Commentary: Understanding Weak Capital Investment: The Role of Market Concentration and Intangibles

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Since the late 1990s, U.S. industries have become more concentrated and the profit margins of U.S. businesses have increased. At the same time, private nonresidential fixed investment and productivity growth have been weak. I review the facts and I discuss the controversies.

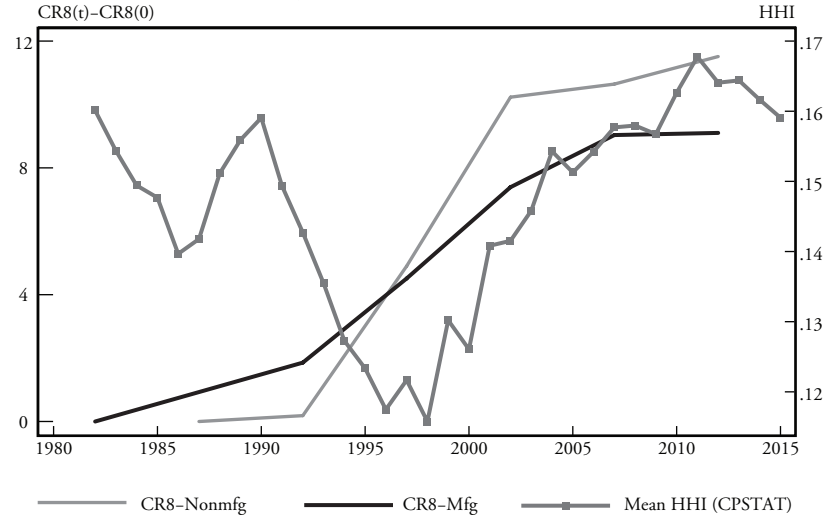
I. Concentration

CEA (2016) and Grullon et al. (2016) are the first papers to document the broad increase in profits and concentration. Decker et al. (2015) argue that, whereas in the 1980s and 1990s declining dynamism was observed in selected sectors (notably retail), the decline was observed across all sectors in the 2000s, including the traditionally high-growth information technology sector. Gutiérrez and Philippon (2017a) take into account foreign competition and study the link between concentration and investment. Autor et al. (2017) study the link between concentration and the labor share. An important issue in the literature is the measurement of markups and excess profits.

I.i. Facts

Chart 1 shows the rise in concentration in the U.S. economy using eight-firms concentration ratios (CR8) from U.S. Census data separately for manufacturing and nonmanufacturing industries, and Hirschman-Herfindahl indexes (HHI) from Compustat. Chart 1

Chart 1
Industry Concentration Measures



Notes: Annual data. Chart shows the weighted average of three measures of Herfindahls. The Raw Compustat HHI is the sum of squared Compustat market shares. The Compustat share-adjusted HHI adjusts for the Compustat share of sales. The Import and Share adjusted HHI is based on FW Herfindahls for Manufacturing and Compustat share-adjusted Herfindahls for nonmanufacturing.

shows the change in CR8 (left axis) and the level of HHI (right axis). We have more granular data for the manufacturing sector. We can perform the analysis with 360 manufacturing industries (NAICS level 6). In manufacturing, CR8 went up 9 points, from 50 percent to 59 percent. For nonmanufacturing industries we can perform the analysis at NAICS level 3, which has a bit more than 70 industries. With this wider definition the CR8s are smaller, but the increase is large, from 15 percent to 26 percent. Compustat's HHI suggest a similar increase in concentration. The timing of the increase is slightly different. In the Census data is occurs mostly in the 1990s, in Compustat mostly in the 2000s. Recall that Compustat covers only publicly listed firms. The declining HHI in the early 1990s in Compustat reflects the quick increase in the number of listed firms.

I.ii. Controversies

I.ii.a. Controversy: An Industry Is Not A Market

This is the traditional complaint from industrial economics and antitrust. Concentration refers to a market. Industrial organization

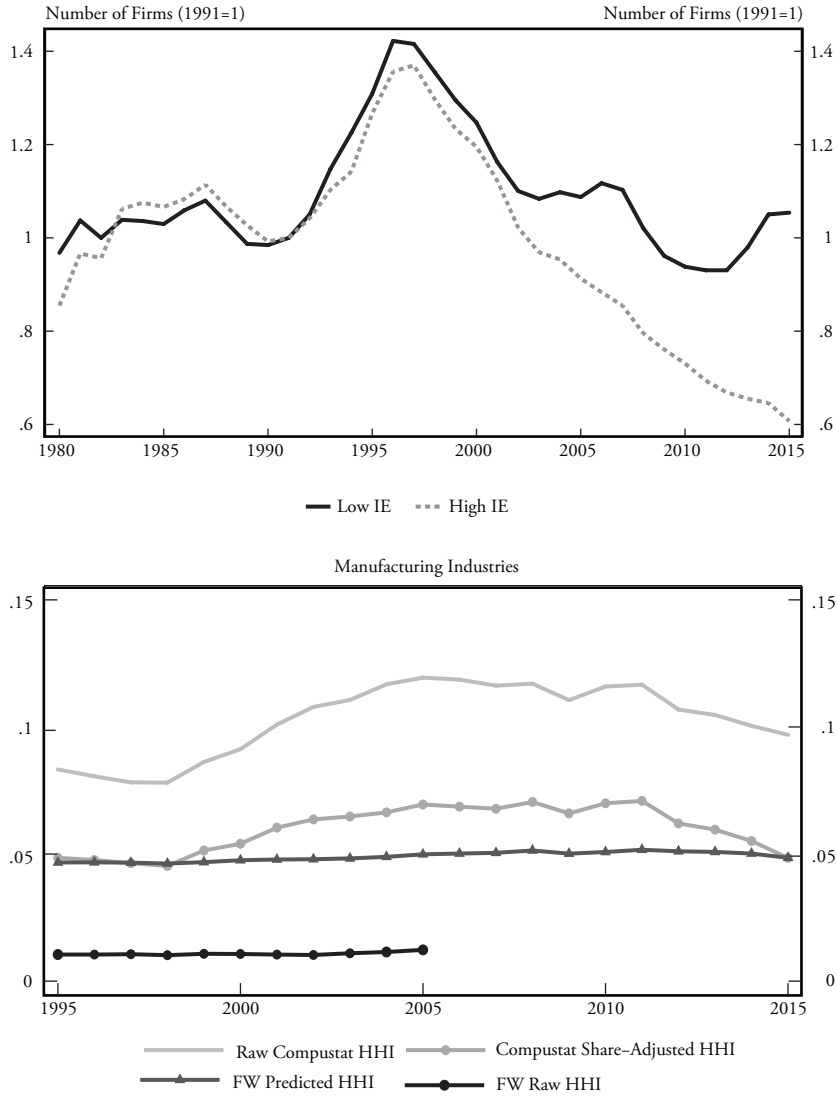
(IO) economists argue that measures of concentration using NAICS (or SIC) codes are useless because most markets are local while these measures treat the entire U.S. economy as one market. Shapiro (2017) makes fun of the "regular drumbeat in the press reporting on a supposed decline of competition in the United States" and explains that "Industrial organization economists have understood for at least 50 years that it is extremely difficult to measure market concentration across the entire economy in a systematic manner that is both consistent and meaningful." He does not consider the kind of data shown in Chart 1 "to be informative regarding overall trends in concentration in well-defined relevant markets that are used by antitrust economists to assess market power, much less trends in competition in the U.S. economy."

This criticism is about measurement. If the measures are indeed useless, they will be uncorrelated with other measures that we are interested in. As it turns out, these measures of concentration are significantly correlated with excess profits, residuals from investment-Q equations, etc. Even these broad, overly aggregated and noisy measures contain useful information so the IO complaint is valid in theory but not overwhelming in practice.[1]

I.ii.b. What About Foreign Competition?

Trade economists make essentially the exact opposite point from IO economists: they argue that Chart 1 is too narrow. We should take into account foreign competition. It is hard to disagree with this point. Consider for instance the China shock in manufacturing (Autor et al. 2016; Pierce and Schott 2016). Chart 2 (top panel) shows the normalized number of firms in industries with high and low Chinese import penetration. Both groups have the same pre-existing trends, including during the dot-com boom, but start to diverge after 2000. Industries exposed to China experience a 40 percent relative decline in the number of firms. In that case, concentration and competition are positively correlated.

Chart 2
Number of Firms by Chinese Exposure and Concentration in Manufacturing



Notes: Annual data. Firm data from Compustat; import data from UN Comtrade. Manufacturing industries only, split into "high" (above-median) and "low" (below-median) exposure based on import penetration from 1991 to 2011.

The good news, however, is that we can build on the work of Feenstra and Weinstein (2017) to adjust the concentration measures. This is what Gutiérrez and Philippon (2017a) have done.[2]

Chart 2 (bottom panel) shows that, controlling for imports, the concentration of manufacturing industries remained largely stable. By contrast, concentration of nonmanufacturing industries increased significantly. We thus get our first caveat: trade-adjusted concentration has increased in U.S. industries that are not exposed to foreign competition. In other words, we are talking (mostly) about a domestic issue.

I.ii.c. What Does Increasing Concentration Mean?

The interpretation of the increase in concentration is controversial. For instance, Furman (2015) argues that the rise in concentration suggests "economic rents and *barriers to competition,*" while Autor et al. (2017) argue almost exactly the opposite: they think that concentration reflects "a winner take most feature" explained by the fact that "consumers have become more sensitive to price and quality due to *greater product market competition.*"

I therefore find it useful to specify three hypotheses:

1. Hypothesis H-EFS (efficient scale)

(a) concentration reflects increasing efficiency of industry leaders. According to this view, concentration is good news. It should be linked to higher profits and faster productivity growth. It's the Walmart 1990s view embraced by Autor et al. (2017).

(b) A particular version of H-EFS is leaders are just better with intangible assets. This is the view of Crouzet and Eberly (2018a). It predicts higher profits, higher intangible investment by leaders, and higher productivity growth in concentrating industries.

2. Hypothesis H-CONS (consolidation)

(a) concentration reflects consolidation in response to foreign competition or in declining industries. This view predicts

that profit margins are squeezed, which leads to mergers. Some mergers among airlines were justified in that way. We have shown above that trade-induced consolidation is an important fact in manufacturing.

3. Hypothesis H-DDC (decreasing domestic competition)

(a) concentration reflects barriers to entry and entrenchment of leaders in many U.S. industries.

(b) it predicts higher profits but lower investment in concentrating industries.

The hypotheses are not mutually exclusive. Intangible assets can create efficiency gains and barriers to entry at the same time. This is the view of Crouzet and Eberly (2018b). In all likelihood, therefore, the truth is a mix of these hypotheses with varying degrees of relevance across industries and time periods.

II. Profits

Furman (2015) shows that "the distribution of returns to capital has grown increasingly skewed and the high returns increasingly persistent" and argues that it "potentially reflects the rising influence of economic rents and barriers to competition."[3] The best measure of excess profits is due to Barkai (2017), who estimates directly the required return on capital and finds a significant increase in excess profits.

II.i. Facts

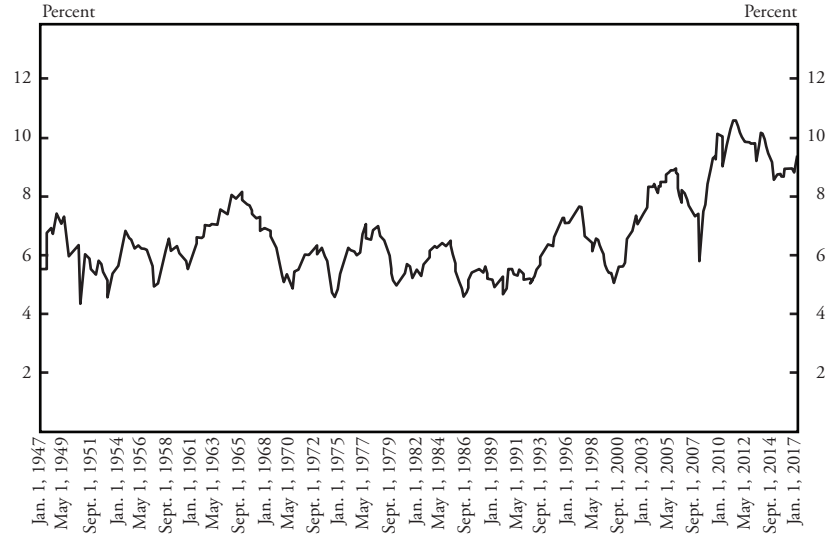
The fact is clear in Chart 3.

II.ii. Controversy

High measured profits can mean two things, and our discussion below will focus on this controversy.[4]

- These profits are rents
- Theses profits are returns to a new kind of capital (intangible) which is large and badly measured

Chart 3
Corporate Profits over GDP



Notes: Corporate Profits over GDP. Corporate Profits After Tax with Inventory Valuation Adjustment (IVA) and Capital Consumption Adjustment (CCAdj), Billions of Dollars, Quarterly, Seasonally Adjusted. Source: FRED.

III. Investment

Gutiérrez and Philippon (2017b) show that the recent weakness of investment is not explained by low expected productivity growth, low expected demand, or financial frictions. Alexander and Eberly (2016) emphasize the role of intangible investment. Lee et al. (2016) find that capital stopped flowing to high Q industries in the late 1990s.

III.i. Facts

In my figures investment always includes intangible investment, as defined by the Bureau of Economic Analysis.

III.i.a. Investment Is Low

Business investment has been weak relative to measures of profitability, funding costs, and market values since the early 2000s. The top panel in Chart 4 shows the ratio of aggregate net investment to net operating surplus for the nonfinancial business sector, from 1960 to 2015. The bottom panel shows the residuals (by year and cumulative) of a regression of net investment on (lagged) Q from 1990

Chart 4
Net Investment, Profits and Q-Residuals

Notes: Annual data from U.S. Flow of Funds accounts. Net investment, net operating surplus for Non Financial Business sector; Q for Non Financial Corporate sector.

to 2001. Both charts show that investment has been low relative to profits and Q since the early 2000s. By 2015, the cumulative underinvestment is large, around 10 percent of capital.

III.i.b. The Investment Gap Comes from Concentrating Industries.

Chart 5 shows that the capital gap is coming from concentrating industries.[5] The top panel shows the actual Herfindahl indexes. The bottom panel shows the cumulative investment gaps relative to Q for the top (solid) and bottom (dotted) concentrating industries.[6] The Herfindahl index for the bottom 10 turns out to be rather stable over time, and investment remains in line with Q. The entire aggregate investment gap comes from concentrating industries.

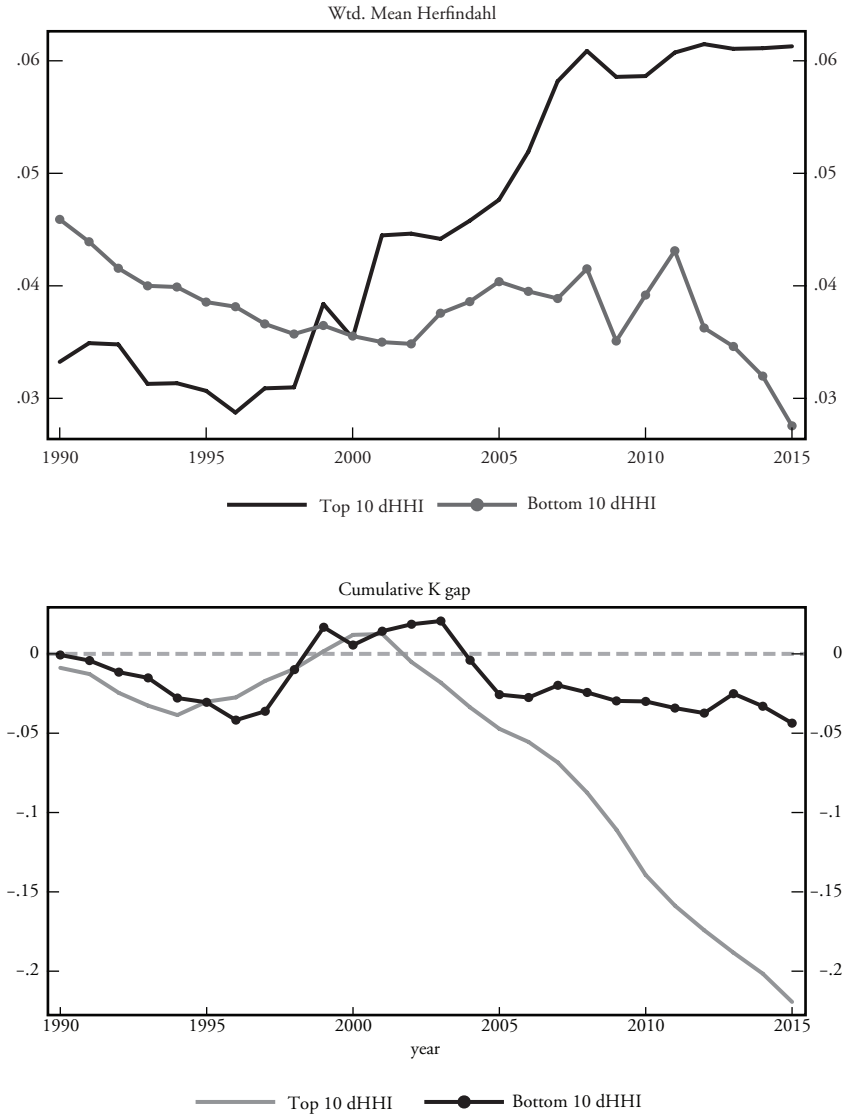
III.ii. Controversy: Is it Simply Unmeasured Intangible Investment

Intangible assets have become more important. Chart 6 reminds us of two important features of intangible asset. At the firm level it is important to understand that most intangible assets come from goodwill. In the aggregate, intangibles matter a lot more for investment than for capital, because they depreciate faster than tangible assets.

Gutiérrez and Philippon (2017b) study tangible and intangible investments separately.[7] High intangible industries exhibit lower "measured" investment and high-intangible firms invest less in the cross section. The rise of intangibles appears to explain between a quarter and a third of the observed investment gap. Even after controlling for intangible investment, however, large and persistent negative residuals remain after 2000—time effects that are correlated with increased concentration and increased quasi-indexer ownership. The fact is that *both* tangible and intangible investments have been weak.

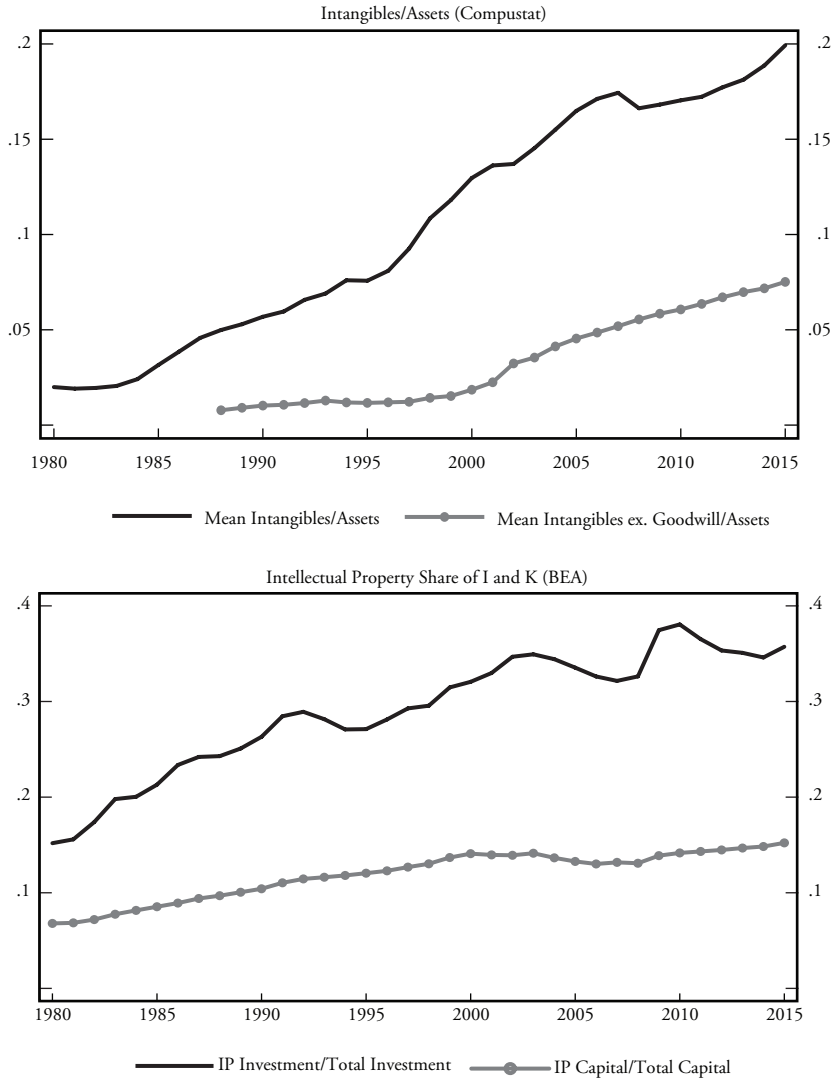
Crouzet and Eberly (2018b) test the link between the share of intangible and four variables: investment gaps; profits; market shares; productivity. They find that the intangible share explains some of the investment gap, and that high intangible firms are more profitable.[8] For the other variables the results are sensitive to excluding goodwill or using the PT measure for intangible. For productivity, since high intangible firms tend to hire more highly educated people than their

Chart 5
Cumulative Capital Gap for Concentrating and Nonconcentrating Industries



Notes: Annual data. Top plot shows the weighted average import adjusted Herfindahl for the 10 industries with the largest and smallest relative change in import-adjusted Herfindahl. Bottom plot shows the cumulative implied capital gap (as percent of capital stock) for the corresponding industries. See text for details.

Chart 6
Intangible Assets, Across Firms and Industries



Notes: The top panel includes all firms incorporated in the United States from Compustat. The bottom panel is based on figures reported by the Bureau of Economic Analysis.

peers, we would need a good adjustment for labor quality, which is difficult at the firm level.

IV. Conclusion

IV.i. About the United States

The evidence is inconsistent with optimistic EFS hypothesis. According to H-EFS, leaders should increase investment in concentrating industries, reflecting their increasing relative productivity. At the firm level, however, we observe the opposite. Industry Leaders account for the increased profit margins and for the investment gap in tangible and intangible investments.

Similarly, according to H-EFS, concentration should lead to productivity gains at the industry level, as high productivity leaders expand. It is an interesting prediction because it has happened in Retail Trade during the 1990s. To test this idea, Gutiérrez and Philippon (2017a) study the relationship between changes in concentration and changes in industry TFP.[9] Table 1 shows that concentration and TFP growth are positively related over the 1997 to 2002 period but not after. In fact, the relationship is negative in the 2007 to 2012 period. Columns 4 and 5 show that the results are similar (and more significant) when we broaden the scope to all industries in our sample.

A key point from Crouzet and Eberly (2018b) is that intangible assets can create efficiency gains and barriers to entry at the same time. One way to summarize their results is that the optimistic H-EFS seems warranted for the retail sector (at least so far, since what was true for Walmart might not be true for Amazon), and that the pessimistic H-DDC seems warranted for health. From the evidence in Gutiérrez and Philippon (2017a), H-DDC also seems to apply to many sectors outside manufacturing. For manufacturing, intangible investment reflects increasing innovation by U.S. firms in response to foreign competition. Finally, the High-tech sector is a mixed bag of rents and efficiency.

Table 1
Industry Regressions: Concentration vs. TFP

	(1)	(2)	(3)	(4)	(5)
	Δ TFP(t, $t-5$)			Δ TFP(t, $t-5$)	
	97-02	02-07	07-12†	90-00	00-14†
ΔCensus CR8(t, $t-5$)	**1.456**** **[0.312]**	0.237 [0.652]	−1.35 [0.871]		
CP CR8(t, $t-5$)				**0.461*** **[0.198]**	**−0.208+** **[0.115]**
Sectors	Manufacturing			All	
Granularity	NAICS-6			KLEMS	
Observations	469	469	299	86	129
R^2	0.045	0	0.008	0.061	0.025

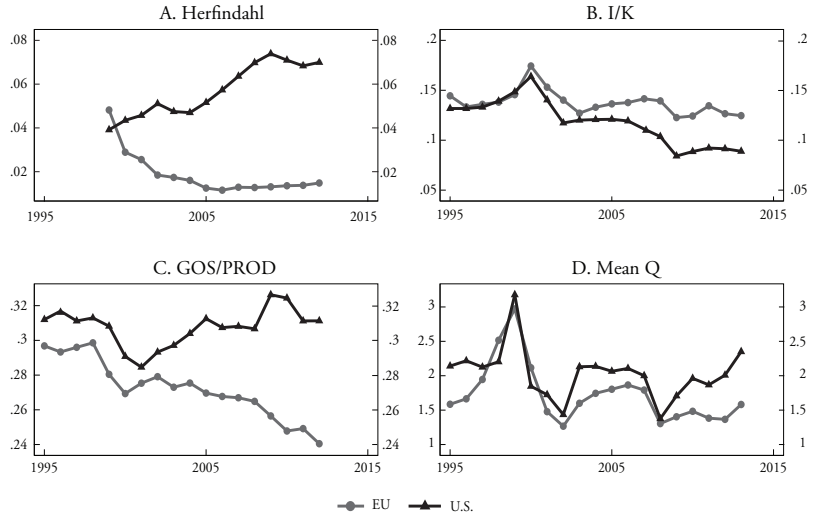
† TFP change to 2011 in column 3, and to 2014 in the last 5Y period of column 5 due to data availability
+ p<0.10
* p<0.06
** p<.01
Notes: The table shows the results of industry-level OLS regressions of contemporaneous changes in TFP and Concentration over the periods specified. Observations are weighted by value added. Columns 1-3 include NAICS-6 manufacturing industries, with TFP from NBER-CES database. Columns 4-5 include all industries in our sample, with TFP from U.S. KLEMS. Standard errors in brackets.

IV.ii. United States vs. Europe

To conclude, let me broaden the analysis outside the United States. One of the more striking facts is that rising concentration, declining labor shares and rising profits are U.S. specific phenomena. In Europe, we observe none of these trends. Depending on the details of data construction, Gutiérrez and Philippon (2018) show that concentration is either flat or decreasing in Europe. Many goods and services (airline tickets, broadband internet, cell phone plans) have become cheaper in Europe than in the United States. Chart 7 compares the weighted average (domestic) Herfindahl, investment rate, operating margin and Q for the five industries that concentrate the most in the United States. We exclude the Manufacturing-Textiles industry even though it exhibits a rise in domestic concentration because the increase is primarily due to foreign competition.

Concentration, profits and Q increased in the United States, while investment decreased. By contrast, concentration decreased in Europe, and investment remained (relatively) stable despite lower profits and lower Q. These industries use the same technology and are exposed to

Chart 7
Comparison with EU for Top 5 Concentrating Industries in U.S.



Notes: Chart based on the top 5 concentrating industries in the United States. These industries are Information Telecom, Arts and Recreation, Wholesale and Retail trade, Other Services and Information Publishing (which includes software). Panel A plots the weighted average Herfindahl across these industries, weighted by sale. For the EU, each industry's Herfindahl is the weighted average Herfindahl across countries. Panel B plots the weighted average investment rate, weighted by the capital stock. Panel C plots the the weighted average ratio of Gross Operating Surplus to Production. Panel D plots the weighted average mean Q, by assets. All weights are based on the U.S. share of industries to control for differences in industry sizes across regions.

the same foreign competition. H-EFS therefore cannot explain these facts. On the other hand, these trends are consistent with DDC since antitrust enforcement in Telecom and Airlines has indeed become more aggressive in Europe than in the United States in recent years (see Faccio and Zingales (2017) for Telecoms, *Economist* (2017) for Airlines, and Gutiérrez and Philippon (2017c) for all industries).

Endnotes

[1]Another complaint is about the interpretation of the increase in concentration, namely that it can reflect expansion by efficient firms into new geographic regions. That critique is fair, but it is just a particular case of the EFS hypothesis that I discuss later.

[2]Feenstra and Weinstein (FW) use Census Herfindahls for the U.S. and import data for foreign countries. The replication files available at the author's website include Herfindahls at the country- and 4-digit Harmonized System (HS-4) level, from 1992 to 2005. We start from these Herfindahls, aggregate them and map them to BEA segments. We then extend the series to cover 1990 to 2015 by regressing FW Herfindahls on Compustat Herfindahls and share of sales. The detailed calculations are described in the appendix. Outside Manufacturing, neither Census nor foreign Herfindahls are available—so we have to use Compustat. We start with the "raw" Herfindahls from Compustat and adjust them to account for the domestic coverage of Compustat as well as the share of imports. Consider an industry with x firms in Compustat and *N* firms globally, all with equal shares of the U.S. market. The Compustat share of output is $s^{CP} = \frac{x}{N}$, and the Compustat-based Herfindahl $HHI^{CP} = \frac{1}{x}$. Under these assumptions, the adjusted Herfindahl can computed as $HHI_t^k = \frac{1}{N} = HHI_{kt}^{CP} \times s_{kt}^{CP}$ where s_{kt}^{CP} is the share of Compustat sales in U.S. output plus imports. We refer to this measure as the "Compustat share-adjusted" Herfindahl (HHI_{kt}^{CPadj}). For service sectors, import data is not available but these are typically small, so we set them to zero.

[3]Furman (2015) also emphasizes the weakness of corporate fixed investment and points out that low investment has coincided with high private returns to capital, implying an increase in the payout rate (dividends and shares buyback).

[4] There is also a debate about markups versus profit margins. This essentially boils down to what we define a fixed versus variable costs. The problem is that, in our large data sets (Census, Compustat) we have neither firm level prices nor firm level marginal costs. De-Loecker and Eeckhout (2017) estimate markups using the ratio of sales to costs of goods sold, which means $\frac{s}{COGS} = \frac{PROFITS+COGS+SG\&A}{COGS} = 1 + \frac{PROFITS+SG\&A}{COGS}$ Since most intangible expenditures show up in SG&A, this measure moves mechanically with the relevance of intangibles. More generally, Lev and Gu (2016) show that financial accounts have become less informative precisely as SG&A and R&D have become more important. Empirically, this matters for the timing and magnitude of the change in market power. If we focus on profits, we conclude that it starts around 2000, that aggregate profits over GDP go up by 3 points, from 6 percent to 9 percent, and that, among listed firms, payouts (dividends and buybacks) over assets go up by 2 or 6 points, from 3 percent to more than 5 percent. COGS-based measures,

on the other hand, produce linear trends from 1980 that simply track the growth of intangible assets. They also imply extremely large markups.

[5]We define concentrating industries based on the relative change in import adjusted Herfindahls from 2000 to 2015. The top 10 concentrating industries include Arts, Health other, Inf. motion, Inf. publish and software, Inf Telecom, Transp pipeline, Transp truck, Min exOil, Retail trade, Transp_air. We exclude Agriculture because Compustat provides limited coverage for this industry.

[6]For each group, the capital gap is calculated based on the cumulative residuals of separate industry-level regressions of net industry investment from the BEA on our measure of (lagged) industry Q from Compustat. To be specific, each line is computed as follows: we first compute the residuals from separate industry-level regressions of net investment on (lagged) mean industry Q, from 1990 to 2001. Then, we average yearly residuals across the industries with the 10 largest and 10 smallest relative changes in import-adjusted Herfindahls from 2000 to 2015. Last, we compute the cumulative capital gap by adding residuals from 1990 to 2015, accounting for depreciation.

[7]Compustat data follow GAAP. Under GAAP, firms report stock and flow measures of tangible capital in the Property, Plant and Equipment (PP&E) and Capital Expenditures (CAPX) line items. Internally created intangibles are expensed on the income statement and almost never appear on the balance sheet—these include R&D and advertising expenses, for example. Externally created (i.e., acquired) intangible assets are capitalized and reported in the Intangible Assets line item. These include Goodwill and Other (identifiable) Intangible Assets such as patents and software. Peters and Taylor (2016) (PT for short) estimate firm-level intangible capital by combining estimates of internally and externally-created intangibles. For the former, they follow Corrado and Hulten (2010) in using granular investment and depreciation assumptions on the R&D and Sales, General & Administrative (SGA) line items to capitalize R&D as well as "expenditures on product design, marketing and customer support, and human capital and organizational development." For the latter, they use the balance sheet measure of externally created intangibles directly. Because it includes nonidentifiable assets such as Goodwill, marketing and human capital, PT's measure of intangible capital is broader than that of National Accounts. It results in higher capital estimates. Our conclusions are robust to excluding Goodwill from PT's measure of intangible capital.

[8]I use profits as a dependent variable since the DLE markup measure is itself a proxy for intangible share of cost so it does not seem like a valid test.

[9]At NAICS Level 6 manufacturing industries using productivity measures from the 2017 release of the NBER-CES database (which contains data up to 2011), and for all U.S. industries using KLEMS at NAICS Level 3 industries. The number of observations decreases in column 3 due to substantial changes to NAICS

Level 6 categories between NAICS 2007 and NAICS 2012. Results before 2007 are robust to considering only those industries with consistent segments from 1997 to 2012. In unreported tests, we find a negative and significant coefficient when considering the 10-year period from 2002 to 2012

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