67 percentage points, of which 44 percent was driven by the downturn in profits experienced in the tech manufacturing and tech services industries, including telecom, and 25 percent in professional, scientific, and administrative activities. There are similarities in the rise and fall of the capital share across tech sectors. In computer and electronics, the net capital share peaked in 1997 and turned negative in 2001–02 during the dot-com crisis. These changes were primarily driven by a decline in profits (net operating surplus), but value added followed a similar trend. Technology manufacturers recovered in profitability thanks to offshoring (or automating) production in the following years. In 1996, the telecom industry reached its highest net capital share level, which then declined until 2000. While this drop was driven by a continuous decrease in profits, too, value added was still growing fast, with a strong increase in gross fixed capital formation expenses that peaked in 2000. Increased competition due to the lower cost of entry enabled by improvement in technology and new regulations, and overinvestment in infrastructure and technologies, seem to be the main reasons mentioned in the literature for the crisis that followed.[4]

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1 IHS Markit Comparative Industry Service (April 2019 release) provides estimates of capital share for 62 industries from 1980 onward. We apply the same methodology discussed above but do not adjust for self-employed income because employment data are not available from the same source.

2 Net capital share is net operating surplus divided by gross value added, or gross capital share adjusted for depreciation.

3 For the 1998–2002 versus 2012–16 period, two main sectors account for the bulk of the mix effect, but for different reasons: manufacturing experienced a decrease in importance in terms of value added, but the sector has lower-than-average capital share, so it contributes to the increase. Real estate exhibits both higher-than-average capital share and increasing value added.

4 See, for example, Kevin L. Kliesen, *Was Y2K behind the business investment boom and bust?*, Federal Reserve Bank of St. Louis Review, 2003, and Robert E. Litan, *The telecom crash: What to do now?*, Brookings, December 2002.

4. A closer look at sectors

We identify the drivers behind the decline in the labor share based on the sector analysis that follows in this chapter. We highlight the key factors in the DuPont decomposition and discuss significant patterns in each sector. Across sectors, we find some similarities and differences in the patterns of capital share increase:

— The 12 sectors we looked at help explain all of the increase in the capital share of income.[37] They made up about one-third of total employment and 44 percent of GDP on average during the 1998–2016 timeframe. However, several sectors, including human health activities, professional services, and public administration and defense, experienced an increase in labor share.

— These 12 sectors represent a broad, diverse set of economic activities including cyclical businesses, selected manufacturing sectors, technological services, and large employers such as retail or construction (Exhibit 8). Most of the 12 sectors tend to be more globalized, with mining and manufacturing having a large share of exports and imports over gross output, and tech-related services being highly dependent on cross-national flows of services and data.[38] They also tend to be more digitized, with a higher average score compared with other sectors, according to our digitization index. More than half are "superstar" and consolidating sectors that often are more knowledge-intensive.[39] Our 12 sectors are more capital-intensive, with an average gross capital share of 50 percent versus 38 percent for the average economy and below 20 percent for the three sectors with growing labor share. There are, however, many exceptions to these tendencies. For instance, construction, wholesale and retail, and transportation and storage stand out as having high employment and low capital share and being less trade-intensive. Construction is less digitized than many other sectors.

— All sectors analyzed have seen a five-percentage-point or greater increase in capital share, with more than half even experiencing an increase above ten percentage points (Exhibit 9). Real estate stands out for its relatively small change, but it matters due to its size and the strong mix effect.

— Across these sectors, depreciation, capital-to-output ratio increases, and ROIC increases are diverse. We use those patterns as indicators of how factors at play in each sector such as automation and investment in intangible assets translate into labor share effects.

— At the sector level, links between productivity, capital share, and wages largely break down, but notably the 12 sectors in focus tend to have above-average productivity growth and wage growth. Ten of the 12 exhibit faster productivity growth than the average for the total economy; eight show higher wage growth. Some sectors, including automotive and

[37] The 12 sectors' increase in net capital share accounts for 101 percent of the total gross capital share increase between 1998–2002 and 2012–16, with an additional 26 percent due to depreciation in all sectors of the economy, and –27 percent due to other sectors not featured in this report, a majority of which experienced a decrease in capital share.

[38] There are notable exceptions, for example housing-related sectors as well as labor-intensive, predominantly domestic services sectors such as wholesale and retail.

[39] *Digital America: A tale of the haves and have-mores*, McKinsey Global Institute, December 2015; *Superstars: The dynamics of firms, sectors, and cities leading the global economy*, McKinsey Global Institute, October 2018; and *Globalization in transition: The future of trade and value chains*, McKinsey Global Institute, January 2019.

computer and electronics, pass on their rapid product innovation–driven productivity gains to consumers. In others, such as construction, price increases allow wage growth despite slow productivity increases. Sectors with particularly strong capital share increases, such as mining, refining, computer and electronics, and information services, have also seen above-average wage growth (see also Figure 7 on page 29). In turn, the three main sectors that most contributed to stabilizing the labor share exhibited slower productivity growth than the total economy average between 1998 and 2016. Wage growth, while moderate and slightly above total economy values, was above productivity growth. Hence, the sectors that contributed to easing the pressure on the labor share did so not because wages were growing fast, but primarily because productivity growth was low.

Exhibit 8

The twelve sectors in focus tend to be smaller in terms of employment and more globalized, with faster productivity growth.

Characteristics of key sectors having contributed to an increase/decrease in capital share

Low High

	Net contribution to capital share increase, 1998–2002 vs 2012–16, %	Gross capital share, 2012–16 average, %	Employment share, 2012–16 average, %	Digitization Index, 2015 or latest available	Trade intensity (exports + imports over gross output), 2012–14 average, %	Productivity growth, CAGR, 1998–2016, %	Wage growth, CAGR, 1998–2016, %
Mining and quarrying	8.8	67	0.5		12	1.3	1.6
Construction	7.1	21	5.1		6	-0.9	1.1
Real estate	14.7	83	1.3		1	1.7	1.6
Coke and refined petroleum	8.9	86	0.1		41	2.5	1.8
Motor vehicles	2.5	53	0.6		34	4.2	-0.4
Pharmaceuticals and chemicals	5.0	70	0.5		29	2.1	1.1
Computer, electronics, and optical	8.7	47	0.7		36	14.2	2.0
Publishing, audiovisuals, and telecom	14.1	60	1.6		17	5.3	1.4
Computer programming and consulting	2.3	6	1.3		7	3.3	0.9
Information services	1.7	43	0.3		7	7.2	3.1
Wholesale and retail	16.8	32	15.2		8	1.6	0.5
Transportation and storage	10.2	29	3.7		18	0.3	0.3
Human health	-7.2	12	7.7		3	0.6	1.0
Professional, scientific, and technical activities	-8.0	18	6.3		7	1.1	1.4
Public administration and defense; compulsory social security; education	-10.4	20	17.8		4	0.1	1.2
Total economy	100	38	100		11	1.3	1.0

Source: OECD STAN; World Input-Output Database (WIOD); *Digital America: A tale of the haves and have-mores*, McKinsey Global Institute, December 2015; McKinsey Global Institute analysis

Exhibit 9

A micro sector lens offers insights into capital-share dynamics.

Contribution to net capital share increase and main DuPont ratios for selected industries, 2012–16 vs 1998–2002 average

Low High

DEP Depreciation
GO Gross output (sales)
GOS Gross operating surplus
NCS Net capital stock
NOS Net operating surplus
ROIC Return on invested capital
VA Value added

	Gross capital share decomposition			Net capital share and ROIC decomposition			ROIC
	GOS/VA Gross capital share, Change, percentage points	**DEP/VA** Depreciation share, Change, percentage points	**NOS/VA** Net capital share, Change, percentage points	**NOS/GO** Profit margin, Change, percentage points	**GO/NCS** Capital turnover, Growth rate, %	**NCS/VA** Capital-to-output ratio, Growth rate, %	**NOS/NCS** ROIC, Change, percentage points
Mining and quarrying	15	-8	23	17	-7	-15	5
Construction	5	0	5	3	-17	12	9
Real estate	1	0	1	1	0	0	0
Coke and refined petroleum	10	-8	18	2	84	-35	30
Motor vehicles	12	3	10	2	-11	30	3
Pharmaceuticals and chemicals	10	3	7	4	-19	18	0
Computer, electronics, and optical	19	4	14	9	-42	0	7
Publishing, audio-visual, and telecom	9	-3	12	8	-9	-1	5
Computer programming and consulting	11	-5	15	8	24	-36	31
Information services	47	21	26	7	-40	80	13
Wholesale and retail	7	1	6	2	-7	17	2
Transportation and storage	9	-2	10	5	10	-1	4
Total economy	4	1	3	2	-11	11	0

Source: OECD STAN; McKinsey Global Institute analysis

Mining and quarrying

The commodity supercycle drove up the capital share.

The mining and quarrying sector—including crude petroleum and gas extraction, coal, metal mining, and support activities—accounted for only 2.2 percent of the value added of the US economy but represented nearly 12 percent of the total increase in net capital share between 1998–2002 and 2012–16. It contributed 0.39 percentage point of the overall 2.54-percentage-point within effect increase (Figure 1).

The industry's capital share is historically higher than that of the total economy; it has increased from about 43 percent in 1998 to more than 70 percent since 2005 (Figure 2). The ratio of depreciation to value added has been historically high and volatile due to sharp variations in value added (Figure 3).

Returns on invested capital (ROIC) rose continuously in the 2000s to reach about 10 percent, above ROIC for the total economy. This level was sustained until 2015, when net operating surplus plummeted (Figure 4). The capital-to-output ratio—net capital stock over value added—decreased due to the high growth in value added, although it has since rebounded (Figure 5).

The commodity supercycle's effects are prevalent. The industry's gross output is highly correlated with energy (0.96) and metal and mineral prices (0.88) (Figure 6).[1] The sharp rise in energy prices in the 2000s and sustained demand from China drove up industry sales, profits, ROIC, and capital share. The capital share started to decrease in 2015–16, with the decline in raw materials' prices.

Between 2012 and 2016, rapid efficiency improvements in shale oil and gas extraction, driven by improvements in technology, lifted productivity by 45 percent in terms of extracted barrels per worker and value added per hour of work, and we mark it as a moderate impact of capital substitution.[2]

We do not mark a high prevalence of superstar effects and consolidation. Parts of the industry have been highly consolidated for a long time, and, with the advent of shale oil and gas driven by smaller private entrepreneurs, the effects have declined rather than increased. We also do not see strong prevalence of bargaining power effects reducing the labor share of income. Despite the increase in capital share and profits, domestic workers benefited from the boom: real average compensation grew by 1.8 percent per year as a result of labor shortages (Figure 7).

Figure 1. **Net capital share contribution**
Percentage points

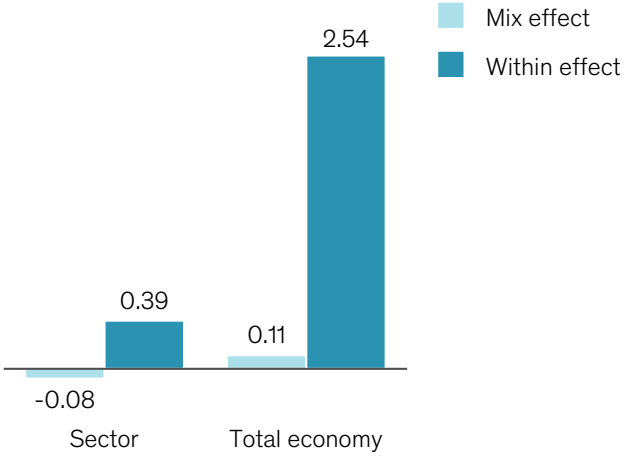


Figure 2. **Gross capital share**
Gross operating surplus/value added (%)

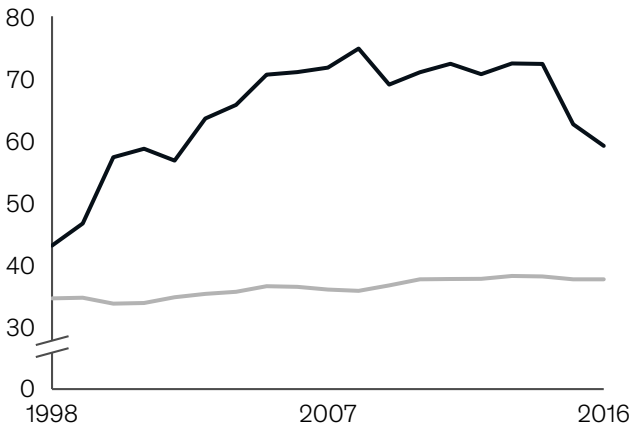
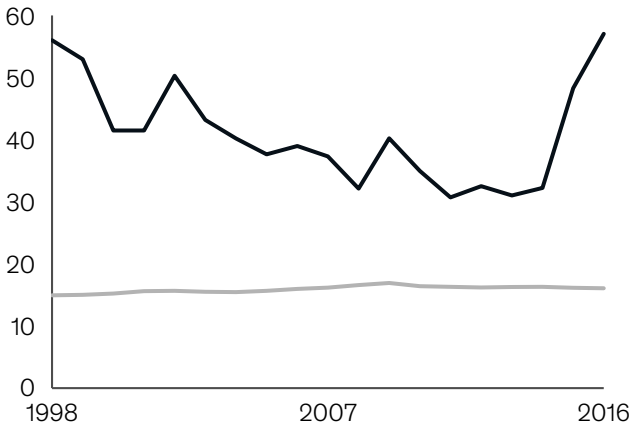


Figure 3. **Depreciation share**
Depreciation/value added (%)



[1] The gross capital share is also highly correlated both with energy prices (0.87) and metal and mineral prices (0.82).
[2] As employment grew strongly, this may be an example of complementarity between capital and labor, ie, labor-augmenting technological progress.

11.9% contribution to net capital share increase, 1998–2002 to 2012–16

2.2% value added share, 2012–16

0.5% total employment share, 2012–16

Figure 4. **Return over invested capital (ROIC)**
Net operating surplus/net capital stock (%)

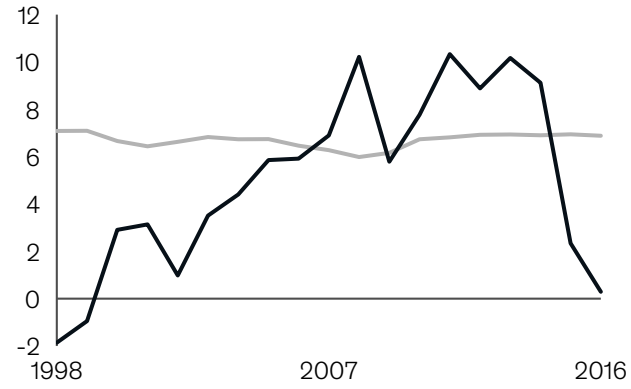


Figure 5. **Capital-to-output ratio**
Net capital stock/value added

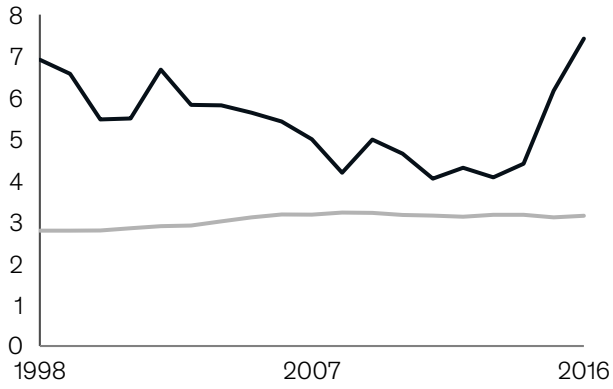


Figure 6. **Gross output and energy prices**
Nominal index: 1 = 1998

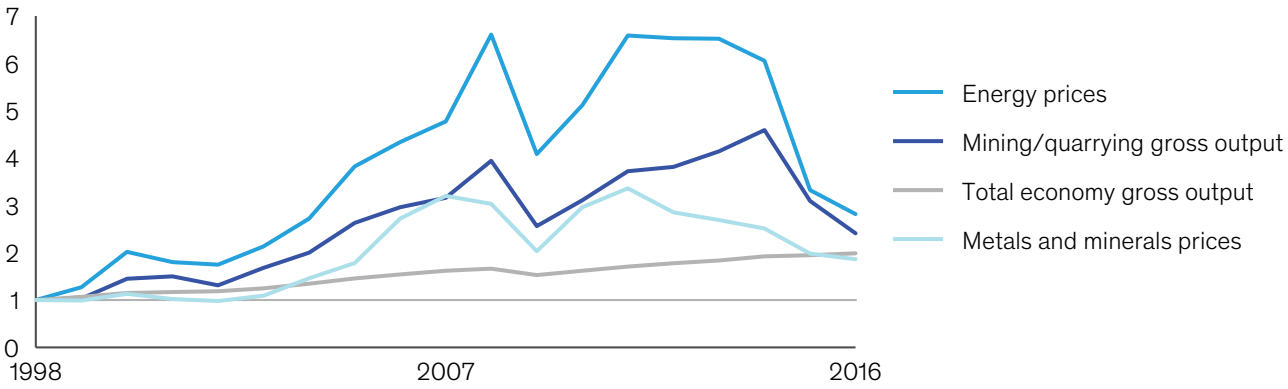
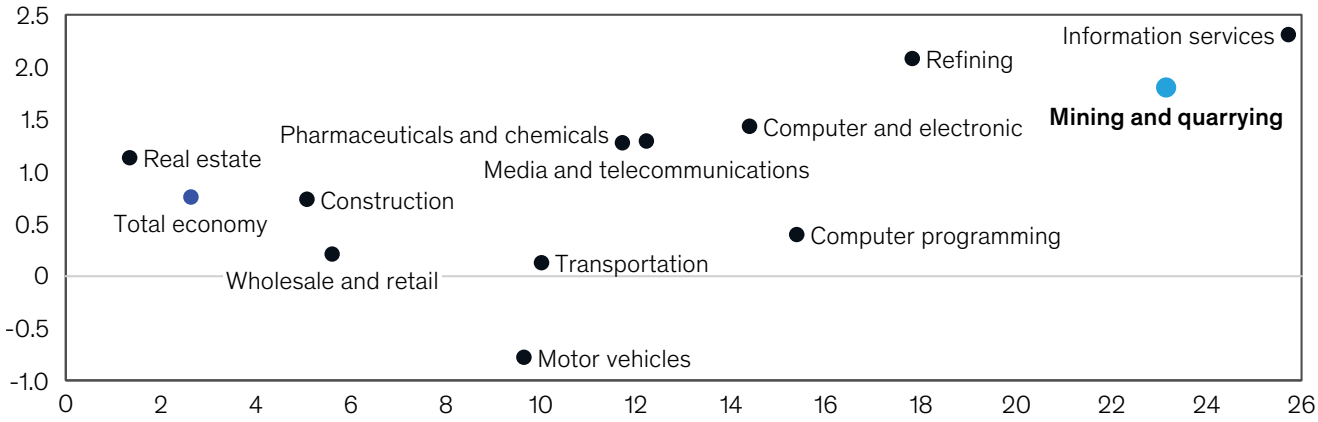


Figure 7. **Average compensation growth vs net capital share change**

Compensation per employee[1]
Real growth, 1998–2002 vs 2012–16 (%)



Net capital share change, 1998–2002 vs 2012–16[1]
Percentage points

[1] 12 sectors in focus accounting for most of the increase in capital share. Compensation adjusted for self-employed income.

Source: World Bank Pink Sheet; OECD STAN; McKinsey Global Institute analysis

Construction

Slow recovery from the financial crisis and rising rates of return raised the net capital share.

The construction sector contributed nearly 10 percent to the net capital share increase. This was due to a large within effect of 0.22 percentage point (Figure 1).

Despite the global financial crisis, construction's capital share rose from 14 percent in 1998 to 23 percent in 2016 (Figure 2). Depreciation has been closely linked to that of the total economy and has been relatively constant over time (Figure 3).

We mark supercycle effects as prevalent for this sector. The first element of the net capital share, ROIC, has followed a boom-bust cycle, with a strong increase before the crisis, a decline from 2006–08, and a slow recovery since 2012, in line with typical price swings in the sector depending on demand and capacity utilization (Figure 4).

The second element of the net capital share, the ratio of net capital stock to value added, rose until 2011, mostly due to a fast decrease in value added in 2008–10 (Figure 5). While value added has found its way back to pre-crisis levels, the expansion of capital stock is still lower than before the crisis, and the ratio of net capital stock to value added is slowly decreasing to pre-crisis levels. We take this as a marker that capital substitution and automation have not materially contributed to labor share declines.[1]

This sector has predominantly been affected by the housing boom-bust cycle. We find that its gross output growth is highly volatile and correlated with the total economy (0.64) (Figure 6). Although the sector has recently captured a larger share of gross operating surplus, probably due to a cyclical recovery, it remains fragmented. Recent consolidation has not given rise to superstar effects.

Average compensation has risen since 1998 even as productivity has declined because of a lack of qualified workers (Figure 7). We therefore do not note globalization or wage bargaining power as a prevalent driver of capital share increases.

Construction lagged behind other sectors in term of productivity growth. Between 1960 and 2010, productivity grew in the overall US economy by 1.8 percent per year, but it declined in construction by 1.1 percent (Figure 8).

Figure 1. **Net capital share contribution**
Percentage points

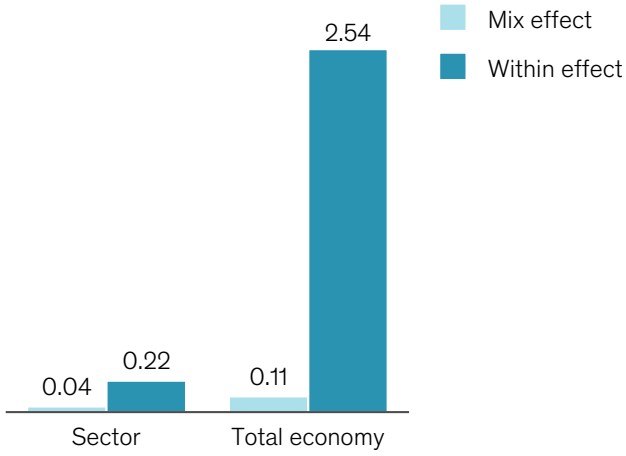


Figure 2. **Gross capital share**
Gross operating surplus/value added (%)

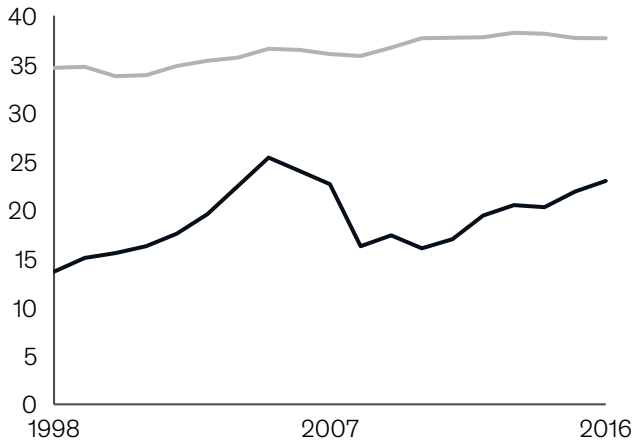
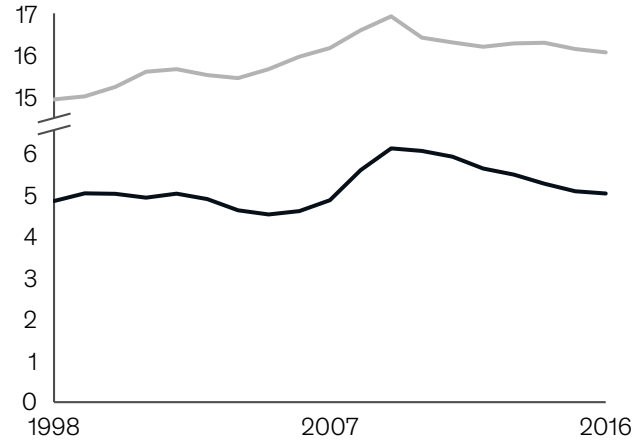


Figure 3. **Depreciation share**
Depreciation/value added (%)



[1] McKinsey Global Institute, *Reinventing construction: A route to higher productivity*, February 2017.

9.7% contribution to net capital share increase, 1998–2002 to 2012–16

4.0% value added share, 2012–16

5.1% total employment share, 2012–16

Figure 4. **Return over invested capital (ROIC)**
Net operating surplus/net capital stock (%)

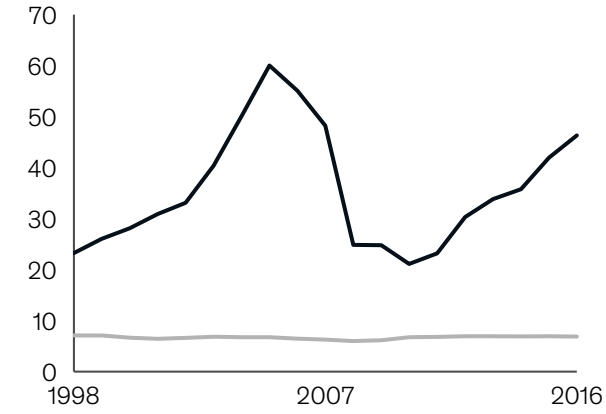


Figure 5. **Capital-to-output ratio**
Net capital stock/value added

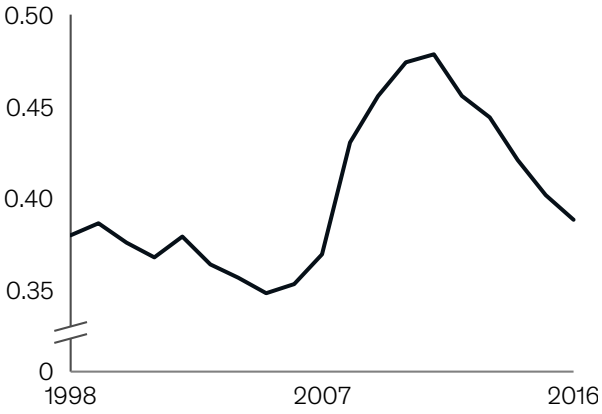


Figure 6. **Gross output growth**
Year over year (%)

Figure 7. **Total compensation vs productivity**
Real index per worker: 1 = 1998

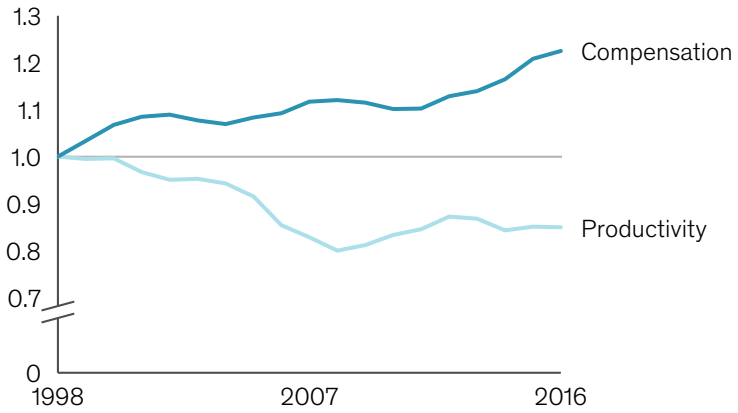
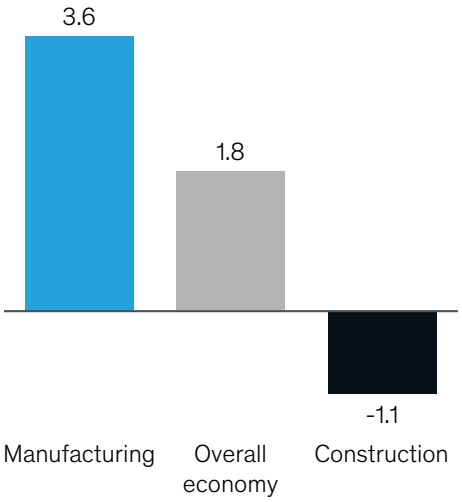


Figure 8. **Long-run productivity growth**
Compound annual growth rate, 1960–2010 (%)



Source: OECD STAN; McKinsey Global Institute analysis

Real estate

The growing weight of this capital-heavy sector drove up the capital share.

The real estate sector contributed to a large share of the net capital share increase of nearly 20 percent. It has a high and positive mix effect (0.37 percentage point) and a smaller within effect (0.16 percentage point) (Figure 1).

Despite its outsize contribution, the sector's capital share increased only marginally, from 81 percent in 1998 to 83 percent in 2016 (Figure 2). Depreciation followed the trend in capital stock, with a buildup until 2006 and then a convergence to its long-term level (Figure 3).

ROIC was stable on average in the years 1998–2002 versus 2012–16, although it decreased during the housing bubble and increased in the ensuing recession (Figure 4). In spite of the highly cyclical pattern, the ratio of capital to output also had similar pre- and post-crisis averages. Our indicators confirm a strong cycle in the middle of our sample. Net capital stock started growing faster than value added in 2003. By 2006, the capital-to-output ratio had increased from 9.4 to 11.0, the highest level in our 12 focus sectors (Figure 5).

Value added continued growing in the 2008–11 downturn, but at slower pace, and net capital stock declined, causing the ratio to return to its long-run average (Figure 6). This suggests that overinvestment in the upward leg of the business cycle was followed by a sharp correction that reduced the capital overhang. This sector mostly derives capital returns from investment in structures. Its relative size means the sector plays a significant role in capital share impact, and we note the real estate boom of the early 2000s as the prevalent factor. The sector's weight in the economy in value added grew from 11.2 percent of GDP in 1998 to 12.7 percent in 2016 (Figure 7). This is directly linked to the strong positive mix effect mentioned above.

Looking forward, the most significant driver of the capital share increase, the larger share of real estate in the economy, may be a long-lasting effect. The within effect seems to have played out with the reduction in capital overhang.

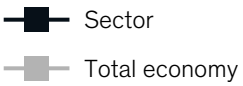


Figure 1. **Net capital share contribution**
Percentage points

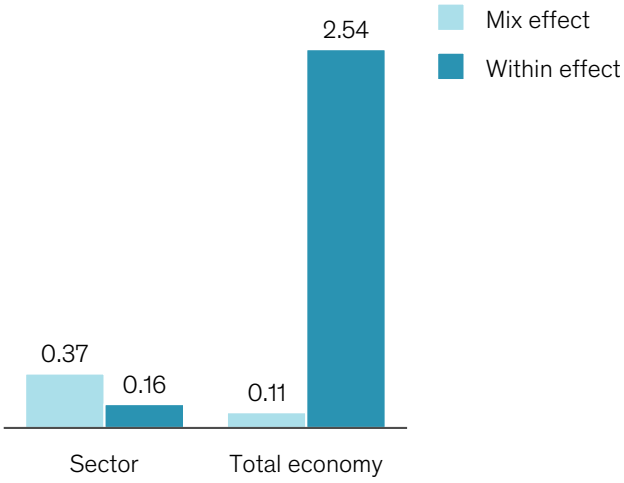
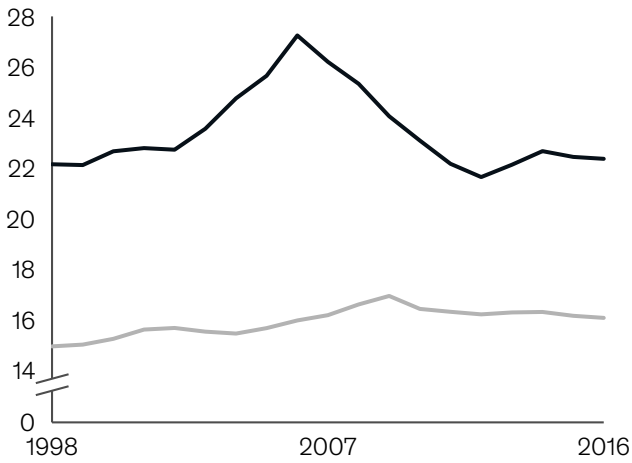


Figure 2. **Gross capital share**
Gross operating surplus/value added (%)

Figure 3. **Depreciation share**
Depreciation/value added (%)



19.9% contribution to net capital share increase, 1998–2002 to 2012–16

12.4% value added share, 2012–16

1.3% total employment share, 2012–16

Figure 4. **Return over invested capital (ROIC)**
Net operating surplus/net capital stock (%)

Figure 5. **Capital-to-output ratio**
Net capital stock/value added

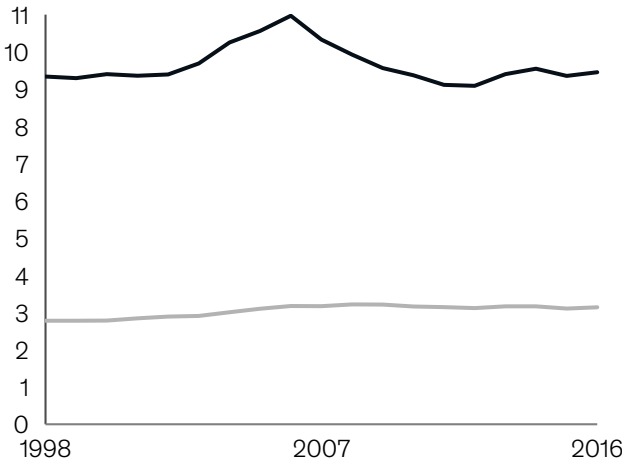


Figure 6. **Capital-to-output growth decomposition**
%

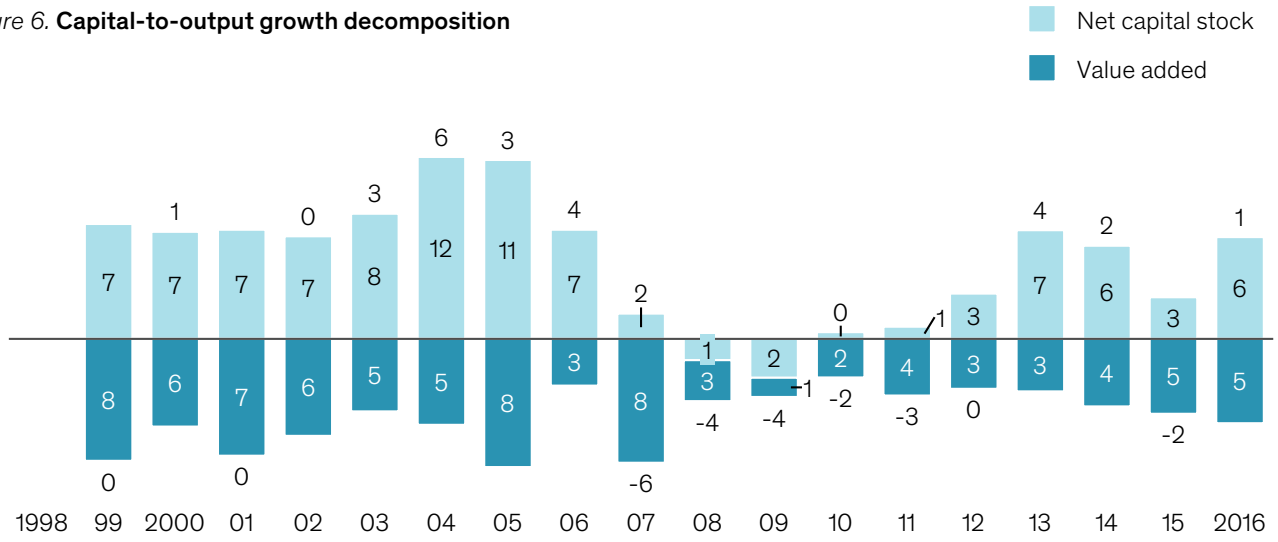
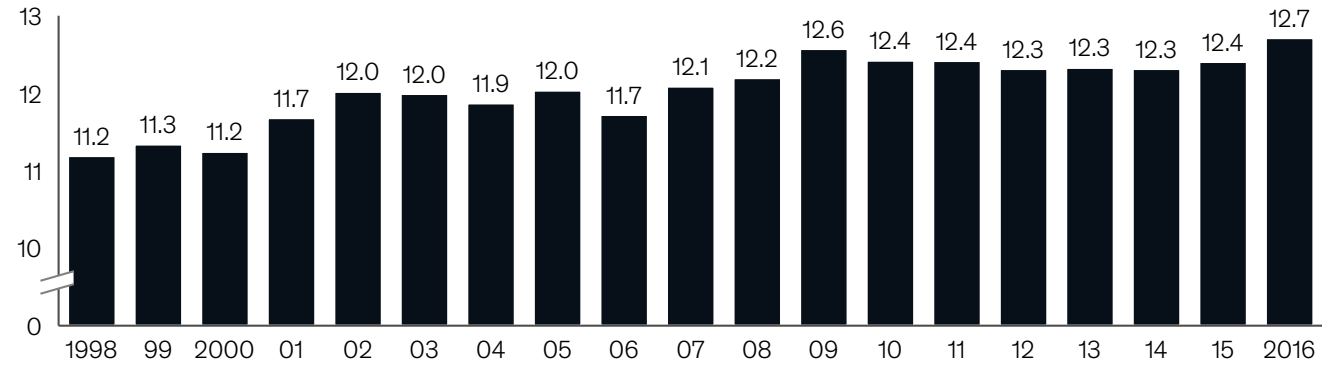


Figure 7. **Share of sector in total value added**
%



Note: Figures may not sum to 100% because of rounding.
Source: OECD STAN; McKinsey Global Institute analysis

Coke and refined petroleum

Sector
Total economy

Rising energy prices and an export ban drove capital share increases.

The coke and refined petroleum sector contributed less than 1 percent of the total economy's value added in 2012–16, but it accounted for 12 percent of the rise in net capital share between 1998–2002 and 2012–16. Large positive mix (0.19 percentage point) and within effects (0.13) illustrate this (Figure 1).

The capital share in this sector has increased from 75 percent in 1998 to more than 85 percent since 2005 (Figure 2). Depreciation over value added decreased due to a surge in value added in the early 2000s and has been relatively constant since (Figure 3).

ROIC, while volatile, stayed well above total economy values (Figure 4).[1] The surge in value added is reflected in the initially decreasing, then constant, capital-to-output ratio (Figure 5). As in mining and quarrying, the increase in value added coupled with high capital share levels drove the large mix effect.

We note supercycle effects and an export ban as the two main factors contributing to the capital share increase via growth in profits and size of the sector. The coke and refined petroleum industry benefited from the long rise in energy prices that started in the mid-2000s (Figure 6). The correlation between sales in the industry and energy prices is near unity (0.99).[2]

Domestic regulation played a role, too. Early in the shale boom, refineries benefited from a ban on crude-oil exports, which kept US raw oil prices low due to the fast increase in extracted volumes. Given that refining companies could sell refined oil on the world market at higher prices, profits rose. The end of the ban in January 2016 was followed by rapid growth in crude oil exports, from less than 5 percent of total production in 2015 to 12 percent in 2017 (Figure 7). Lower energy prices and the end of the ban caused sales to decline in 2015–16.

Successive waves of consolidation mean that the sector was well positioned to benefit from a "golden age" of refining that started in 2002. The number of operating plants decreased by 43 percent between 1982 and 2002, while refining capacity stayed roughly constant, thanks to expansion and upgrading of remaining facilities rather than greenfield investment. We mark this as a moderate superstar effect of the recent capital share increase (Figure 8).

Figure 1. **Net capital share contribution**
Percentage points

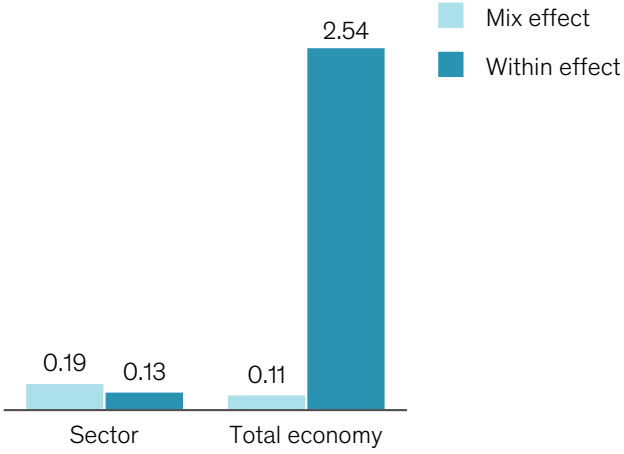


Figure 2. **Gross capital share**
Gross operating surplus/value added (%)

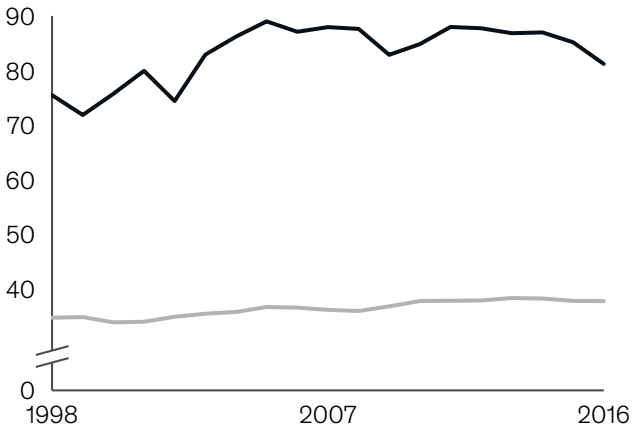
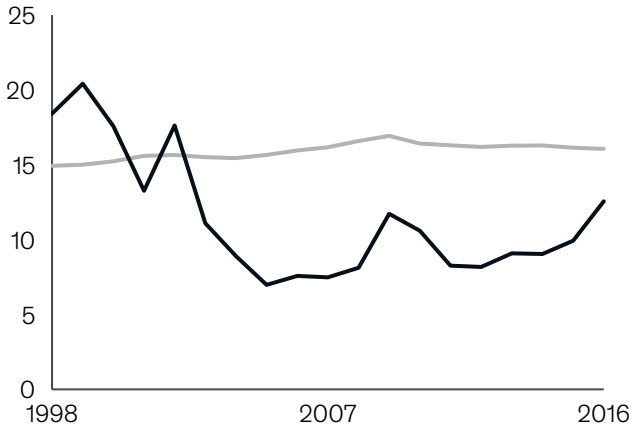


Figure 3. **Depreciation share**
Depreciation/value added (%)



[1] Most refineries operate with fully amortized capital but high replacement value, which would bring back ROIC in line with total economy levels. Before the early 2000s price surge, the industry was not profitable, with ROIC below WACC.
[2] The gross capital share is highly correlated with energy prices as well (0.80).

12.1% contribution to net capital share increase, 1998–2002 to 2012–16

0.9% value added share, 2012–16

0.1% total employment share, 2012–16

Figure 4. **Return over invested capital (ROIC)**
Net operating surplus/net capital stock (%)

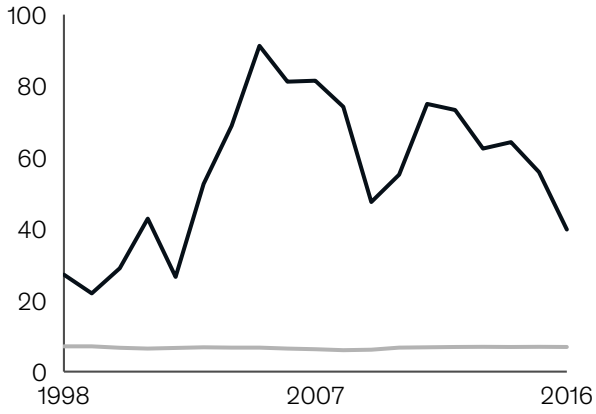


Figure 5. **Capital-to-output ratio**
Net capital stock/value added

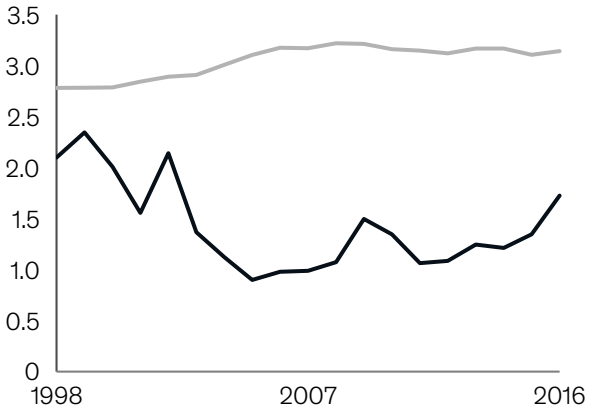


Figure 6. **Gross output and energy prices**
Nominal index: 1 = 1998

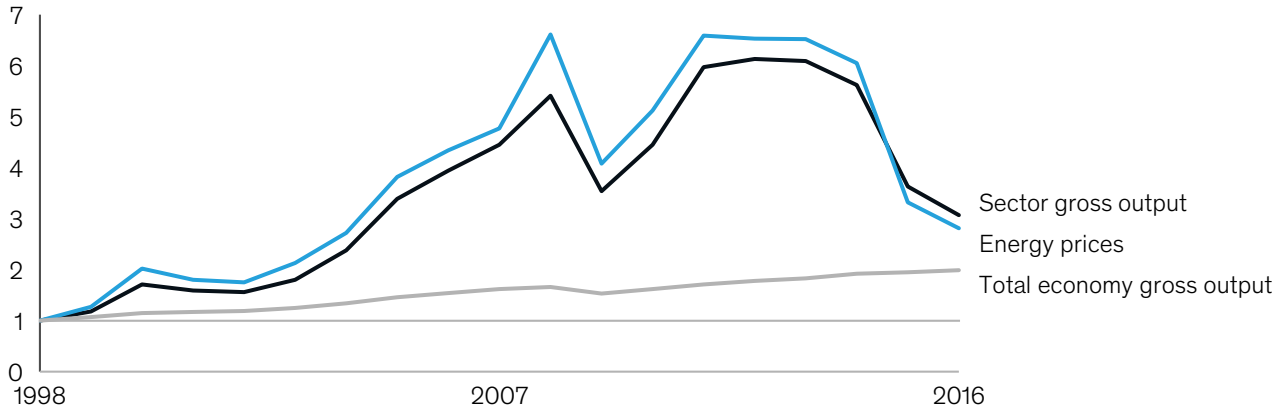


Figure 7. **Share of exports of crude oil vs domestic production**
%

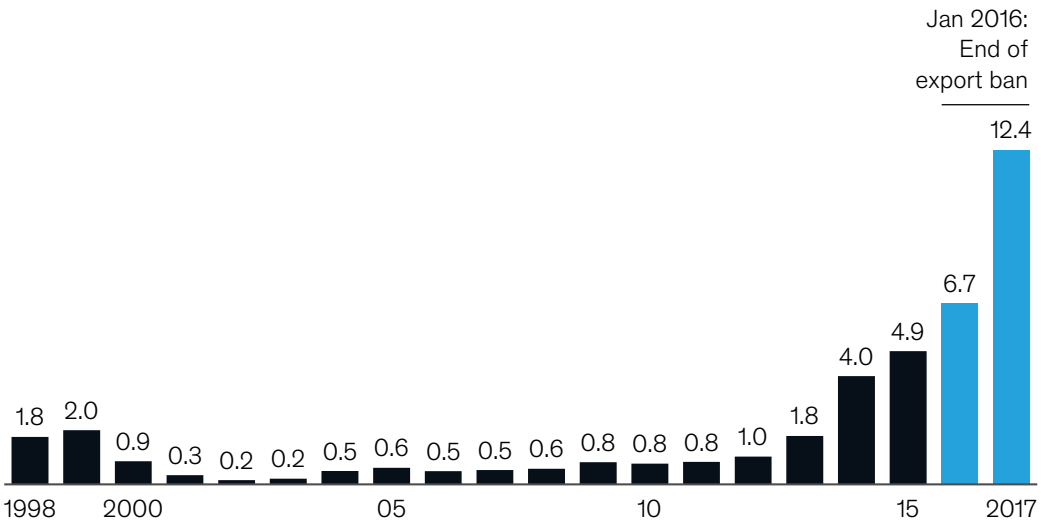
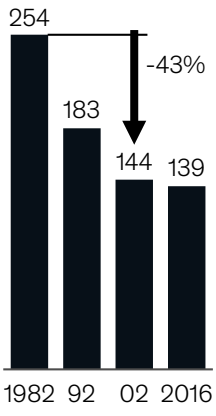


Figure 8. **Number of operating refineries**



Source: World Bank Pink Sheet; US EIA; OECD STAN; McKinsey Global Institute analysis

Motor vehicles

Automation and relocation of production contributed to a growing gap between wages and productivity.

Given the size of the motor vehicles sector (less than 1 percent of value added relative to the total economy), its aggregate impact is modest, at 3.3 percent of the total net capital increase. Most of this contribution is due to a rise in capital share in the industry itself, with a within effect of 0.11 percentage point. This compares to a slightly negative mix effect of –0.02 percentage point, mainly due to the decreasing share of value added compared with the total economy (Figure 1).

The industry significantly increased its capital share, from 41 percent in 1998 to 54 percent in 2016, despite a sharp drop in profits during the global financial crisis (Figure 2). The sudden contraction in value added during the crisis also explains the brief surge in the depreciation ratio (Figure 3).

The sector experienced long-term increases in both ROIC and capital-to-output ratio. We attribute these increases to capital substitution and automation, offshoring, and declining labor bargaining power. Our measure of ROIC fell below zero during the global financial crisis and has progressively recovered since 2010 (Figure 4). Capital used for production (capital-to-output ratio) also spiked due to the collapse of value added during the crisis (Figure 5). A long-run shift in net capital stock toward more machinery and equipment, from 43 percent in 1998 to 51 percent in 2016, indicates the growing role of automation. Notably, in the early 2000s, automakers substituted capital for labor and shifted some production offshore.

Motor vehicles are a prime example of the divergence between productivity and wages. Between 1998 and 2016, average labor compensation decreased by 7.5 percent while productivity more than doubled (Figure 6). Locating production in the southern United States, offshoring to Mexico, and growing global trade put pressure on US wages. The trade momentum (the sum of exports and imports over gross output) was 41 percent higher in 2016 than in 1998, even though it has been declining since 2013 (Figure 7). The share of workers covered by unions continued falling, from 32 percent in 2003 to 18 percent in 2016 (Figure 8).

Figure 1. **Net capital share contribution**
Percentage points

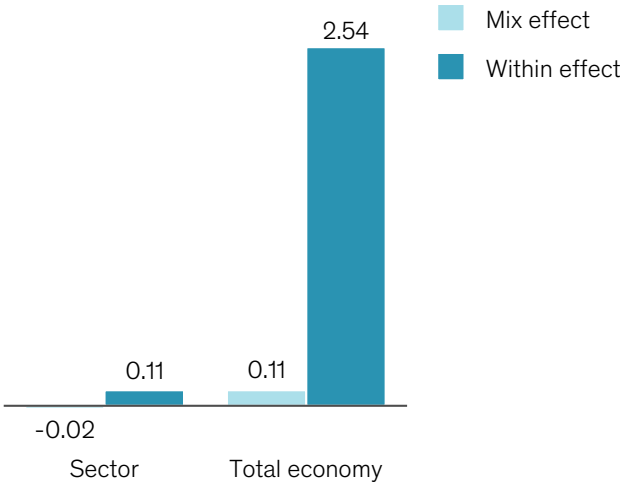


Figure 2. **Gross capital share**
Gross operating surplus/value added (%)

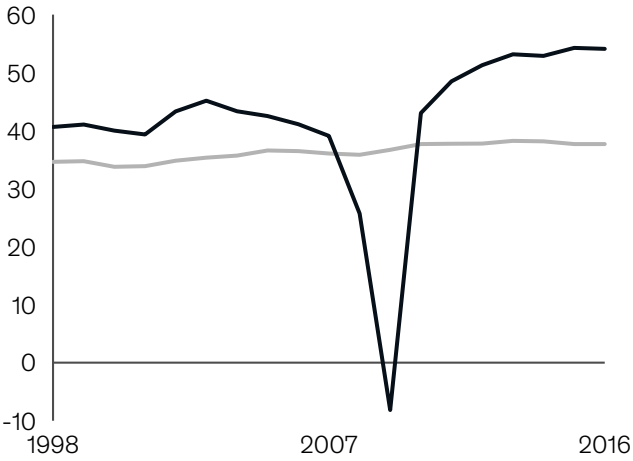
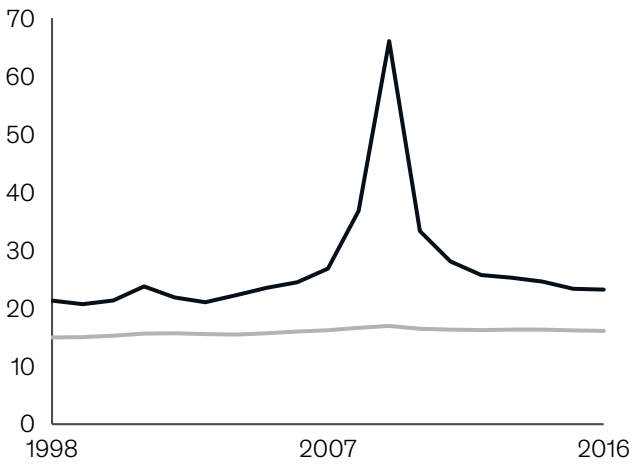


Figure 3. **Depreciation share**
Depreciation/value added (%)



3.3% contribution to net capital share increase, 1998–2002 to 2012–16

0.9% value added share, 2012–16

0.6% total employment share, 2012–16

Figure 4. **Return over invested capital (ROIC)**
Net operating surplus/net capital stock (%)

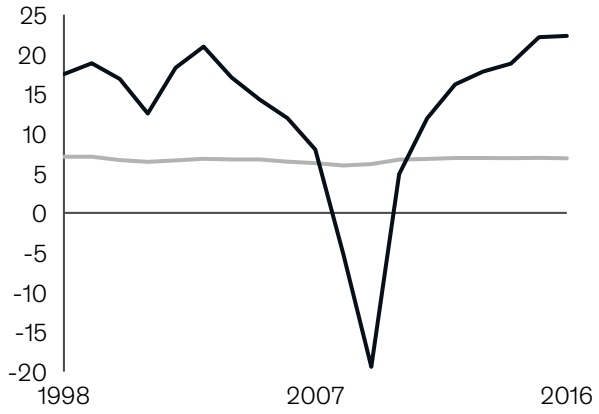


Figure 5. **Capital-to-output ratio**
Net capital stock/value added

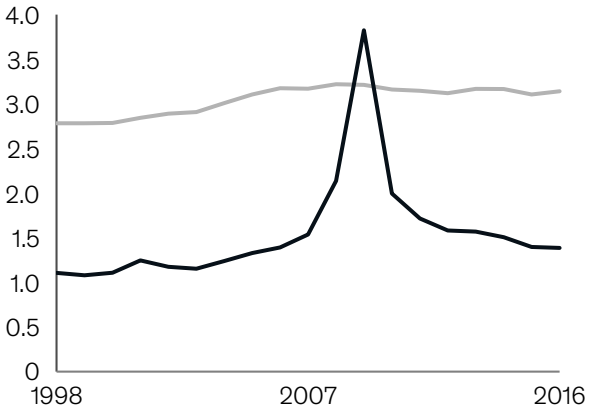


Figure 6. **Productivity and labor compensation**
Real index per worker: 1 = 1998

Productivity

Labor compensation

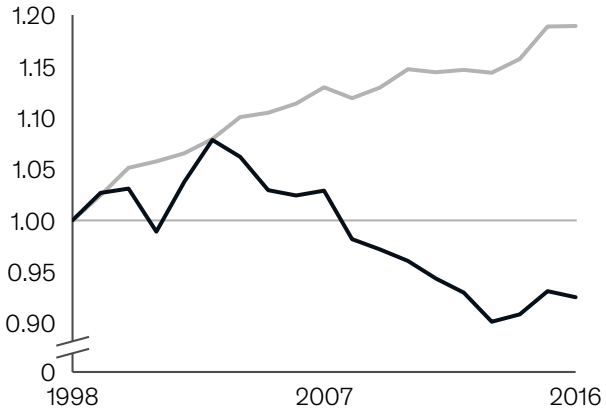


Figure 7. **Trade momentum**
(Exports + imports)/gross ouput (%)

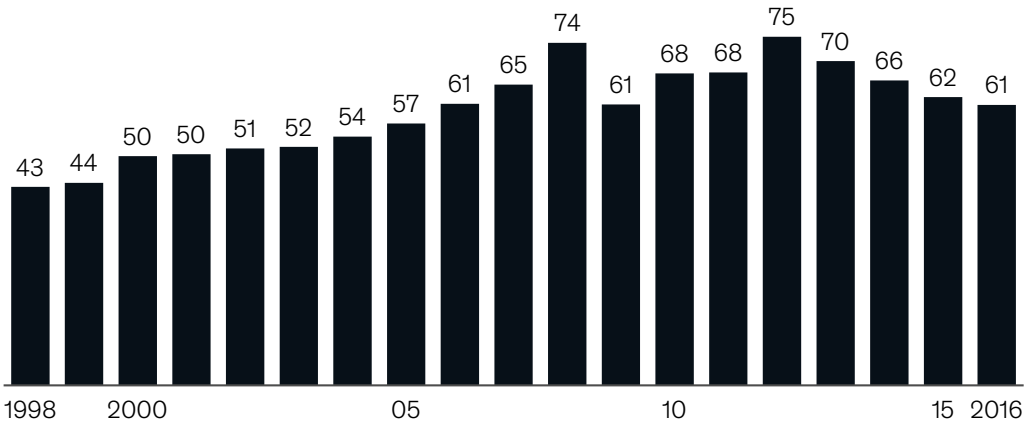
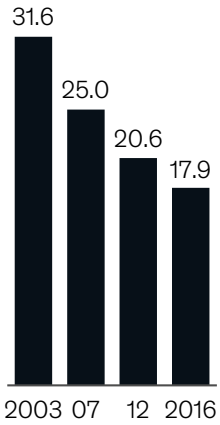
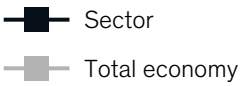


Figure 8. **Coverage rate of unions**
%



Source: IHS Markit Comparative Industry Service (April 2019 release); OECD STAN; Union Membership and Coverage Database; McKinsey Global Institute analysis

Pharmaceuticals and chemicals



The sector posted rising profits and capital share amid an increase in capital stock and a shift to IPP assets.

The pharmaceuticals and chemicals sector accounts for 6.8 percent of the net capital share increase, higher than its 2.2 percent share of value added, with a mix effect of 0.04 percentage point and a within effect of 0.14 (Figure 1).

The capital share of income rose from 61 percent in 1998 to 70 percent in 2016 (Figure 2). About one-third of this was due to depreciation, which has also risen (Figure 3). Depreciation increased because these industries require more capital, and in particular more IPP assets (Figure 7).

Both the pharmaceuticals and chemicals subsectors contributed significantly to the increase in net capital share, the former with 42 percent and the latter with 58 percent (Figure 6).

We also note capital substitution and automation as primary drivers of the capital share increases, with a shift in manufacturing technology and more extensive use of analytics.[1] Profit margins rose substantially but were largely offset by the need to devote more capital to production (Figure 8). While return on invested capital is relatively high compared with other sectors, it was roughly unchanged between 1998–2002 and 2012–16—and it is worth noting that returns have been decreasing since 2011 (Figure 4). The capital-to-output ratio rose from 1.9 in 1998 to 2.5 in 2016 (Figure 5).

MGI research has shown that these companies' share of economic profit in 133 countries rose from about 11 percent in 1995–97 to more than 15 percent in 2014–16, and that they include a number of superstar companies.[2] In the G-20 alone, the pharmaceutical sector's gross operating surplus grew 43 percent between 1995 and 2017. Decreasing returns on R&D, pressure to lower costs, and increasing competition from generics and new biotech entrants has led to substantial consolidation. We therefore attribute moderate impact to superstar effects, despite relatively constant ROIC.

We also mark globalization as a moderate driver of the capital share increase; pharmaceutical companies accelerated the globalization (and in some cases outsourcing) of research and development, supply chains (technical development, commercial manufacturing), and commercialization.

Figure 1. **Net capital share contribution**
Percentage points

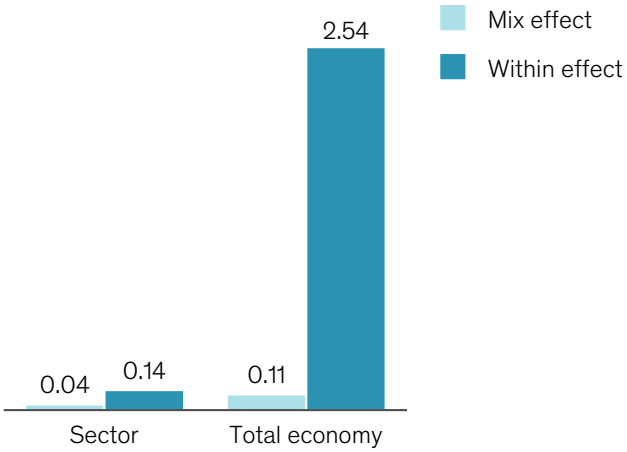


Figure 2. **Gross capital share**
Gross operating surplus/value added (%)

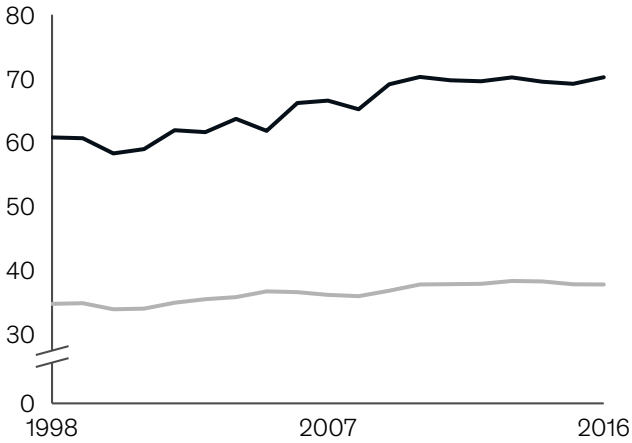
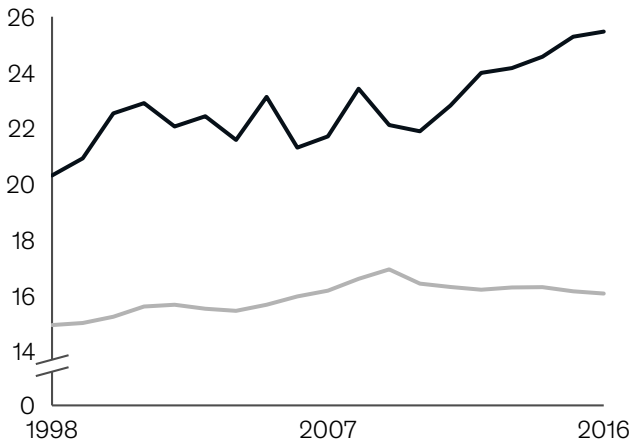


Figure 3. **Depreciation share**
Depreciation/value added (%)



[1] Examples of new manufacturing technologies are continuous manufacturing, modular plants, and automated warehousing and, for advanced analytics, engineering efficiency and quality controls.
[2] McKinsey Global Institute, *Superstars: The dynamics of firms, sectors, and cities leading the global economy*, October 2018.

6.8% contribution to net capital share increase, 1998–2002 to 2012–16

2.2% value added share, 2012–16

0.5% total employment share, 2012–16

Figure 4. **Return over invested capital (ROIC)**
Net operating surplus/net capital stock (%)

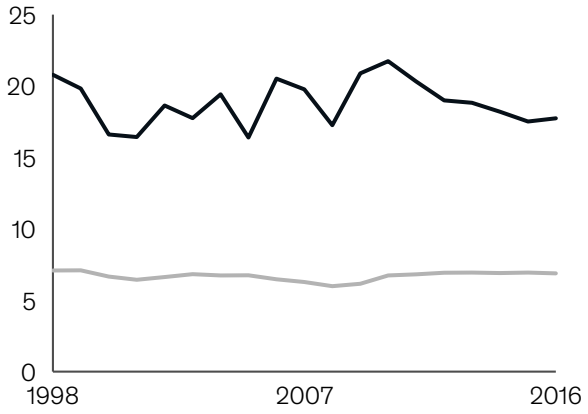


Figure 5. **Capital-to-output ratio**
Net capital stock/value added

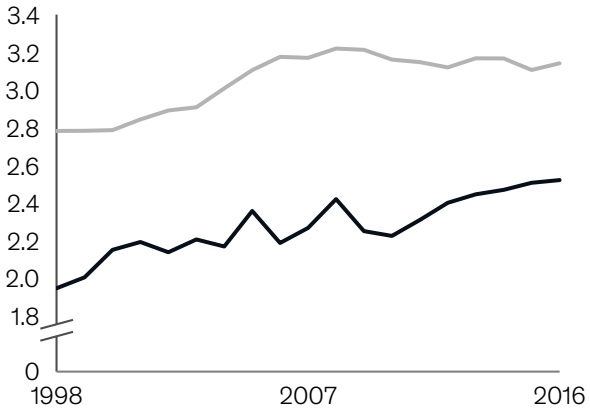


Figure 6. **Share of contribution to net capital share increase**
%

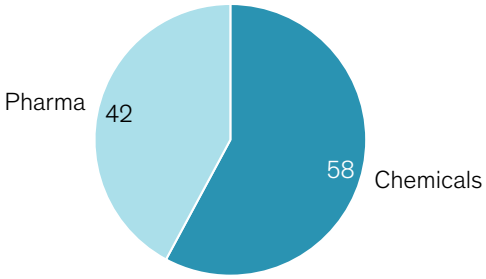


Figure 7. **Net capital structure**
Share in constant prices

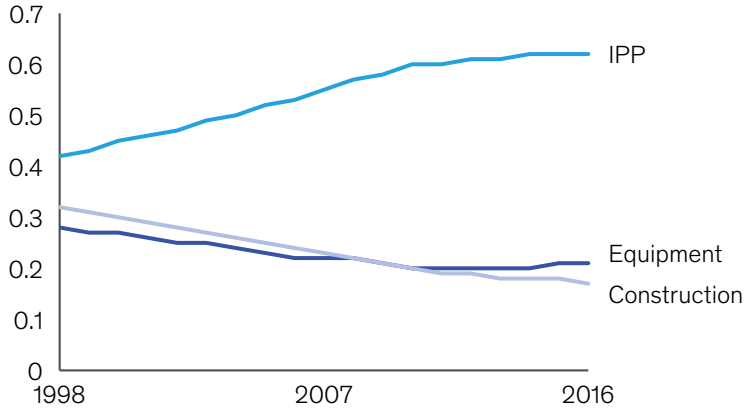
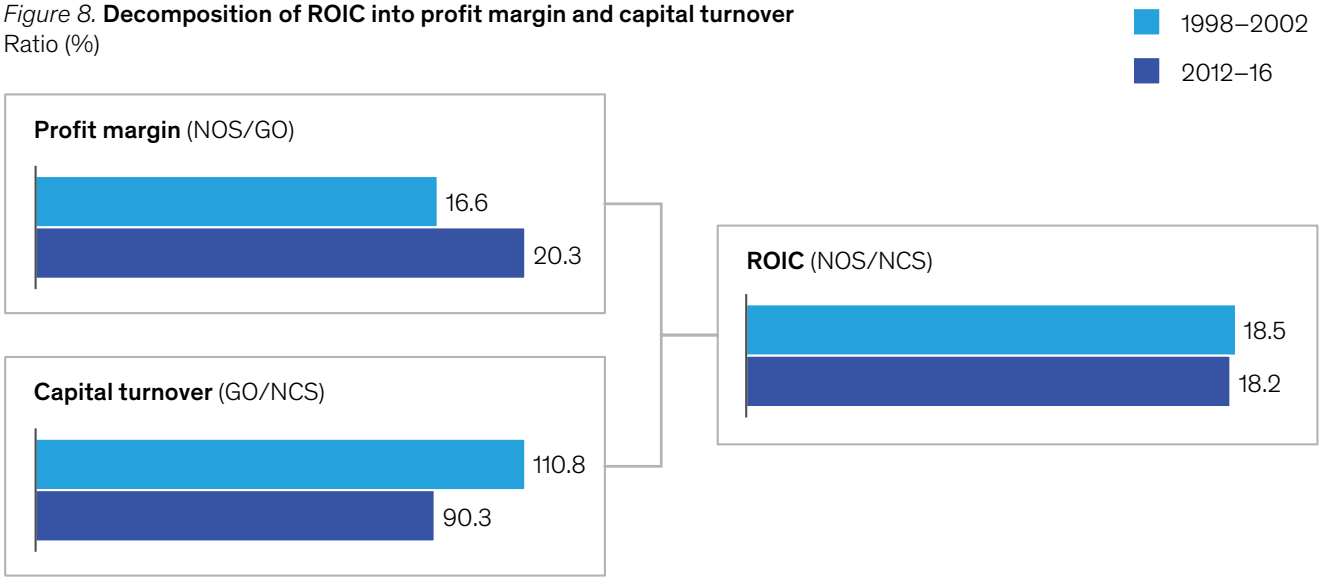
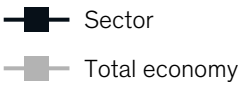


Figure 8. **Decomposition of ROIC into profit margin and capital turnover**
Ratio (%)



Source: OECD; OECD STAN; McKinsey Global Institute analysis

Computers and electronics



A cyclical rebound, shift toward IPP capital, and offshoring affected the capital share.

Computer and electronics manufacturing constitutes a relatively small sector with an outsize impact on capital share. It accounted for just 1.6 percent of the total economy's value added in 2012–16 but represented 11.8 percent of the increase in net capital share between 1998–2002 and 2012–16. This increase was mainly driven by a large within effect of 0.26, compared to a mix effect of 0.06 (Figure 1).

The sector has been influenced by most of the drivers of the recent capital share increase: a cyclical rebound from the dot-com crisis, a capital shift toward IPP, offshoring, and structural changes in production.

Its capital share of income rebounded from the dot-com bust and rose to 47 percent, well above the total economy (Figure 2). Depreciation increased by the equivalent of nearly one-fourth of the increase in capital share (Figure 3). This trend started in the late 1990s and early 2000s (Figure 6). As tech innovations became more R&D-intensive, companies raised the share of faster-depreciating IPP capital from 31 to 48 percent of net capital stock (Figure 7).

ROIC dropped sharply in 2001, followed by a steady recovery—but in contrast to capital share, it did not significantly exceed levels before the dot-com crisis or total economy levels (Figure 4). We note an impact of the boom-bust pattern and do not attribute high relevance to superstar effects for the capital share increase in this sector; while there is some evidence of such effects at the company level, there is less so at the sector level.[1]

The capital-to-output ratio, after rising during the 2001 crisis in line with a decline in value added, has been relatively steady since (Figure 5). Net capital stock grew relative to gross output until 2009. This is reflected in a significant decrease in capital turnover, suggesting some investment in automation. Supply chains lengthened with some production moving offshore, exemplified in the negative shift in trade balance (Figure 8). We therefore note significant relevance of both capital substitution and a globalization effect.

In the United States, the sector reduced employment (total hours worked) by about 44 percent from 1998 to 2016 but improved competitiveness and profitability by moving away from manufacturing computers, communication equipment, and, to a lesser extent, semiconductors, and toward navigation, control, and precision equipment (Figure 9).

Figure 1. **Net capital share contribution**
Percentage points

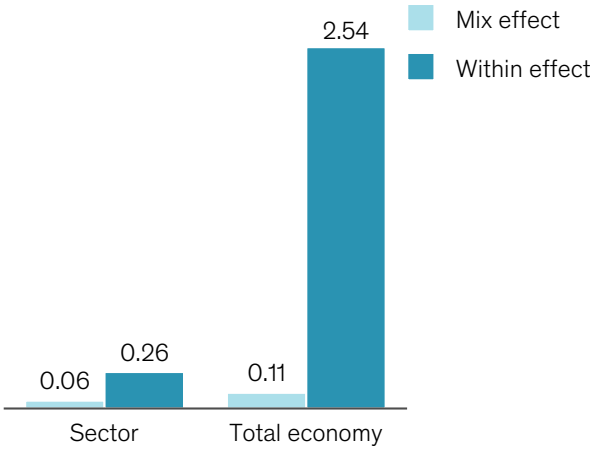


Figure 2. **Gross capital share**
Gross operating surplus/value added (%)

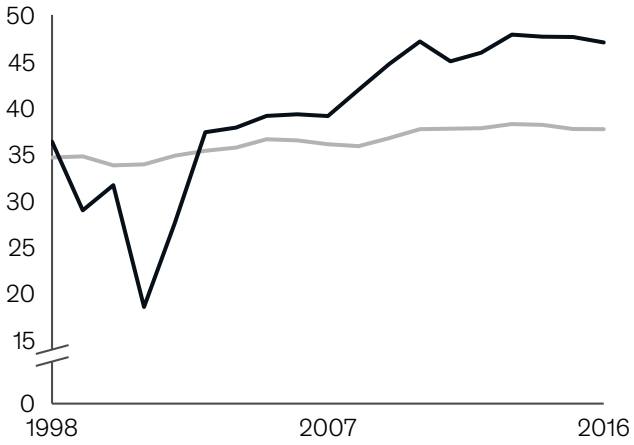
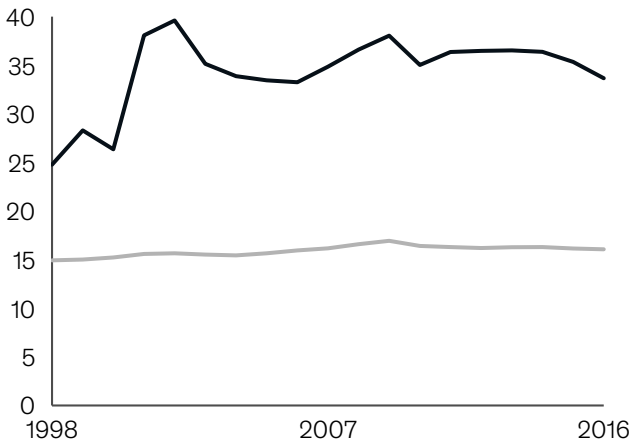


Figure 3. **Depreciation share**
Depreciation/value added (%)



[1] While some companies in the sector have growing rates of return, others have declining returns. Consolidation is happening in the industry, for example in semiconductors, but is driven by the increasing fixed costs for technological innovation, with competition still being strong. Marking "superstar effects" as relevant for this sector would not change the overall results of our analysis much: the share of the economy-wide decline attributable to superstar effects would increase from 18 to 19 percent.

11.8% contribution to net capital share increase, 1998–2002 to 2012–16

1.6% value added share, 2012–16

0.7% total employment share, 2012–16

Figure 4. **Return over invested capital (ROIC)**
Net operating surplus/net capital stock (%)

Figure 5. **Capital-to-output ratio**
Net capital stock/value added

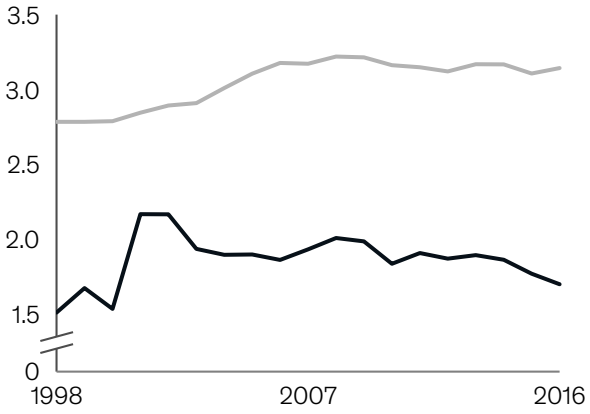


Figure 6. **Long-run depreciation**
Depreciation/value added (%)

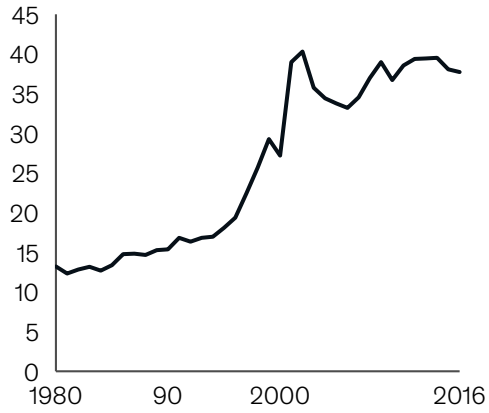


Figure 7. **Net capital structure**
Share in constant prices

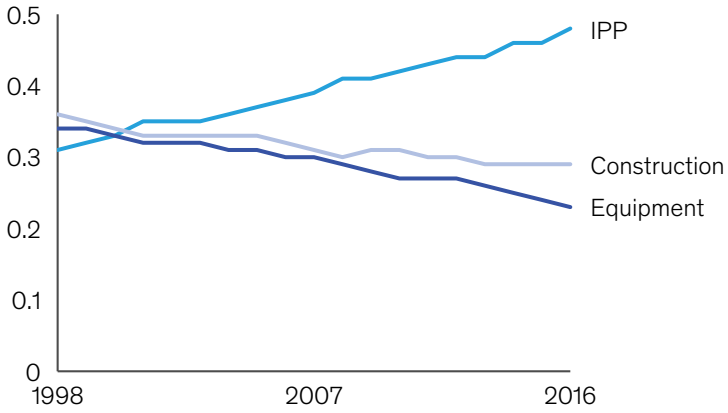


Figure 8. **Sector trade balance**
Net exports/value added (%)

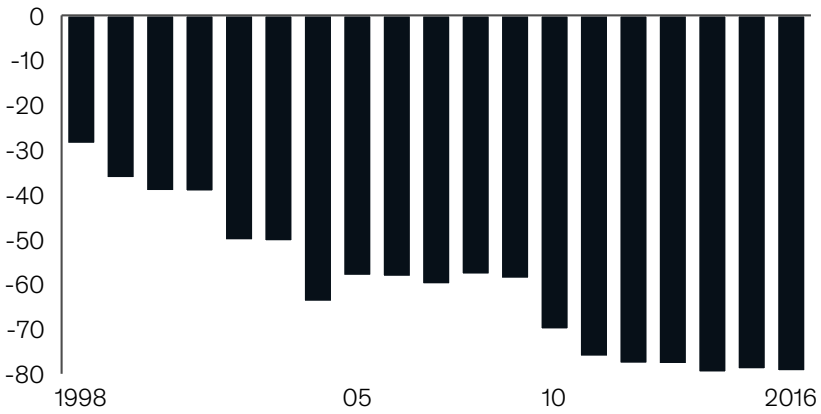
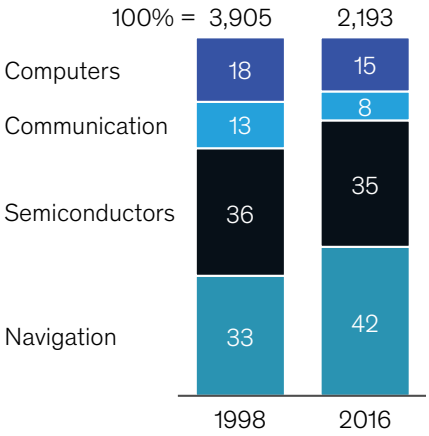


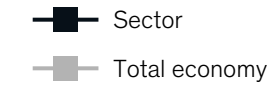
Figure 9. **Share of total hours worked in the sector**[1]
%; million hours



[1] Categories are: computers; communication equipment; semiconductors; navigational, measuring, electromedical, and control instruments; and others (audio, video, magnetic and optical media). Figures may not sum to 100% because of rounding.

Source: IHS Markit Comparative Industry Service (April 2019 release); BLS Employment Projections; OECD; OECD STAN; McKinsey Global Institute analysis

Media and telecommunications



The sector contributed almost one-fifth of the capital share increase as it increased consolidation and grew profit margins.

The media and telecom sector—publishing (including software), motion pictures, music, television, and broadcasting—is a significant driver of the capital share increase, contributing 19 percent of the rise while accounting for only 4.1 percent of the total economy. This originates mainly from a large within effect of 0.53 percentage point, while the mix effect is slightly negative, at –0.03 (Figure 1).

This sector's capital share increased from 47 percent in 2000 to 61 percent in 2016 (Figure 2). Unlike in many other industries, depreciation did not rise relative to value added (Figure 3).

ROIC rebounded quickly from the dot-com crisis to reach 15 percent in 2016 (Figure 4). Part of the increase in net capital share is thus linked to the boom-bust effect of the 2001 crisis, and we mark it as a moderate driver.

Overall, the capital-to-output ratio remained relatively steady, so we do not list capital substitution as a relevant driver (Figure 5). While the sector made significant investments, declining quality-adjusted ICT prices meant that the capital-to-output ratio remained stable. Nominal investment in fixed assets relative to value added in audiovisual, broadcasting, and telecom peaked at 63 percent in 2000 and fell to 34 percent in 2016, while values for publishing were constant (Figure 6).

A further decomposition of ROIC into return on sales and capital turnover pinpoints strong rises in profit margin as the primary driver of the growth in ROIC, which grew from 8.9 percent in 1998–2002 to more than 13.6 percent in 2012–16 (Figure 8).

Telecommunications companies led the increase in net capital share within the sector, accounting for 51 percent of the total, followed by audiovisual and broadcasting at 36 percent, and publishing at 12 percent (Figure 7).

Telecom companies had to adapt to a fast convergence of wired and wireless business and shrinking legacy markets. They are reaping benefits from large investments in digital (for example, fiber networks) and from cost cutting as well as consolidation. As of 2018, three companies account for 78 percent of the US telecommunications market.[1] Consolidation in audiovisual and media companies has also increased, in a sector that is benefiting from rising world demand for higher-quality digital content. We note superstar effects—in this case, increase in returns—as a primary driver for capital share increases.

Figure 1. **Net capital share contribution**
Percentage points

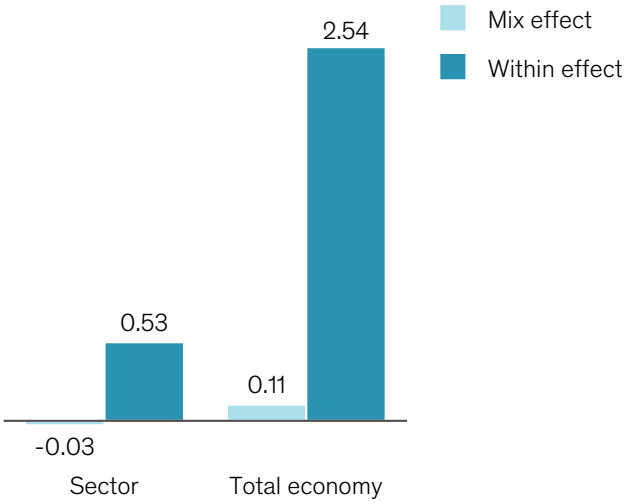


Figure 2. **Gross capital share**
Gross operating surplus/value added (%)

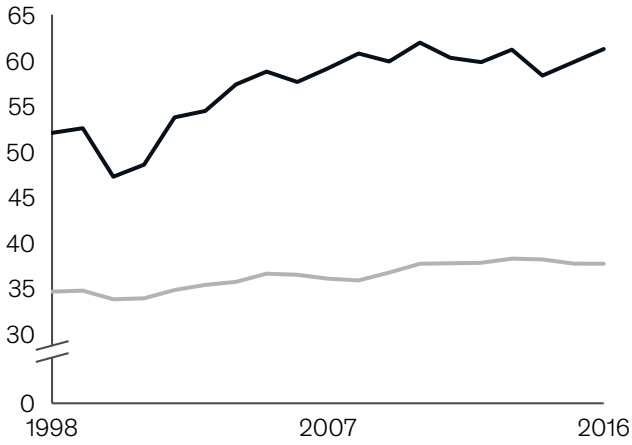
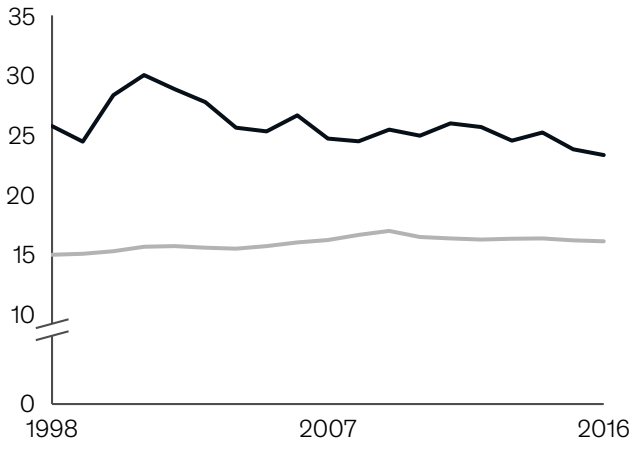


Figure 3. **Depreciation share**
Depreciation/value added (%)



[1] "The next capitalist revolution," *The Economist*, November 2018.

19.0% contribution to net capital share increase, 1998–2002 to 2012–16

4.1% value added share, 2012–16

1.6% total employment share, 2012–16

Figure 4. **Return over invested capital (ROIC)**
Net operating surplus/net capital stock (%)

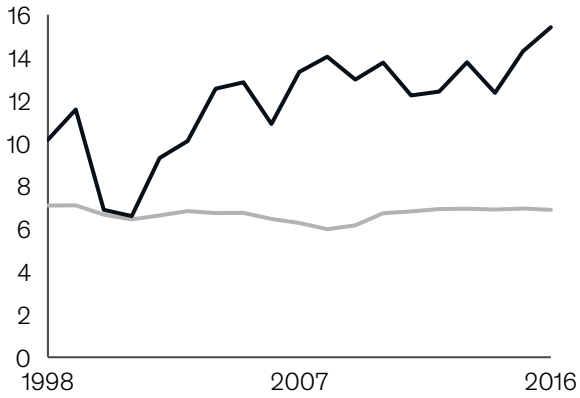


Figure 5. **Capital-to-output ratio**
Net capital stock/value added

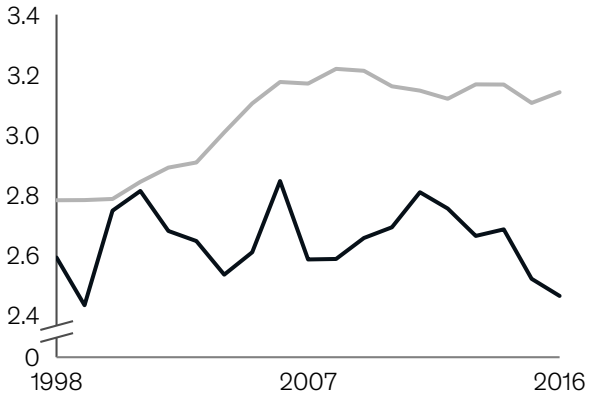


Figure 6. **Gross fixed capital formation**
Nominal share of value added (%)

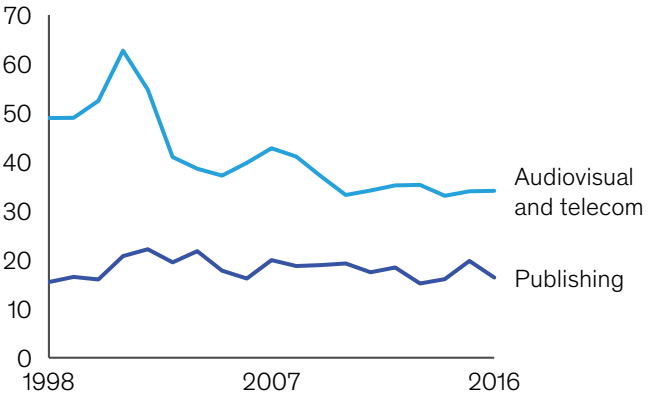


Figure 7. **Share of contribution to net capital share increase**
%

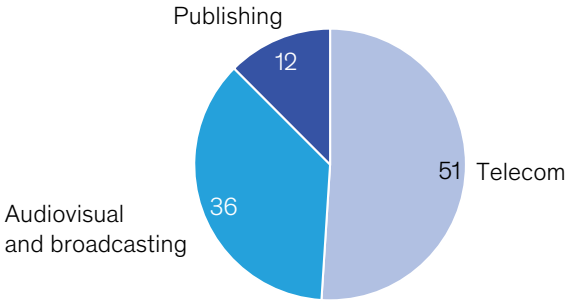
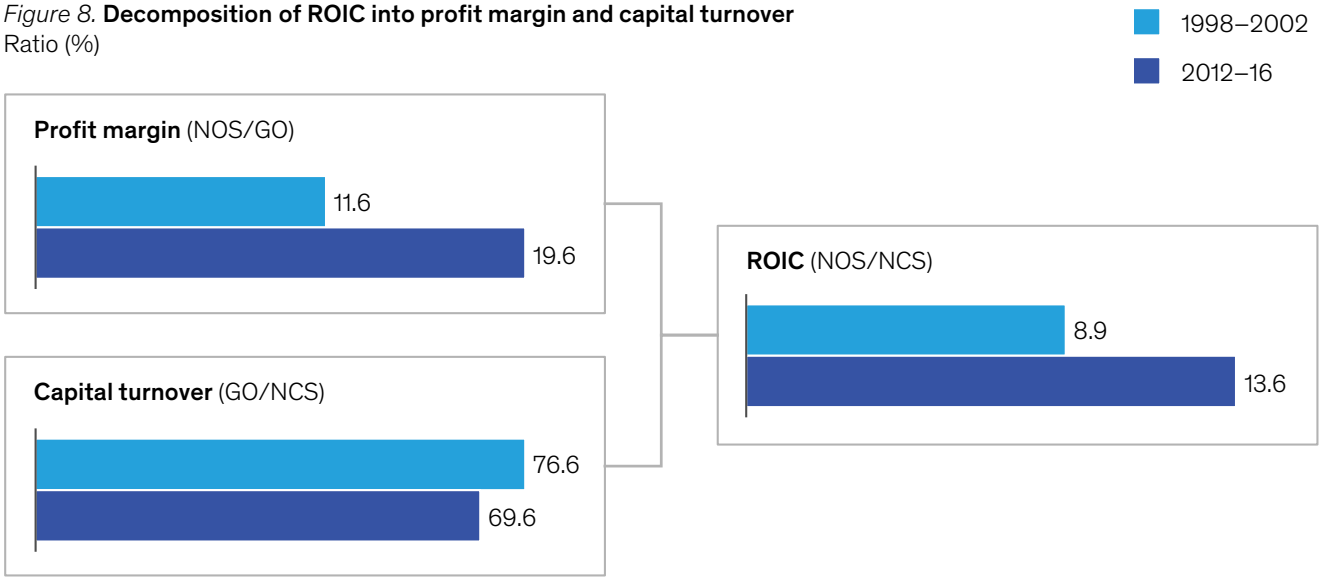


Figure 8. **Decomposition of ROIC into profit margin and capital turnover**
Ratio (%)



Note: Figures may not sum to 100% because of rounding.
Source: OECD; OECD STAN; *The Economist*; McKinsey Global Institute analysis

Computer services

Recovery from the dot-com bust and capital lightening drove up return on invested capital.

The computer services sector—computer programming, computer consultancy, and IT facilities management—contributed only 1.5 percent to value added and 3.1 percent to the increase in capital share, mainly because its mix effect of –0.11 percentage point offset most of the 0.20 percentage point within effect (Figure 1). The negative mix effect stems from growth in a sector with a much lower capital share than average.

After a decline during the 2000–01 dot-com bust, the gross capital share of the computer programming and consulting sector rose to 17 percent in 2009. It retreated to 10 percent by 2016 (Figure 2). Depreciation as a share of value added has been decreasing since its peak in 2002 (Figure 3).

ROIC was negative between 1999 and 2002 due to the dot-com crisis and has recovered since (Figure 4). We mark boom-bust effects as a moderate driver of capital share increases in this sector.

The capital-to-output ratio decreased in this labor-intensive sector; we do not consider capital substitution a driver of capital share increases (Figure 5). Net capital stock additions have been modest compared to value added growth since the end of the dot-com crisis, suggesting that the industry requires less capital per unit of output, possibly because of the fast decrease in the quality-adjusted cost of ICT equipment.

While we do not see labor bargaining as a relevant issue in this sector with marginal unionization rates, outsourcing of nonconsulting activities such as software programming and infrastructure management is a significant trend. Enabled by improvements in technology, the import share from the rest of the world in terms of sectoral US gross output increased from 5.7 percent in 2008 to 7.7 percent in 2011 (Figure 6). We thus mark it as a moderate driver of the capital share increase. Average compensation has been growing roughly in line with the total economy, and employment growth was strong, showcasing the high demand for qualified IT specialists (Figure 7).

A large share of workers in this sector is self-employed (8.4 percent on average between 1998 and 2016). Correspondingly, a significant part of net operating surplus is mixed income from independent workers. Adjustment for this mixed income pushes the remaining net capital share into negative territory (Figure 8).[1]

Figure 1. **Net capital share contribution**
Percentage points

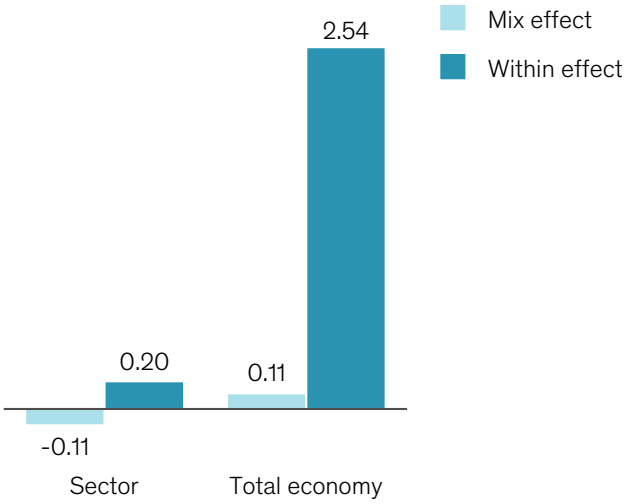


Figure 2. **Gross capital share**
Gross operating surplus/value added (%)

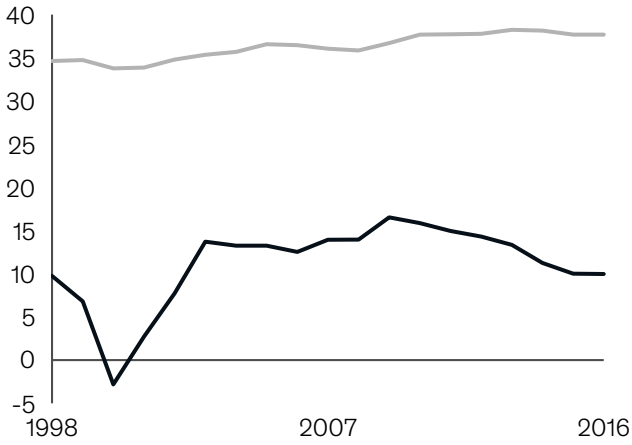
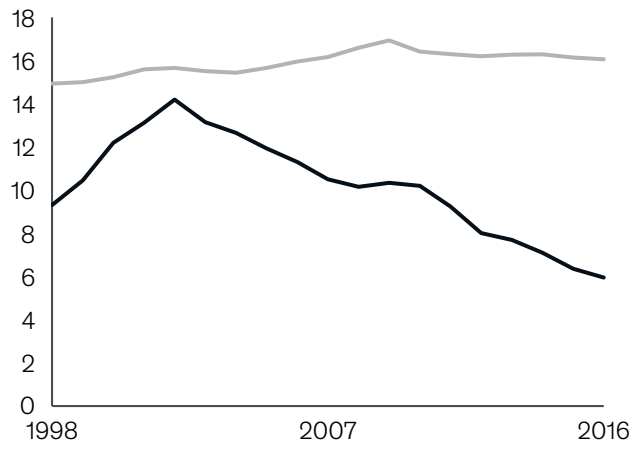


Figure 3. **Depreciation share**
Depreciation/value added (%)



[1] While we run all our analyses with adjusted series, we show non-adjusted values on these exhibits to facilitate discussion about the levels.

3.1% contribution to net capital share increase, 1998–2002 to 2012–16

1.5% value added share, 2012–16

1.3% total employment share, 2012–16

Figure 4. **Return over invested capital (ROIC)**
Net operating surplus/net capital stock (%)

Figure 5. **Capital-to-output ratio**
Net capital stock/value added

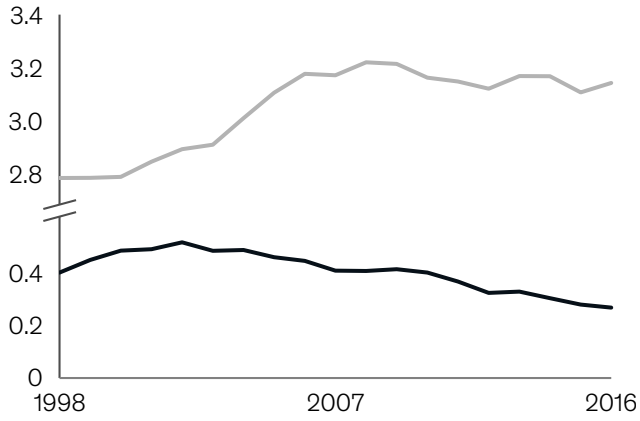


Figure 6. **Total computer services imports from the rest of the world**
% of US gross output

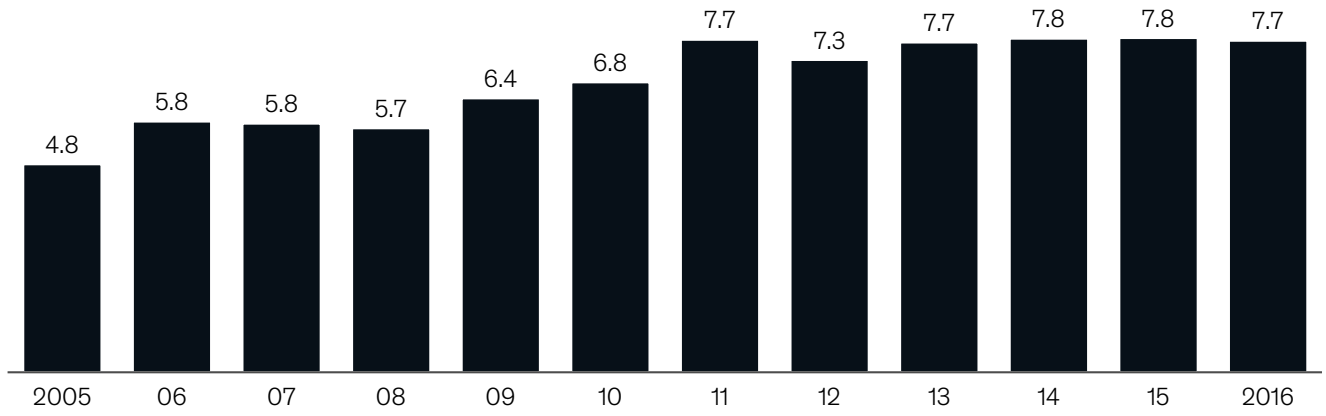


Figure 7. **Average compensation and number of workers**
Index: 1 = 1998

Average compensation

Number of workers

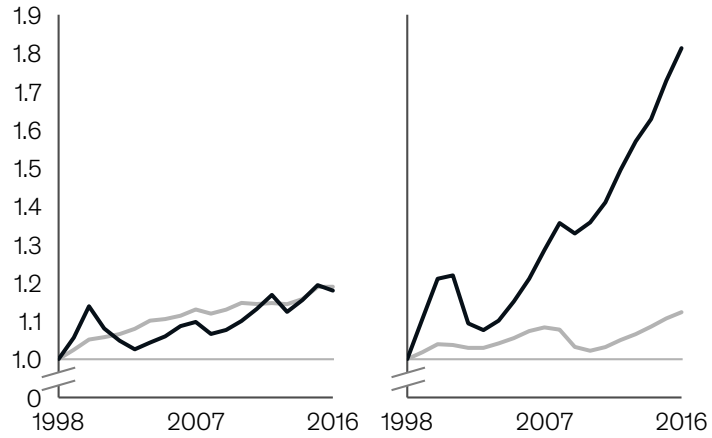
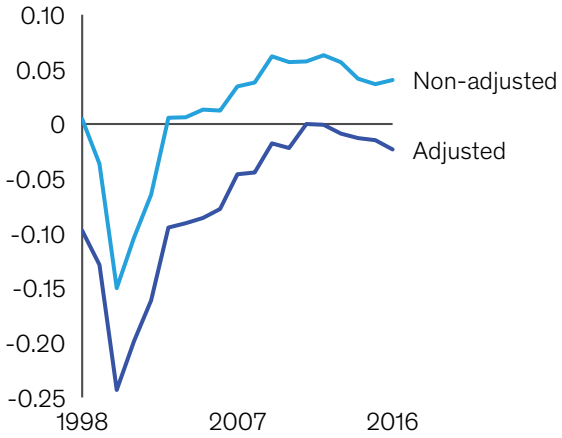


Figure 8. **Net capital share**
(NOS/VA), non-adjusted vs adjusted (%)



Note: Figures may not sum to 100% because of rounding.
Source: OECD STAN; UNCTAD; McKinsey Global Institute analysis

Information services

The smallest sector in focus showed a rapid rise in capital stock and depreciation.

Information services—data processing and hosting activities, and web search portals—is the smallest of our 12 sectors, with only 0.6 percent of value added and 2.3 percent of the increase in net capital share. It exhibits a mix effect of –0.06 percentage point and a within effect of 0.12 percentage point (Figure 1). We include it because of the increasing relevance of information services in the economy and the weight of tech companies.

After a dip in 1999–2001, the sector had a roughly stable gross capital share (Figure 2). Depreciation rose faster than value added and accounted for 45 percent of the gross capital share increase (Figure 3).

ROIC moved from negative during the dot-com crisis to strongly positive between 2002 and 2008, to close to zero since 2012 (Figure 4). We mark moderate relevance of cyclical and recovery effects. Low returns may seem surprising for a sector with highly profitable large companies and their growing role in the global economy. Explanations could include a long tail of less profitable, smaller companies or competition for rapid market share gains. Moreover, our analysis is at the sectoral rather than company level, and many high-return activities of tech giants are classified in industries outside information services, for example in advertising services.

Net capital stock rose relative to value added, and the capital-to-output ratio tripled from 0.6 in 1998 to 1.8 in 2016 (Figure 5). This increase has been sustained by rising capital stock (Figure 6). The increase is striking, considering that quality-adjusted prices for investment goods declined rapidly in this sector in contrast to the total economy (Figure 7). Investment relative to value added grew from around 30 percent in the mid-2000s to above 60 percent in recent years. We therefore list capital substitution as the most relevant driver of capital share increases in this sector.

While this sector never was labor-intensive, further investment in automation was accompanied by a continuous drop in employment until 2010, with remaining workers focusing on higher value-added activities seeing the highest average compensation growth (2.3 percent per year between 1998-02 and 2012-16) in our sample (Figure 8).

Figure 1. **Net capital share contribution**
Percentage points

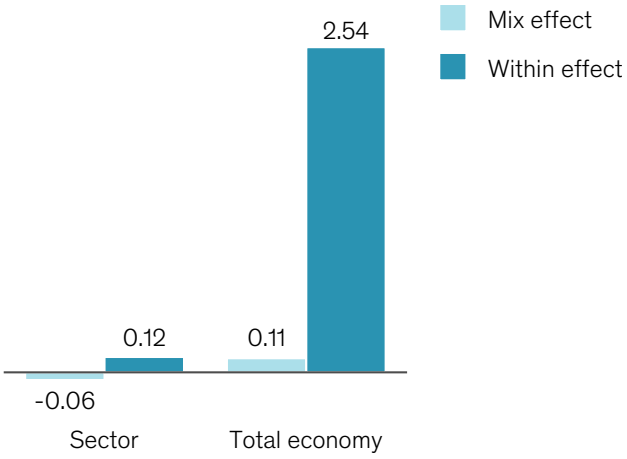


Figure 2. **Gross capital share**
Gross operating surplus/value added (%)

Figure 3. **Depreciation share**
Depreciation/value added (%)

Source: McKinsey Global Institute analysis

2.3% contribution to net capital share increase, 1998–2002 to 2012–16

0.6% value added share, 2012–16

0.3% total employment share, 2012–16

Figure 4. **Return over invested capital (ROIC)**
Net operating surplus/net capital stock (%)

Figure 5. **Capital-to-output ratio**
Net capital stock/value added

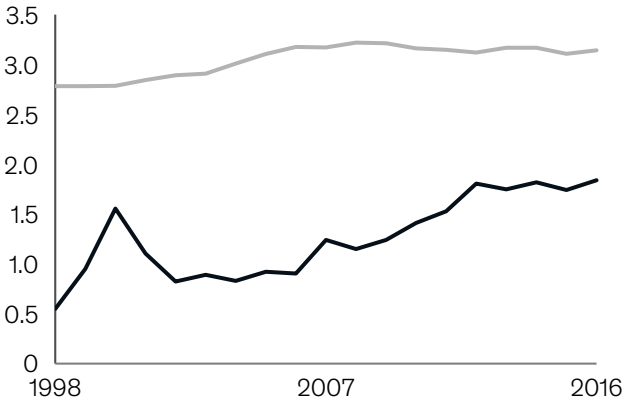


Figure 6. **Capital to output growth decomposition**
%

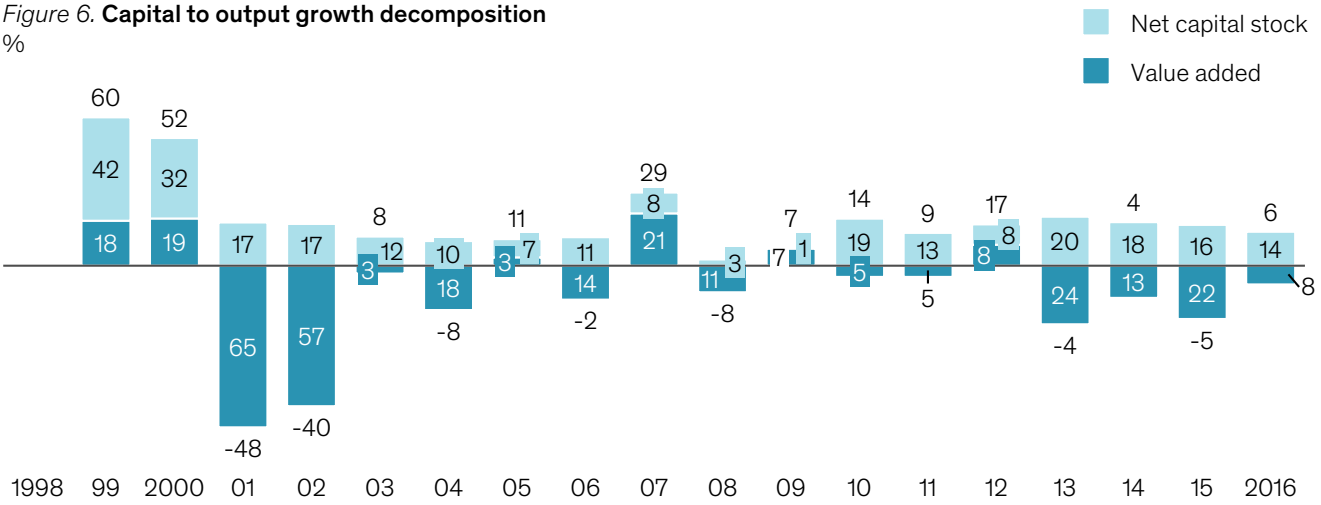


Figure 7. **Price of gross fixed capital formation for computer and information services**
Index: 1 = 1980

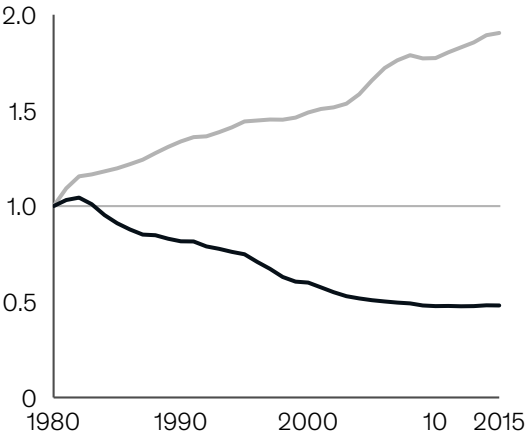
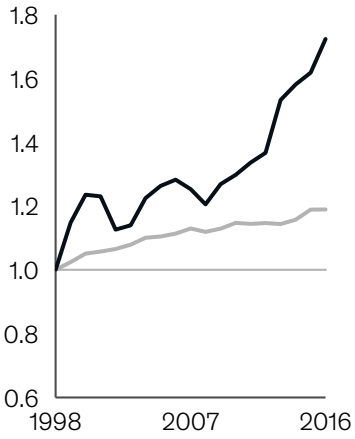
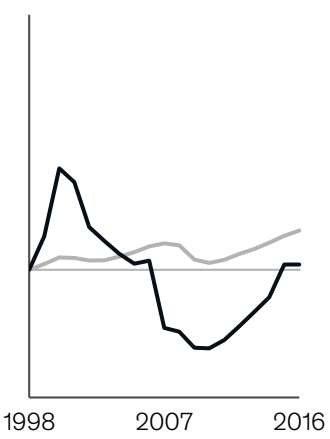


Figure 8. **Average compensation and number of workers**
Index: 1 = 1998

Average compensation

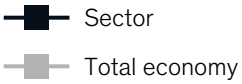


Number of workers



Note: Figures may not sum to 100% because of rounding.
Source: EU KLEMS; OECD STAN; McKinsey Global Institute analysis

Wholesale and retail



The sector showed a sharp increase in capital share as ROIC recovered after overinvestment in structures before 2008.

Wholesale and retail trade is one of the largest of the 12 selected sectors, accounting for 10.4 percent of value added and 22.8 percent of the increase in net capital share, with the mix effect at 0.06 percentage point and within effect at 0.54 (Figure 1).

The capital share in wholesale and retail trade rose quickly between 2002 and 2016, from 25 to 33 percent of value added, in spite of the global financial crisis (Figure 2). Depreciation in this sector has been rising in line with the total economy (Figure 3).

This links to a shift from construction toward equipment and intellectual property investment, pointing to the rise of automation and the industry's continuing digitization of sales and processes. The share of IPP in net capital stock rose from 2 percent in 1998 to 6 percent in 2016. Machinery and equipment rose from 26 to 30 percent.

ROIC followed a U pattern, decreasing until 2008, and then increasing (Figure 4). In 2012–16, the industry was transitioning from post-crisis recovery toward rapid increases in profit margins and digitization, particularly with online sales. With pressure from new digital entrants, various measures of consolidation have been rising, and we mark this as a moderately relevant driver accordingly.[1]

The capital-to-output ratio rose from 0.85 in 1998 to 1.14 in 2008, in the depths of the global financial crisis (Figure 5). Since then, it has declined as value added has nearly returned to pre-crisis growth rates. Net capital stock growth has not fully recovered, as the sector has been working through a real estate overhang (Figure 6).[2] Over the full period, we note capital substitution from the wave of large store expansions as well as technology improvement from ICT and equipment investment as moderately relevant drivers of the capital share increase.

While the rate of workers covered by union contracts is low in the United States and has remained relatively constant, wage growth in the sector is the lowest of all 12 sectors, at 0.2 percent per year between 1998–2002 and 2012–16. We thus mark it as an additional moderate driver (Figure 7).

Figure 1. **Net capital share contribution**
Percentage points

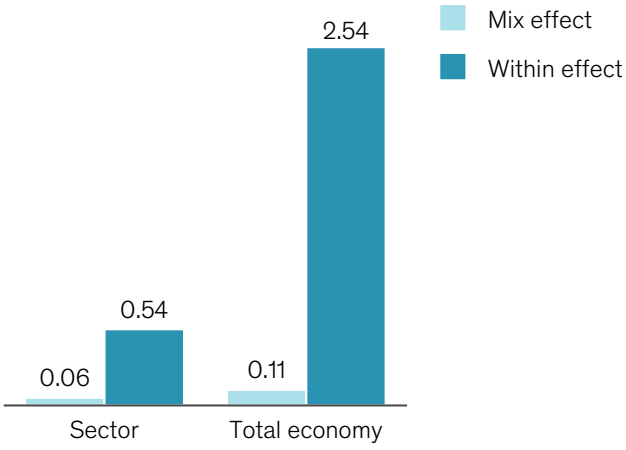


Figure 2. **Gross capital share**
Gross operating surplus/value added (%)

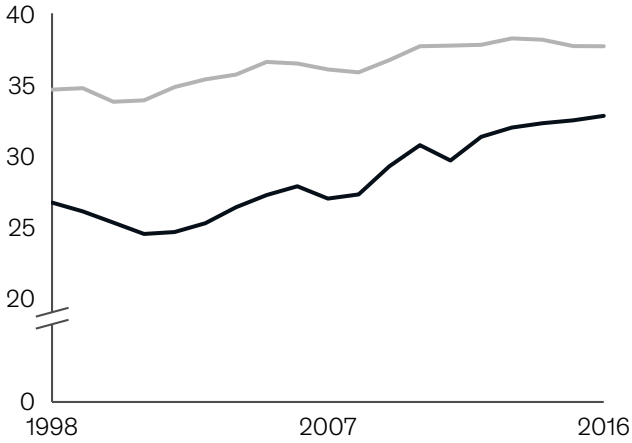
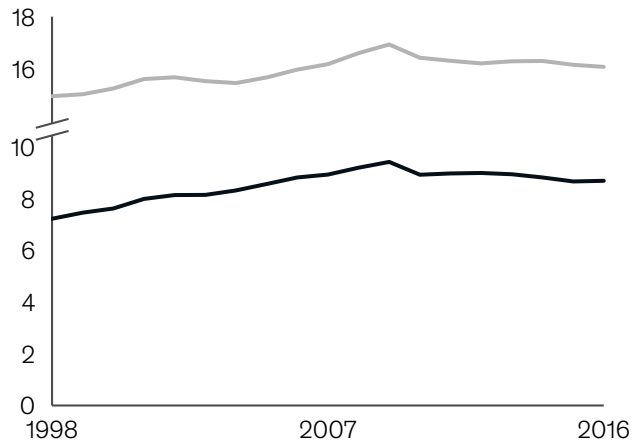


Figure 3. **Depreciation share**
Depreciation/value added (%)



[1] David Autor et al., "The fall of the labor share and the rise of superstar firms," IZA discussion paper number 10756, May 2017.
[2] In the post-financial crisis years, companies have been reformatting older stores in city centers more often than making greenfield investments in suburbs.

22.8% contribution to net capital share increase, 1998–2002 to 2012–16

10.4% value added share, 2012–16

15.2% total employment share, 2012–16

Figure 4. **Return over invested capital (ROIC)**
Net operating surplus/net capital stock (%)

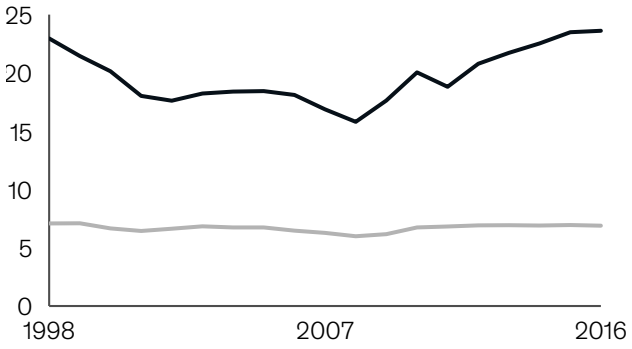


Figure 5. **Capital-to-output ratio**
Net capital stock/value added

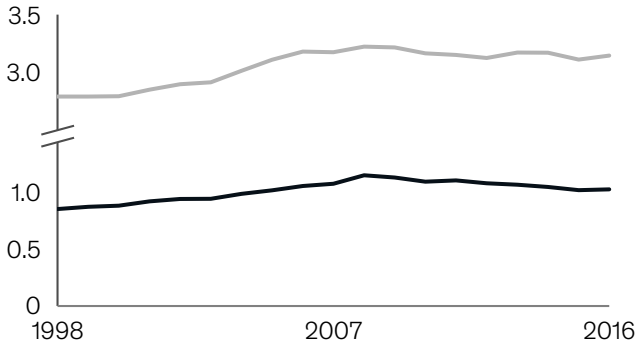


Figure 6. **Capital to output growth decomposition**
%

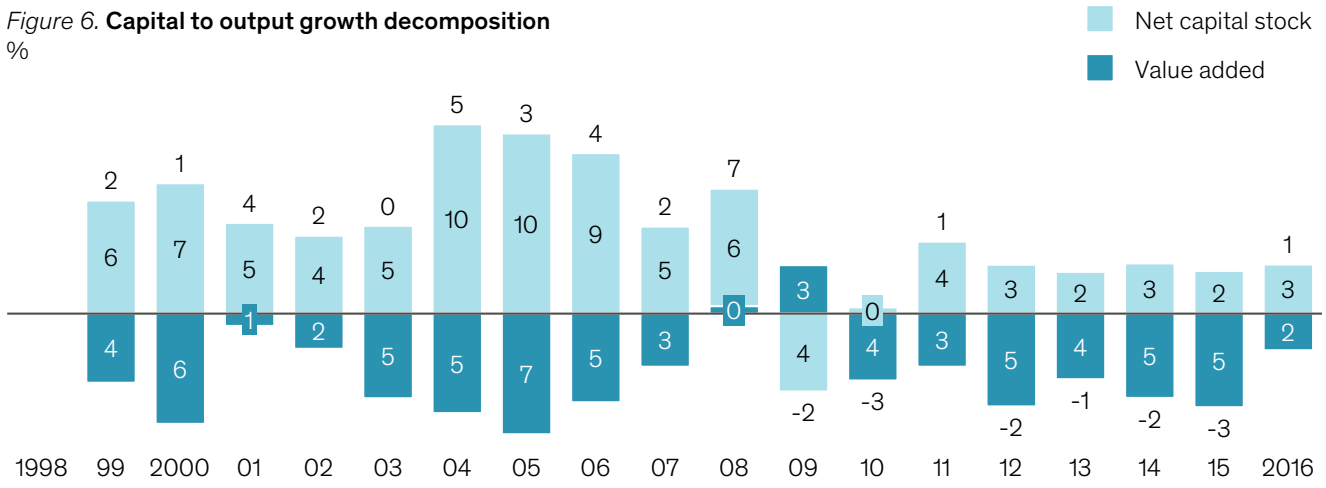
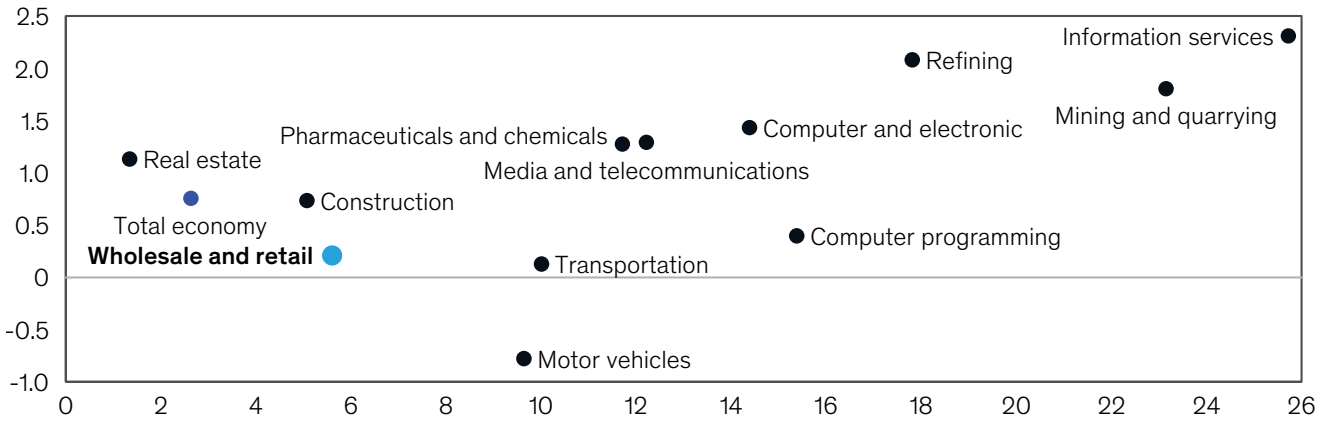


Figure 7. **Average compensation growth vs net capital share change**

Compensation per employee[1]
Real growth, 1998–2002 vs 2012–16 (%)

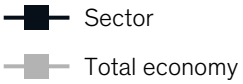


Net capital share change, 1998–2002 vs 2012–16[1]
Percentage points

[1] 12 sectors in focus accounting for most of the increase in capital share. Compensation adjusted for self-employed income.
Note: Figures may not sum to 100% because of rounding.

Source: David Autor et al.; OECD STAN; McKinsey Global Institute analysis

Transportation and storage



Rising consolidation among airlines and stronger demand for travel raised the capital share.

The transportation and storage sector makes a large contribution to the net capital share increase of almost 14 percent, with a slightly positive mix effect of 0.04 percentage point and a large within effect of 0.33 (Figure 1). After a rapid increase in capital share in the 2000s, this sector has been stable since 2010 at around 30 percent of value added (Figure 2).

Depreciation was slightly lower toward the end of the sample but was relatively stable compared with variations experienced in other sectors (Figure 3). All subsectors contributed to the increase in net capital share. Air transport accounted for 45 percent of the increase, followed by postal services at 18 percent, land transportation companies at 16 percent, and warehousing and logistics at 12 percent (Figure 6).

The increase in capital share is reflected in a doubling in ROIC from less than 3 percent in 1998 to nearly 6 percent in 2016 (Figure 4). We attribute this partially to boom-bust effects with recent strong demand for transportation services, and partially to rising consolidation. The sector's output is highly correlated with total economy business cycles, with a correlation coefficient of 0.95 between 1998 and 2016 (Figure 8). Consolidation also played a role; the number of major airlines competing in the United States fell from 12 in the early 2000s to five in 2017. The market share of the top five US airlines in terms of available seat kilometers increased from 68 percent in 1998 to 84 percent in 2016.[1]

The capital-to-output ratio was stable over the period, and we do not list capital substitution as a driver of capital share increases (Figure 5). Apart from warehousing and ticketing, automation has had a modest influence on this sector, with legislation slowing adoption in rail. Mass adoption of autonomous vehicles has not yet taken place.

While this sector is less exposed to international competition than many others, labor's bargaining power has weakened. The share of workers covered by unions decreased from 36 percent in 2003 to 27 percent in 2016. The rights of independent workers, for instance in ride hailing services, is widely debated (Figure 7). As in wholesale and retail, average yearly compensation growth was near zero (0.1 percent) between 1998–02 and 2012–16. We thus note bargaining power as a moderate driver for capital share increases.

Figure 1. **Net capital share contribution**
Percentage points

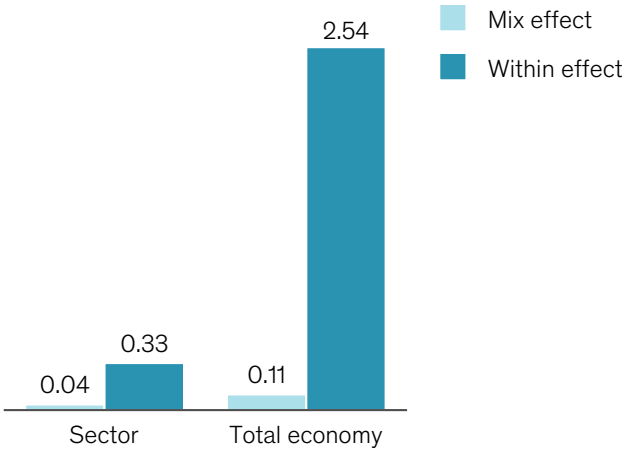


Figure 2. **Gross capital share**
Gross operating surplus/value added (%)

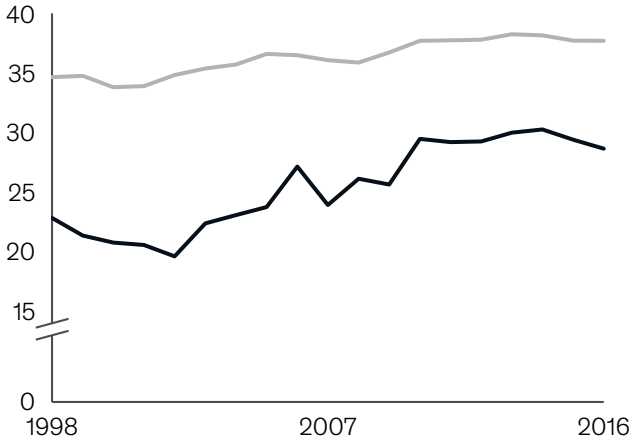


Figure 3. **Depreciation share**
Depreciation/value added (%)

[1] Diio Mi. Some economists even point to a need to raise competition and regulatory scrutiny; see, for example, "The next capitalist revolution," *The Economist*, November 2018, and Scott A. Wolla and Carolyn Backus, "The economics of flying: How competitive are the friendly skies?," *Page One Economics*, Federal Reserve Bank of St. Louis, November 2018.

13.9% contribution to net capital share increase, 1998–2002 to 2012–16

3.2% value added share, 2012–16

3.7% total employment share, 2012–16

Figure 4. **Return over invested capital (ROIC)**
Net operating surplus/net capital stock (%)

Figure 5. **Capital-to-output ratio**
Net capital stock/value added

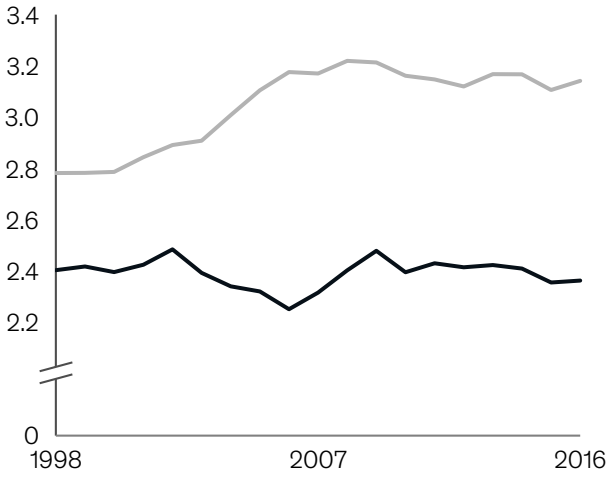


Figure 6. **Share of contribution to net capital share increase**
%

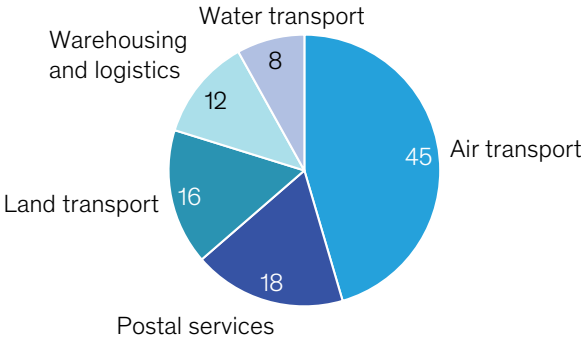
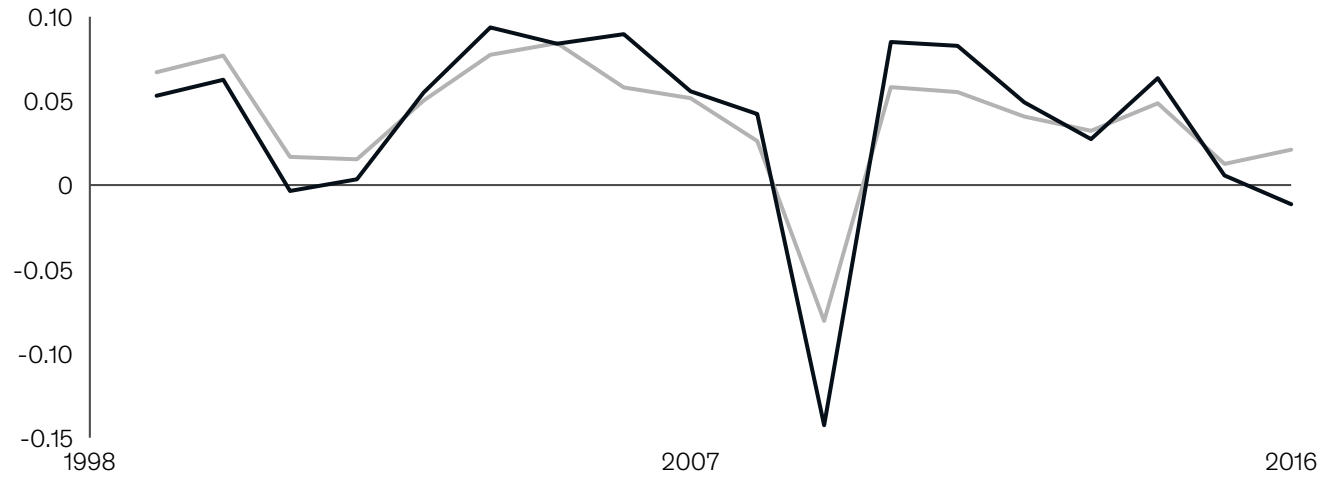


Figure 7. **Coverage rate of unions**
%

Figure 8. **Gross output growth**
Year over year (%)



Note: Figures may not sum to 100% because of rounding.

Source: Diio Mi; OECD STAN; *The Economist;* Page One Economics; Union Membership and Coverage Database; McKinsey Global Institute analysis

5. Conclusion and outlook: Setting the right priorities

The decline in the labor share of income has been much discussed, not least because of concerns about its contribution to wage stagnation, populism, and hostility to globalization. The rising power of companies vis-à-vis workers—whether from new technology, globalization, the hollowing out of labor unions, or market consolidation—has shaped much of the public discussion about labor share declines and stagnant wages. Our analysis suggests that while all of these factors play a role, the bigger contributors to economy-wide lower labor share since the turn of the millennium appear to be supercycle- and boom-bust-related effects, as well as a secular rise in depreciation, notably from a shift to intangibles. As for stagnant median wages, weak productivity growth had a bigger impact than the declining labor share.

Looking ahead, our analysis might suggest that the labor share decline could be dampened but continue (Exhibit 10). According to the most recent BLS data, the labor share was relatively stable in 2017–18. Looking at the five drivers in the past and their potential trajectory ahead, commodity cycle effects should taper off or reverse; energy prices have recovered since 2017 but are still well below their 2011–14 peak, although technological advances in shale oil and gas may sustain profitability in the sector. Global value chains are shifting, and offshoring for labor cost arbitrage is declining.[40]

The ongoing shift to intangibles will likely continue to raise depreciation, however. Superstar effects as well as consolidation could also continue, although policy changes and hypercompetition might alter the trajectory. Capital substitution and technology deployment look set to continue or even accelerate, with significant uncertainty around the elasticities of substitution between capital and labor, including types of capital and human skills, and their respective impact on the labor share. Our research suggests that this has not been a pronounced factor in the past, however. In regard to sector mix effects, forecasts of gross operating surplus and value added until 2030 suggest that the labor share may benefit from a shifting economic structure toward sectors that currently display a higher labor share, such as healthcare and social work activities, and a moderate downward adjustment in economic weight of some sectors with a typically low labor share, such as real estate and coke and refined petroleum.[41]

This analysis represents our preliminary perspective to help foster discussion and dialogue on the topic of declining labor share. We continue to research these issues and will adjust and refine our findings as we learn more. Nonetheless, our initial insights already raise some important potential research questions and policy implications.

Policy makers may want to focus their attention on driving productivity growth to help address wage stagnation; our research suggests that continued digitization and sustaining strong demand and investment will be critical. The benefits to productivity will likely outweigh any negative impact on labor share from capital substitution, if the past 20 years are a good

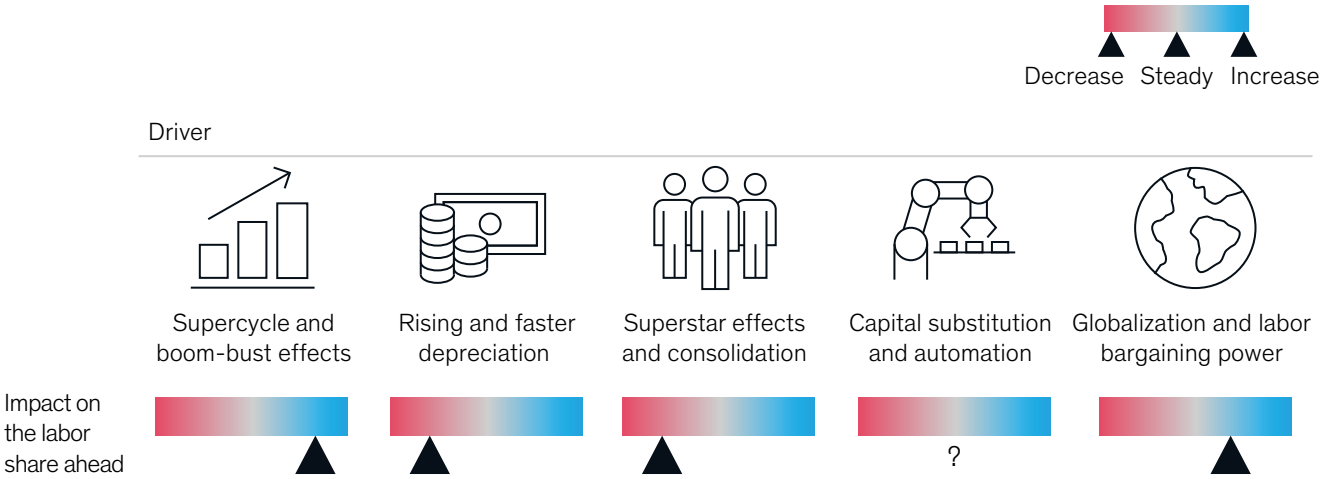
[40] See *Globalization in transition: The future of trade and value chains,* McKinsey Global Institute, January 2019.
[41] Mix versus within decomposition used with forecasts from IHS Markit Comparative Industry Service, April 2019 release.

indicator for what could be ahead.[42] They may want to counter the divergence of median from mean wages by addressing rising workplace inequality, notably the wage premium awarded to the most skilled workers. This would include retraining workers as companies automate more work activities, as well as coming to grips with superstar effects.[43]

Labor share declines have, in comparison, a smaller influence on wages. A large share of the decline is more technical than distributional (depreciation) and linked to a structural shift of investment toward intangibles. Another large share relates to supercycle and boom-bust effects, which are difficult to address in isolation. Actionable policies might have to focus on measuring superstar effects and ensuring a competitive environment across sectors. Policy makers may also need to mitigate the consequences of globalization where the changes in economic structure take place too rapidly for workers to adapt, and ensure that technology works alongside human labor to make it more productive rather than substitute it.

Exhibit 10

Looking ahead, further labor share declines appear likely but at a slower pace.



Source: McKinsey Global Institute analysis

[42] *Solving the productivity puzzle: The role of demand and the promise of digitization,* McKinsey Global Institute, February 2018.

[43] For automation's effect on the workforce see *Skill shift: Automation and the future of the workforce*, McKinsey Global Institute, May 2018, and *Jobs lost, jobs gained: Workforce transitions in a time of automation*, McKinsey Global institute, December 2017. While our findings in this paper suggest that consolidation and superstar effects are only moderate drivers of labor share declines, which in turn explain only a small share of the weakness in median wage growth, these effects are likely more important in explaining wage inequality as a potent driver of median wage stagnation.

Appendix A: Literature overview

Exhibit A1

Literature review

Source Methodology and data • Timeline • Countries • Data type • Model	Key findings by main drivers	Supercycles and boom-bust	Rising and faster depreciation	Superstar effects and consolidation	Capital substitution and automation	Globalization and labor bargaining power
International Monetary Fund, "Understanding the downward trend in labor income shares," *IMF World Economic Outlook,* chapter 3, April 2017 • 1991-2014 for core analyses, longer series for selected variables • 35 advanced economies (AEs), 54 emerging markets and developing economies • Literature; CEIC database; OECD; IMF; World Input-Output database; EU KLEMS; Eurostat • Regression models	Decline in price of investment goods has largest effect in AEs (1/2 of decline in labor share), with industries having a higher degree of exposure to automation experiencing a higher decline				●	
	Trade integration leading to specialization toward capital intensive goods (and lower labor share) not relevant in AEs					●
	Participation in global value chains (imports for assembly and re-exports) and financial integration (external assets and liabilities) has significant impact in AEs (1/4 of decline in labor share)					●
	Policies (corporate tax) and institutions (unionization rate) have small negative effect only					●
Dongya Koh and Raül Santaeulàlia-Llopis, *Labor share decline and intellectual property capital,* Working Papers nb 927, 2016 • 1947-2013 • US • BEA • Benchmark labor share with current BEA accounting vs one that only considers depreciation and capital income from structures and equipment	Long run decline in labor share is partly driven by transition to a more intellectual property and products (IPP) capital intensive economy, with IPP depreciation and rising net IPP capital income accounting for most of the decline		●			
Loukas Karabarbounis and Brent Neiman, "The global decline of the labor share," *Quarterly Journal of Economics,* Volume 129, Issue 1, February 2014 • 1975-2012 • 59 countries • BEA; UN; OECD; EU KLEMS; PWT; WB • Regression models; theoretical labor share model with estimated elasticity of substitution using cross-country data	Decrease in relative price of investment goods due to IT technology and digital age induced firms to shift away from labor toward capital. It explains roughly half of the decline in labor share and dominates other effects such as increasing profits, capital-augmenting technology growth, and changing skill composition of labor force				●	
Michael W. L. Elsby, Bart Hobijn, and Aysegul Sahin, *The decline of the U.S. labor share,* Brookings Papers on Economic Activity, Fall 2013 • 1987-2011 • US • BEA, BLS (59 sectors) • Regressions with cross-industry data in equipment prices, import exposure, and union coverage rate	Limited support for substitution of capital for unskilled labor due to technical change				●	
	Offshoring of labor-intensive component of the US supply chain is the leading potential explanation for decline in labor share					●
	Evidence for institutional explanations based on unionization decline is weakly positive or inconclusive					●

Source: McKinsey Global Institute analysis

Exhibit A2

Literature review

Source Methodology and data • Timeline • Countries • Data type • Model	Key findings by main drivers	Supercycles and boom-bust	Rising and faster depreciation	Superstar effects and consolidation	Capital substitution and automation	Globalization and labor bargaining power
Matthew Rognlie, *Deciphering the fall and rise in the net capital share: Accumulation or scarcity?,* Brookings Papers on Economic Activity, Spring 2015 • 1950-2010 • US and 6 advanced economies (G-7) • National Accounts from Piketty and Zucman (2014), private or corporate sector • Net capital share over value added, comparison of housing sector vs other sectors	Net capital share is increasing because of the housing sector, and more particularly imputed rents to homeowners, which is influenced by neither globalization nor technology, but is the result of the limited quantity of available residential land and rising cost of residential investment	●				
Germán Gutiérrez, *Investigating global labor and profit shares,* SSRN Working Paper, 2017 • 1970-2014 (international analysis), 1987-2015 or shorter (US regressions) • US and 11 advanced economies • KLEMS, BEA (27 sectors for international analysis), CompNet, CompStat, BVD Orbis, US Census (54 sectors for US regressions) • Focus on non-financial business sectors, with exclusion of real estate sector for regressions; decomposition of capital share into required rate of return part and pure profit part as in Barkai (2016); US regressions with 6 main drivers with tests on gross, net labor share, and profit share	Decrease in labor share across most industries, with decrease in labor share and rise in pure profits					
	Labor share decline is concentrated in real estate in most countries, with US being an exception	●				
	Aggregate patterns consistent with market power and efficient scale of operation (proxied by firm markup and concentration)			●		
	Relevance of automation and capital-biased technical change for some sectors only, not for total economy (manufacturing, mining, and retail)				●	
	Other potential drivers of pure profits such as import competition, rising returns to housing capital, intangibles not relevant in general		●			●
Daron Acemoglu and Pascual Restrepo, *Modeling automation,* NBER, Working Paper No. 24321, 2018 • Theoretical model • Universal • Defined theoretical variables • Modeling of automation not as factor-augmenting technological change, but as process of machines replacing tasks initially performed by workers. Aggregate output is produced by combining services from a range of tasks	Use of machines instead of labor reduces the labor share in national income, decreases labor demand, and can reduce the equilibrium wage				●	
	Technologies threatening labor share are the ones that don't lead to major productivity breakthrough, but are good enough to be adopted				●	
	Importance of creation of new tasks in which labor still has a competitive advantage to sustain the labor share level				●	
	Increase in performance of automation in already automated tasks is similar to capital-augmenting technological change, and its effect on labor share depends on elasticity of substitution				●	
	Possible to have periods of fast automation, decrease in labor share, and capital accumulation even with lower than unity elasticity of substitution, as automation increases demand for capital and its rental rate				●	

Source: McKinsey Global Institute analysis

Exhibit A3

Literature review

Source Methodology and data • Timeline • Countries • Data type • Model	Key findings by main drivers	Supercycles and boom-bust	Rising and faster depreciation	Superstar effects and consolidation	Capital substitution and automation	Globalization and labor bargaining power
OECD, "Decoupling of wages from productivity: What implications for public policies?," *OECD Economic Outlook,* Volume 2012 Issue 2, 2018 • 1995-2013 • 24 OECD countries • Productivity and wages for non-financial private sector, OECD data and reference papers • Decoupling between productivity, median and average compensation; primary sector and housing excluded; review of recent OECD and external research including Schwellnus et al. (2018), Autor and Salomons (2018), and Autor et al. (2017)	Around half of the gap between median compensation and productivity is attributed to labor share decline, and half to wage inequality in average in 24 OECD countries, with the US having a slightly higher contribution of inequality					
	Decline in investment prices tends to reduce labor share by 1.7 percentage points in OECD countries, particularly in the 2000s				●	
	ICT technologies may have facilitated the emergence of superstar firms with very low labor share			●		
	Increase in global value chain brings about a decrease of the labor share of around 0.6 percentage point in OECD countries					●
	Effect of institutional framework depends on initial policy settings and time horizon: labor share is more robust in countries with • More high-skill workers • Competition-friendly product market policies (reduction in rents to capital owners outweighs substitution effect due to lower regulatory barriers to investment) • Lower minimum wages (initial positive effect of higher level but strong substitution effect in the long run)			●		●
	Effect of centralized bargaining is inconclusive; it can promote the transmission of productivity gains to wages, but could reduce wage setting flexibility of firms and productivity growth					●
Simcha Barkai, *Declining labor and capital shares,* working paper, London Business School, 2017 • 1984-2014 • US • BEA; National Income and Productivity Accounts (NIPA); Integrated Macroeconomic Accounts; OECD Tax Database; Tax Foundation; FRED; Moody's; US Census • Focus on non-financial corporate sector; capital share subdivided into capital costs share (capital stock times required rate of return on capital) and a pure profit share (remaining part of GVA); general equilibrium model; cross-industry regressions (750 NAICS) on link between labor share and concentration	Capital costs share has been decreasing even more than labor share as the drop in cost of borrowing (required rate of return) was only partially compensated by higher capital inputs					
	Profits share has increased dramatically from below 5% in mid-1980s to more than 15% in 2010s					
	Results robust to alternative borrowing costs and accounting for missing intangibles capital					
	Calibrated GE model shows that decline in competition can match findings			●		
	Decline in labor share is related to higher concentration at the 3 digit industry level, which is taken as evidence of a decline in competition			●		

Source: McKinsey Global Institute analysis

Exhibit A4

Literature review

Source Methodology and data • Timeline • Countries • Data type • Model	Key findings by main drivers	Supercycles and boom-bust	Rising and faster depreciation	Superstar effects and consolidation	Capital substitution and automation	Globalization and labor bargaining power
Robert Z. Lawrence, *Recent declines in labor's share in US income: A preliminary neoclassical account,* Working Paper 15-10,2015, Peterson Institute for International Economics • 1929-2014 (maximum for long run aggregates); 2000-2012 (shift-share analysis with revised data); 1987-2011 (shift share with unrevised data) • US • BEA; BLS; NBER-CES Manufacturing Industry Database; Jorgenson, Ho, and Samuels (2012) • Shift-share analysis (mix vs within effect decomposition) with no sector excluded (total economy); detailed review of literature on elasticity of substitution between capital and labor; methodology showing that declining labor share is compatible with capital and labor being complementary with effective capital-labor ratio declines; estimations of elasticity of substitution and size of factor-augmenting technical change at the sectorial level	Manufacturing, mining and quarrying, and IT services account for more than 80% of the decline in labor share, with education, healthcare, and social assistance being the main sector contributing positively (2000-2012, data revised, taking into consideration R&D as investment)					
	Manufacturing alone—mainly petroleum and coal, chemical products, and computer and electronics)—explains 88% of the decline in labor share, followed by finance, insurance, real estate, rental and leasing (27%) (1987-2011, data not revised)					
	Elasticity of substitution estimated to be far below one, with strong, labor-augmenting technical change for the total economy, manufacturing, and most of its subsectors				●	
	Compatible with fact that while capital-labor ratios have risen, effective ones (adjusted for technological progress) have fallen				●	
	Seems that improvements in equipment and software increase product of labor more than capital, which is consistent with rise in average compensation and rates of return in sectors driving most of the labor share decrease				●	
	Weakness of investment and capital formation could be the cause for decreasing labor share				●	

Source: McKinsey Global Institute analysis

Appendix B: Sources and methodology

Our analysis is based on industry-level data from OECD STAN, July 2018 release. It extends from 1998, the first year for which granular data are available for the sectors in focus for the United States, to 2016, the last year available. This happens to be the period with the fastest decrease in labor share. The industry breakdown is based on the International Standard Industrial Classification of all economic activities (ISIC Rev. 4). We chose to use OECD data as opposed to data from US statistical agencies directly since it helps enable compatibility of data and replication to other countries for further research. It also allows us to use OECD measures of net capital stock at the industry level. As a rule of thumb, we always use the most granular data available. This means our work includes 68 industries in the analysis of the mix and within effect across sectors, and 43 industries in the DuPont decomposition. The lower availability of industries in the latter case is caused by limited data on capital stock at the granular level. IHS Markit Comparative Industry Service (April 2019 release) data were used for the analysis described in Box 4, "Long-run patterns in capital share," where we extend the mix and within effect analysis back to 1980 as a robustness check.

The labor share is adjusted for self-employed income following the standard approach used in the literature by multiplying it with total employment over number of employees at the most granular industry level. It implicitly assumes that self-employed and employed workers earn the same wage. This adjustment is then reflected in gross and net capital share as well, following calculations described in footnote 1 of Exhibit 4, assuming that the self-employed income impacts net profits but has no impact on depreciation. Our analysis is based on value added at basic prices, which is gross output value adjusted for intermediate consumption used for production. It includes total labor compensation, gross operating surplus, and self-employed income as well as taxes less subsidies on production.[44] Considering taxes and subsidies is not central to our results, and one can assume that the capital share is the mirror image of the labor share.[45]

We calculate the total contribution of every sector to the increase in capital share by weighting the change by its share of nominal value added (Exhibit B1). Then we decompose it into a "within" and "mix" effect. The within effect can be interpreted as the impact of the change in capital share within each sector to overall economy capital share change, while the mix effect captures the fact that growing or shrinking sectors—in value added—affect the capital share due to the fact that their own capital share differs from the one of the total economy. Our approach is based on a standard decomposition, with two additions. First, for every sector, we adjust the capital shares for the average value for the total economy over the entire sample (1998–2016).[46] This enables us to avoid inflating the mix effect: we want to strike a balance between capturing the evolution of the relative sectoral value-added size in the economy and the structural, long-run differences in capital shares compared with the total economy.[47] Second, among the different options for disentangling the mix from the within effect, we chose an intermediary one, where we take the average of the capital share in the first and second period.[48]

[44] Taxes and subsidies on production don't include value-added taxes, which are part of taxes less subsidies on products (and not production) used in value added at market prices, which is not available at the sector level.

[45] The size of taxes is negligible and was relatively stable over time. For the total economy, taxes less subsidies on production accounted for only 3.6 percent of value added at basic prices in 2012–16, a slight increase from the level of 3.3 percent recorded in 1998–2002. Out of the 68 sectors used in the mix analysis, only four have a share of taxes less subsidies over value added exceeding 10 percent, with no clear trend over time. The relative contribution of the sectors to the increase in net capital share with and without considering taxes is similar for the 12 sectors in focus.

[46] The choice of the time period average used for demeaning has negligible influence on our results.

[47] Demeaning affects only the mix effect, not the within effect, and only at the sector level, not in aggregate. Importantly, it modifies the total effect (sum of mix and within). Due to demeaning, sectors with very high net capital share level to the total economy, such as mining and real estate, have a lower mix effect, while sectors with low net capital share, such as computer manufacturing, have a higher mix effect. While the relative size of the contribution of sectors is affected by this adjustment, our results don't depend on this methodological choice.

[48] Multiplying the difference between the value-added share in the mix effect with the last period gives us an upper bound for the mix effect, while multiplying it with the first period is a lower bound. There is no methodological reason for choosing the former or latter option, and taking the average between both time periods allows us to avoid this arbitrary choice.

Exhibit B1

We used an analytical formulation to decompose the change in capital share.

Our methodology decomposes the change in capital share into mix and within components, with adjustment for total economy value and averaging between the initial and last period

Capital share decomposition

Capital share adjusted for mean value (total economy)

$$\overline{c}_i = \frac{Ki}{Yi} - \frac{\sum Ki}{\sum Yi} = \frac{Ki}{Yi} - \left(\frac{\overline{K}}{Y}\right)$$

Value-added share

$$y_i = \frac{Yi}{\sum Yi}$$

Change in aggregated capital share

$$\sum_i \overline{c}_{i,t+1} y_{i,t+1} - \sum_i \overline{c}_{i,t} y_{i,t} =$$

Selected methodology

$$\underbrace{\sum_i \frac{\overline{c}_{i,t+1} + \overline{c}_{i,t}}{2} \left[y_{i,t+1} - y_{i,t}\right]}_{\text{Mix effect}} + \underbrace{\sum_i \frac{y_{i,t+1} + y_{i,t}}{2} \left[c_{i,t+1} - c_{i,t}\right]}_{\text{Within effect}}$$

Where …

i = a sector

t = a time period

Y = nominal value added

y = value added share of a particular sector compared to the total economy

K = (net) operating surplus

$\overline{c}$ = (net) capital share, or the ratio of K to Y

c = capital share adjusted for the total economy average value over the sample

Source: McKinsey Global Institute analysis

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