Concerns About Concentration

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ABSTRACT

Recent reports that document increases in aggregate concentration measures and the correlation of concentration with a variety of other economic outcomes—including rising profit rates and a declining labor share—have led to great concern about the health of competition in the United States and global economies. This memo attempts first to clarify evidence on concentration trends in product and labor markets and to highlight significant measurement and interpretation challenges for aggregate studies of concentration. I then review the state of U.S. competition policy, focusing on impediments to rigorous enforcement of both merger policy and limits on exclusionary behavior. Finally, I suggest potential policy reforms that would promote competition, and describe some of the promises and pitfalls of these approaches.

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1. Introduction

There has been an explosion of concern in recent years about the state of competition in the United States and global economies. Media reports have highlighted growing concentration across industries and the dominance of large digital platforms;[1] government agencies and non-governmental organizations have weighed in on the state of competition;[2] economic researchers have documented trends in aggregate concentration measures and the correlation of concentration with a variety of other economic outcomes, including rising profit rates and declining labor share of income;[3] and some politicians have taken up calls for policy changes to invigorate antitrust enforcement, regulate dominant firms, or even break up large tech companies (Graham, 2019). These debates extend to labor markets as well as to product markets, with an increasing body of research exploring labor market power, or so-called "monopsony."[4]

In this memo I first summarize recent evidence on concentration trends in product and labor markets, highlighting significant measurement and interpretation challenges for aggregate studies. I then briefly discuss U.S. competition policy, focusing on challenges to rigorous enforcement of both merger policy and what antitrust practitioners call "unilateral conduct" (such as monopolization or exclusionary behavior). Finally, I suggest potential policy reforms to preserve or increase competition, describing some of their promises and pitfalls.

2. Industry Concentration: What Can We Make of Reported Trends?

2.1 Issues in the Measurement of Industry Concentration

There are dozens of recent studies attempting to measure economy-wide changes in industry concentration over the past several decades. Many of these studies then relate the measured changes in concentration to outcomes such as corporate profits, markups, or labor share. The authors of these studies use a variety of different data sets and methodologies to measure concentration, some more convincing than others. I

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1   For example, "Too Much of a Good Thing" (2016); "The Next Capitalist Revolution" (2018); Porter (2016); Francis and Knutson (2015); Ip (2019).

2   For example, Council of Economic Advisors (2016a, 2016b); "1st Joint IMF-OECD-World" (2018); Bajgar, Berlingieri, Calligaris, Criscuolo, and Timmis (2019); "The Rise of Corporate" (2019).

3   A very small sampling includes Autor, Dorn, Katz, Patterson, and Van Reenen (2019), Covarrubias, Gutiérrez, and Philippon (2019), Ganapati (2019), Grullon, Larkin, and Michaely (2018), Gutierrez and Philippon (2018), Hsieh and Rossi-Hansberg (2019), Rossi-Hansberg, Sarte, and Trachter (2018). See also Philippon's brief for this forum.

4   See Azar, Marinescu, and Steinbaum (2017); Azar, Marinescu, Steinbaum, and Taska (2018); Benmelech, Bergman, and Kim (2019); Prager and Schmitt (2019); and Rinz (2018).

begin this discussion by laying out some principles to guide judgement about which measures of industry concentration are likely to yield the most meaningful statistics:

(i) Industries should be defined narrowly.

Economy-wide concentration studies typically use the North American Industrial Classification System (NAICS) or Standard Industrial Classification (SIC) codes to define industries, with levels of aggregation that range from very broad one- or two-digit sectors ("Manufacturing") to more narrow four- (SIC) or six-digit (NAICS) industry-specific codes ("Breakfast Cereal Manufacturing").[5] Aggregations less specific than the four-digit SIC industry code are almost surely too expansive to provide insight into anything beyond the question of whether large firms in broad sectors are getting larger. As an example, the NAICS three-digit "Food Manufacturing" industry comprises manufacturers of breakfast cereal, chocolate and confectionary, dog and cat food, and animal slaughterhouses, among many, many others. It is difficult to think of what one could learn from changes in firm revenue shares, let alone concentration, across this mix of activities.[6] The specificity of four-digit SIC or six-digit NAICS codes generally produces more interpretable industry definitions, though even these are rarely well-defined markets from a competitive standpoint.

(ii) Measures of revenue shares should be built up from establishment data, not from assignment of top-line, firm-level sales.

Some studies in this literature rely on firm-level databases, such as *Compustat*, that report a primary industry code for a firm, typically at a four-digit SIC level. The assignment of all of a firm's revenue to one code in most cases systematically biases measures of industry concentration upward.[7] It is much more accurate to measure industry revenues in the United States using the establishment level data produced by the Economic Census.[8]

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5   See Appendix A1 for examples. Some data providers append additional digits to the SIC or NAICS codes to create finer product level distinctions. While not part of the official classification system, this may allow finer gradations in classification.

6   While overly broad levels of aggregation likely on average understate concentration in true markets, they are uninformative with respect to concentration levels in any particular market. Moreover, *changes* in concentration may reflect compositional changes in industry mix without *any* change in the concentration of any individual market.

7   This is because many firms, particularly the largest ones, operate across several different industry segments. For instance, Autor et al. (2019) report that in 2012, the largest firm in a given four-digit industry operates in an average of nine other four-digit industries (down from 13 in 1982), and one-quarter of top four firms in one industry are among the largest four firms in another four-digit industry.

8   Some studies have used establishment-level data available from NETS, a privately produced data set; see e.g., Rossi-Hansberg et al. (2019). See Bajgar et al. (2019) for a discussion of the myriad problems with Orbis, used for many studies of European Union concentration.

(iii) Concentration measures should be based on the universe of firms, not only large or publicly traded firms.

Economic activity in many small and privately held firms may be missing in databases such as Orbis or Compustat, which rely on publicly reported financial data, such as 10-Ks, that privately held firms may not disclose. If the total commerce in these firms is significant, individually or in the aggregate, statistics excluding their activities may be misleading and will distort changes when the companies sampled change over time. This is especially problematic for studies of European concentration based on Orbis data, which expanded coverage of small and midsize European companies over time.

(iv) Concentration measures should reflect the size distribution of firms.

Industrial organization economists and antitrust practitioners prefer the Hirschman-Herfindahl Index, or HHI, which is the sum of squared market shares of all firms. Higher HHIs reflect more concentrated revenue, with an upper limit of 1 (or 10,000, if shares are measured as 0–100%) for monopoly. This provides more information about revenue distribution than concentration ratios, which are the revenue share accounted for by the largest N firms (commonly four or eight, denoted as CR4 or CR8). For example, a CR8 of 80% could reflect one firm with a 75% share, or eight firms with 10% shares, with very different implications for market structure. The HHI would distinguish between these situations.

(v) Concentration measures should reflect the appropriate geographic scope of a given product market.

This is aspirational and is virtually never satisfied in aggregate studies of concentration. Almost all studies apply a single geographic aggregation, typically national, to all industries. This is too narrow for markets with globally traded goods, such as aircraft, cement, or petroleum, and much too broad for markets with locally delivered goods and services, such as scheduled airline service between cities, concrete, or retail gasoline. Furthermore, to the extent that imports or exports are important in a given market, measures built up from sales only by U.S. entities could have severe mismeasurement. This is also problematic for firm-level data sources like *Compustat*, for which U.S. sales may be a fraction of firms' recorded global revenue.

2.2 Four Main Takeaways From the Literature on Market Concentration

I offer four main takeaways from the burgeoning literature on trends in market concentration. My critical read of the literature incorporates the measurement principles described above to interpret and prioritize various studies.

(i) Studies of broad industry categories at the national level suggest increased concentration of revenue among the largest firms over the past 20 to 40 years.

The work of Autor et al. (2019) is representative of estimated trends in average

concentration levels built from establishment-level data for four-digit SIC industries at the national level. Figure 1 reproduces the figure from Autor et al.[9] that graphs CR4 and CR20 for revenue and employment concentration.[10] While all sectors show average increases in the CR4 between 1982 and 2012—between 5- and 15-point increases in the CR4—the rates of increase vary considerably. The smallest increases are in manufacturing, for which many product markets are more likely to be national or global in scope. The average manufacturing industry evidences a 4-point rise in the CR4, to just under 44%, which would be consistent with an increase in average firm share from 10% to 11% for each top four firm over the 30-year period. This is about the same increase as in Services, where the level of CR4 is much lower, reaching less than 15% in 2012. Retail trade experiences the greatest increase, roughly doubling the CR4 over 20 years, from 15% to 30%, for an average share of 7.5% for each of the top four firms. Finance, Utilities and Transportation, and Wholesale Trade experience increases between these endpoints, but only Utilities and Transportation end up with four-firm levels of concentration as high as 40%. If the SIC4 industries in this figure were true markets, it would not seem that concentration at any of these reported levels should trigger alarm, as the CR4 statistics suggest no fewer than 9 (Manufacturing) to 26 (Services) competitors in the average individual industry. On the other hand, too broad a definition could mask significantly higher concentration in more narrow product or geographic markets.
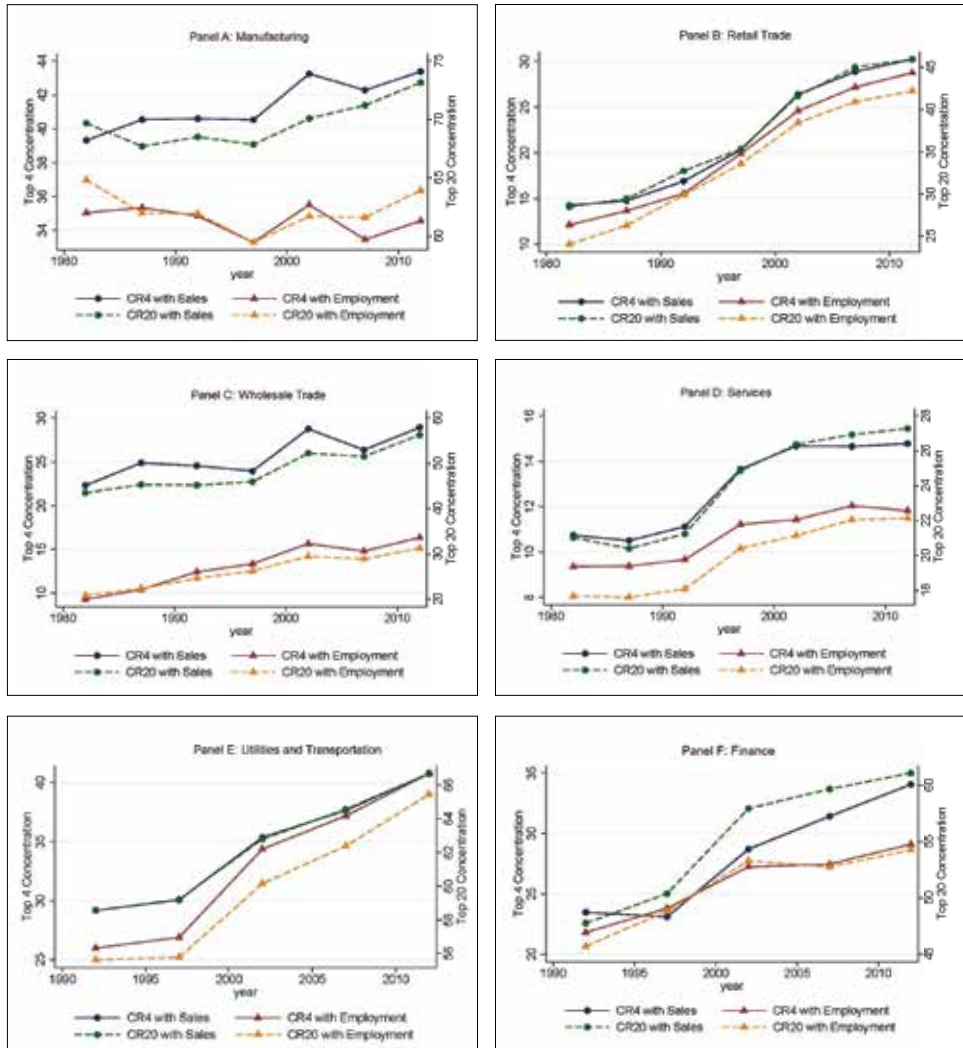
Figure 2 reproduces the Autor et al. (2019) graphs on concentration as measured by the HHI. This is scaled between 1 for an industry with 100 firms, each with a revenue share of 1%, to 100 for a monopoly. In none of the sectors is the average industry even moderately concentrated. The Horizontal Merger Guidelines (HMGs) used by the United States Department of Justice Antitrust Division and the Federal Trade Commission to evaluate mergers specify markets with HHIs greater than 18 on this scale to be moderately concentrated; those with HHI above 25 on this scale are highly concentrated.[11] The highest average HHI in Figure 2 is between 8 and 9, in Manufacturing and Utilities and Transportation, which would be the value for an industry comprised of 11 to 12.5 equal-sized firms. In Services, the average HHI doesn't even reach 2. A second difference from Figure 1 is that in both Manufacturing and Wholesale Trade, the revenue-based HHI is virtually the same in 2012 as it is in 1982, in contrast to the CR4 results. At this level of aggregation, even the broad conclusion that concentration has increased is sensitive to seemingly innocuous measurement choices.

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9   Figures 1 through 3 are reproduced from academic papers. I apologize that these are not formatted for readability in black-and-white reproduction, red/green colorblindness, or other limits discerning color-based distinctions.

10 These are constructed from establishment-level data from the U.S. Economic Census, aggregating revenue to the firm-industry-year to compute concentration ratios and HHIs (scaled 0 to 100) at the four-digit SIC level. Industries are weighted by employment to compute the six broad sector averages graphed in these figures. The axes are not standardized across sectors, so neither the level nor the slopes of the curves (reflecting the rate of increase over time) are comparable across the sectors.

11 In antitrust, HHIs are measured with shares between 0 and 100, so the HHI ranges from 0 to 10,000 for a monopoly. The 2010 HMGs define cutoffs of 1800 for moderate and 2500 for high concentration.
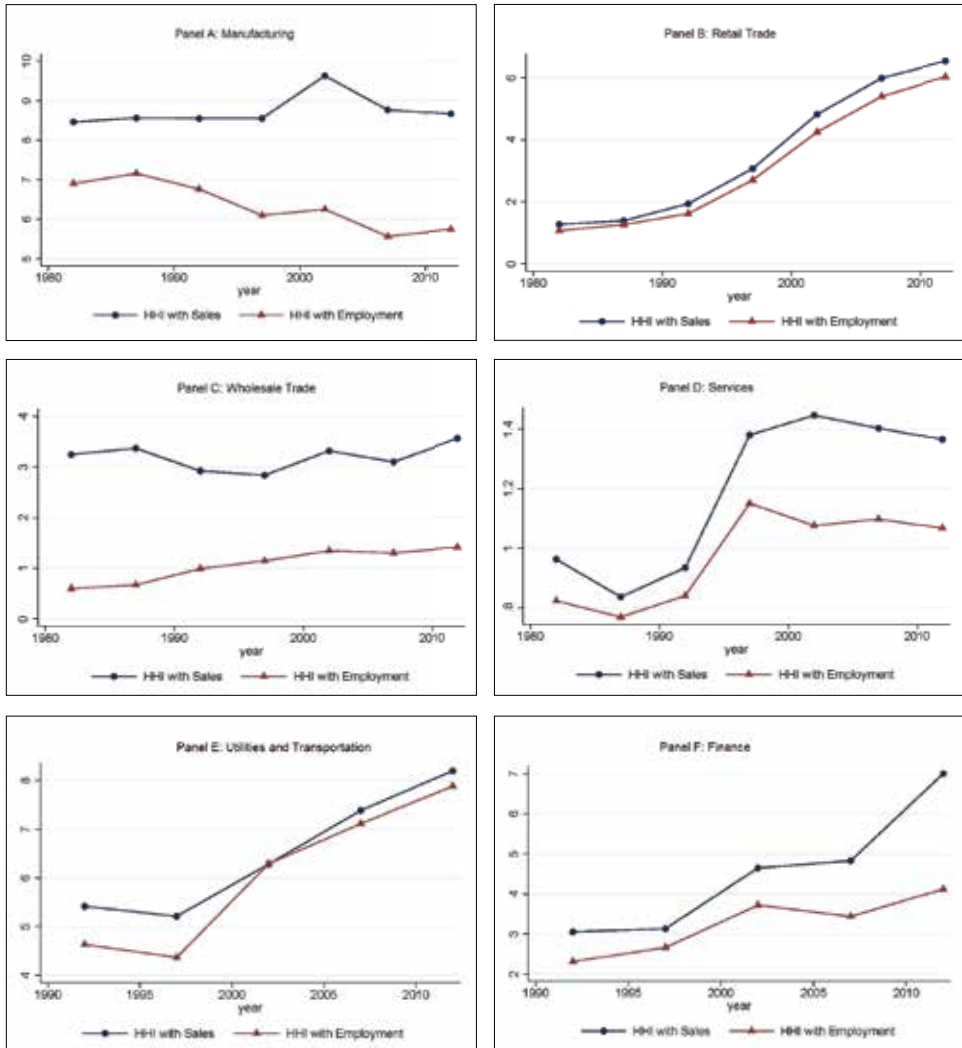
Figure 1: Average Concentration (CR4, CR20) in Four-Digit Industries by Sector.

Source: Autor et al. (2019), Figure 4.

Note: Top (blue and green Lines with circles) are revenue shares; bottom (red and orange lines with triangles) are employment shares. Top four firm shares are plotted on the left axis, top 20 on the right.

Figure 2: Average U.S. Concentration (HHI) in Four-Digit SIC Industries by Sector, 1982-2012.

Note: The Hirschman-Herfindahl Index (HHI) is scaled 0 to 100. The blue circles plot the HHI calculated using firm sales and the red triangles plot the HHI calculated using employment.

While these particular figures focus on U.S. markets, there is evidence suggesting these trends are shared in other developed economies, perhaps with somewhat higher increases in CR4-type measures in the United States. It is difficult to access comprehensive microdata outside the United States, which can affect cross-country comparisons. While the similarity of results continues to be debated,[12] it is likely a mistake to think that whatever explanation accounts for these trends should have a U.S.-centric focus.

(ii) Rising national concentration is not mirrored by increased concentration at the more local level, which recent work suggests has declined on average. A plausible explanation for this divergence is growth in the national revenue share of the largest firms in most industry categories, accompanied by expansion of those firms into new geographies.

Defining industry boundaries is only part of the challenge of defining a market in which firms compete. Geography also plays a critical role. Consider two industries in the NAICS segment 3273. Cement (NAICS 327310) is manufactured centrally and transported long distances, even internationally, particularly where low-cost water transport is available.[13] Concrete (NAICS 327320)—a mixture of cement, aggregate (gravel or sand), and water—must be consumed within about 45 minutes of mixing, sharply limiting the market radius of a ready-mix concrete plant. This distinction is important. A U.S.-wide market for cement that excludes imports from industry sales is likely too narrow and may make the industry look more concentrated than it actually is if the imports are produced by non-U.S. firms and if U.S. exports are low. But, aggregating concrete revenue to the national level likely makes the concrete industry look much less concentrated than are the true local markets. Moreover, mis-aggregation can turn the implication of changes in concentration upside down. For example, a merger of a concrete firm operating only in the Southwest with a firm operating only in New England would appear to increase U.S. concrete industry concentration, even if, in the aftermath of the merger, local market concentration was unchanged, or perhaps lower if the firm opened up new concrete production facilities in previously unserved local markets.
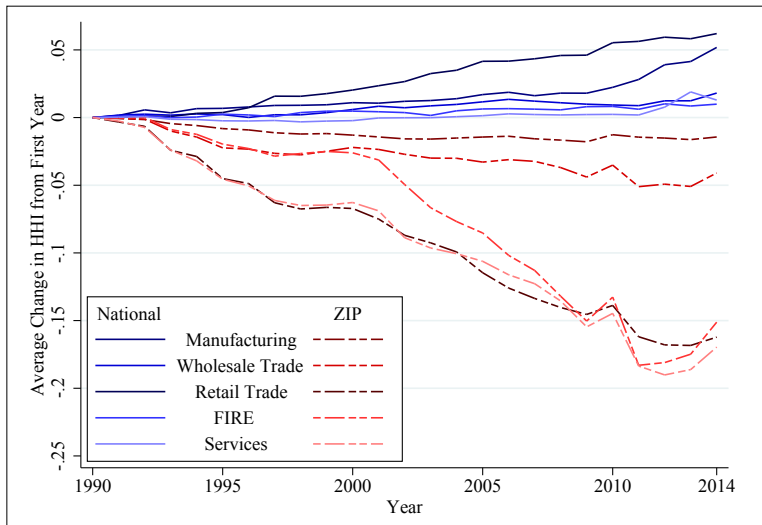
Research by Rossi-Hansberg et al. (2019) and Hsieh and Rossi-Hansberg (2019) illustrates the practical importance of considering geography when trying to

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12 Compare, for example, Autor et al. (2019) and Bajgar et al. (2019) to Gutiérrez and Philippon (2018) and Covarrubias et al. (2019). The disagreement over United States vs. European trends may be in substantial part dependent on the data sources used. See Bajgar et al. (2019) for a discussion of the impact of changes in Orbis coverage of small and mid-size EU firms over time and errors in firm ownership. Based on their corrections to Orbis, Bajgar et al. (2019) report increasing concentration (measured by CR8, the revenue share of the eight largest firms) in both the United States and Europe, although the magnitude of the increase is somewhat higher in the United States.

13 In the United States, imports account for roughly 10% of total consumption; see Portland Cement Association (2016).

understand the nature of economy-wide changes. Their work shows that national and local concentration trends between 1990 and 2014 diverge across most sectors of the U.S. economy.[14] This is apparent in Figure 3, which compares average changes in narrow industry HHIs (scaled 0–1.0) at the national level to those for the same industries at the local level of eight-digit ZIP codes; similar results are obtained for counties or CBSA metropolitan areas. The results replicate the qualitative findings of increasing concentration at the national level over time, but local market trends are negative—in some industries, like Retail Trade, FIRE (Financial, Insurance, and Real Estate), and Services, very substantially so.

Figure 3. Diverging National and Local Concentration Trends, Averaged to Sector Level

Source: Rossi-Hansberg et al. (2019), figure 4.

Note: Average change in revenue-based HHI (scaled 0–1.0), computed from NETS establishment-level data. Industries are defined at eight-digit SIC level, and changes in HHI for each industry–geography are averaged with weights given by employment share of industry–location pair. Alternative geographic aggregations include: National, Core-Based Statistical Area (similar to MSA), County, and eight-digit ZIP code. Excludes industry–location pairs with no observations. Patterns are qualitatively similar using a balanced sample of industry–geography pairs observed for all years, although local concentration is roughly unchanged for manufacturing and wholesale trade by the end of the sample period.

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14 These are based on establishment-level data from a private data source, National Establishment Time Series (NETS), which enables the researchers to observe sales in each year at fine levels of industry and geographic disaggregation. The industry definition is SIC8 (four-digit SIC with a product code appended). The authors exclude inherently "location specific" activities, such as agriculture, mining, or public utilities, where establishments may be constrained in location by natural resources or proximity to customers. Some of these (utilities) are likely local markets, in others (agriculture, mining) firms compete globally. See Rossi-Hansberg et al. (2019) for detailed discussion.

The authors offer a reconciliation for these seemingly contradictory trends. They present additional evidence that, within industries, the largest firm grew over time, in terms of both industry revenue share and locations served. It appears that the growth of the largest firms, on average, contributes both to rising national concentration and falling local concentration. By entering into new markets, these large firms bring an additional firm to a local market, thereby reducing local-level concentration. The authors confirm that when a large firm opens an establishment in a new ZIP code, local concentration falls and remains low over time.

In some industries, the rising national concentration is most relevant and the geographic dispersion of establishments that all compete in a regional or national market may offer little or no additional benefit to consumers. In other industries, particularly in the service sector, declining local concentration likely indicates more choices for consumers.

(iii) Aggregate estimates of average markups or profit rates appear to have increased over time.

Like the concentration literature, a large number of papers have tackled the question of whether aggregate profit rates, or markups of prices over marginal costs, have increased, and if so, by how much. Most, but not all, of the work reports rising markups, often of incredibly large magnitudes. For example, De Loecker, Eeckhout, and Unger (2018) report a tripling of the average margin in the United States from 20% over cost in 1980 to 60% over cost in 2016; De Loecker and Eeckhout (2018, p. 6) report that the "evolution of markups is comparable in Europe, North America, Asia and Oceania," with increases of 40 to 60 percentage points. Autor et al. (2019) find that some production function-based estimation methods suggest markups increasing from 150% to 300% over this period.

The distribution of markups also has changed. Autor et al. (2019) report that when average markups are measured as the median markup or as unweighted average markups, only modest increases are observed. Substantial increases are observed in the average markup when it is weighted by firm value-added. This indicates either rising market shares of high-markup firms, growing markups for larger firms, or both. Autor et al. conclude that the higher than average markups over costs for the largest firms reflects their greater productivity relative to other firms in their industry category. They label these "superstar" firms, for their combination of scale, inferred efficiency, and margin levels.

A key question for scholars and policy makers is whether the calculations showing increased markups are reflective of increased economic rents, as many are inclined to assume. The implausible magnitude of many estimates, considerable sensitivity of implied markups to alternative estimation methods, and identified difficulties with some of the methods used to generate these numbers suggest some circumspection.

Is it credible that weighted *average* economic margins have increased from 20% to 60% between 1980 and 2016, as in De Loecker, Eeckhout, and Unger (2018)? Or from 120% (more than double marginal costs) to 200% (more than triple marginal costs), as some estimates in Autor et al. (2019) suggest? Those are astonishing numbers that yield implications inconsistent with other data on the economy (Basu, 2019).

Markups derived from accounting data are susceptible to a broad range of difficulties in mapping accounting data to economic costs and profitability. Capital cost accounting can be notoriously unhinged from economic costs, as discussed by industrial organization scholars of the 1970s and 1980s (e.g., Fisher & McGowan, 1983). These problems are compounded for companies that have significant investment in intangible capital such as intellectual property, information technology, advertising, research and development, and the like. Bessen's (2017) research suggests that proprietary IT investment generates competitive advantages that give rise to both increased concentration and increased productivity, yielding higher estimated markups that could reflect normal returns to IT investments. These make accurate estimation of economic margins difficult and interpretation of estimates fraught.[15]

Basu (2019) describes the strength and weaknesses of the various approaches taken in the literature and highlights inconsistencies between the implications of estimated markups and observed patterns in macroeconomic data. He is reluctant to endorse any of these estimates, concluding that more research is needed to understand "why most markup estimates based on micro data are implausibly large and grow too fast in relation to the macro facts to be explained" (Basu, 2019, p. 20).

(iv) There is vigorous debate over the implications of these patterns in aggregate concentration and markups for the state of competition.

There are reasons to be cautious about concluding that market concentration has risen or is a meaningful problem for market competition and consumer welfare. Few of the existing studies that find increased market concentration calculate concentration at the level of a recognizable market. Markups and profit rates are difficult to measure with reliability and even more challenging to interpret. Furthermore, a long-standing literature casts significant doubt on the idea that cross-industry correlations of concentration with various outcomes imply reduced market competition.[16]

As that literature emphasizes, concentration is not necessarily the inverse of competition, and measuring the correlation of concentration and markups does not aid with the diagnosis. This is because changes in concentration measures have

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15 Approaches that infer markups from production function-based estimates generally use stylized functional forms estimated at highly aggregated levels (for example, two-digit SIC industries). Even firms in the same narrow market exhibit substantial heterogeneity in productivity (e.g., Syverson, 2018), so imposing a common production function across two-digit sectors is more than heroic. Moreover, production function-based estimates also are sensitive to how cost data are reported and used, particularly assumptions about how reported accounting costs map into variable and fixed cost components.

16 See, e.g., discussions in O'Brien (2017), Shapiro (2018, 2019), and Berry, Gaynor, & Scott Morton, (2019).

no direct relationship to changes in market competitiveness or performance. For example, a market may become more highly concentrated when a firm acquires a competitor or increases barriers to entry, reducing competition and raising equilibrium prices. A wealth of detailed studies demonstrate these anticompetitive effects in the context of mergers across a broad variety of markets.[17] If a merger reduces competition in input markets, such as labor, the firm may exercise its new market power by depressing what it pays workers or other suppliers (Prager & Schmitt, 2019), raising *measured* markups in product markets and creating competitive harm upstream. Firms may soften competition and increase equilibrium prices by requiring trading partners to sign most favored nations clauses to ensure rivals cannot undercut them or by adopting customer loyalty programs such as frequent flyer rewards that make consumers unwilling to switch firms for modestly lower prices. In cases like these, higher concentration and adverse consumer impacts are outcomes of reduced competition.

In contrast to the above examples of anticompetitive behavior, a market might instead become more highly concentrated when one of the firms in that market becomes more efficient, enabling it to reduce prices and increase its market share, or when a firm develops an innovative product that consumers value, leading consumers to shift their purchases to that firm, perhaps even at a higher price, reflecting the greater consumer value (Demsetz, 1973). These cases may be associated with new capital, information technology, intellectual property, or other investments that reduce marginal costs or improve product offerings. Economists would characterize these markets as *more* competitive, even though the outcome is associated with increased concentration and quite possibly both higher average markups and higher price associated with improved quality.

As another example, if fixed costs increase—for example, due to investments in information technology needed to produce a competitive product or consumer preferences for superstores with greater variety—average costs may increase and the equilibrium number of firms in a market may decline. This may generate a correlation between higher concentration, higher markups over marginal costs, and, depending on the context, even higher prices—but often also consumer benefits. These can all be outcomes of the competitive process, not a failure of it. Ganapati (2018) provides evidence of this phenomenon in wholesale trade, which has become much more concentrated in recent years as investments in information technology, logistics, and international supply and domestic distribution networks have facilitated the growth of the largest wholesalers. These wholesalers deliver greater variety and service to customers, reduce customer acquisition costs, and at the same time, realize higher markups from their "superstar" performance.

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17 See Ashenfelter et al. (2014) and Kwoka (2015) on a broad set of merger retrospectives. Gowrisankaran, Nevo, and Town (2015), Ho and Lee (2017), Prager and Schmitt (2019), and the work reviewed in Gaynor, Ho, and Town (2015) analyze merger impacts on health care markets.

Perhaps surprisingly, there can be cases where a reduction in competition leads to a reduction in concentration, as can happen when a small number of dominant firms in a market tacitly or explicitly collude to raise their prices, ceding some of their collective market share to a group of fringe competitors while raising the dominant firms' profits and reducing measured concentration. Miller and Weinberg (2017) show that in the aftermath of the Miller/Coors joint venture (JV), tacit collusion between Anheuser-Busch InBev and Miller/Coors increased. This led to rising prices and markups for their beer at the cost of eroding their market share in the years following the JV, reducing measured concentration over time.[18]

Finally, there may be markets in which firms compete to become large through innovative offerings that attract most consumers, generating competitive benefits. But if those markets then "tip" to insulate the market leader from any future competitive challenge, that same concentration may be associated with reduced competition and erosion of consumer value over time.

As these examples and a rich literature in industrial organization make clear, prices, profits, markups, *and* concentration are all codetermined *outcomes* of the competitive process in a market. There is not an independent causal relationship between concentration and prices or markups that can be inferred. Correlations measured across broad industries are particularly problematic, as there may be mixtures of each example above represented in the data.

As the examples mentioned here suggest, we can learn much more about competitive effects from detailed studies of individual industries that tackle issues of heterogeneity, causality, and competitive mechanisms head on. Deciding whether a policy intervention is needed, and if so, what it should be, requires solving those inference problems. Much of the recent literature focuses on economy-wide trends, and thus cannot deliver an accurate diagnosis of the issue. To take a medical analogy, a doctor's decision to treat a fever with Tylenol, advanced antibiotics, or an emergency appendectomy depends on her diagnosis of the root cause of the fever. In any given situation, two of the treatments might prove both ineffective and costly to the patient. Similarly, economic policy prescription should be focused on treating the underlying causes, not simply symptoms.

3. Concentration in the Labor Market: What Should We Make of Reported Correlations With Workers' Wages?

The literature on industry concentration trends developed in large part from an effort to understand the declining labor share of national income. A number of scholars have begun to focus directly on labor market concentration and outcomes for

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18 The rise of consumer preferences for craft beer likely exacerbated the merger-induced decline in concentration.

workers.[19] This research correlates aggregate measures of employer concentration with wages, analogous to the literature correlating industry concentration with markups and other outcomes. Much of it concludes that occupations or industries in areas with fewer (more concentrated) employers are associated with lower wage levels. One should be cautious in assigning a causal relationship based on these studies, however.[20]

First, as with the measurement of market concentration in the product market, measurement of concentration in the labor market is fraught with issues and ambiguity. One issue is that when scholars attempt to define a "labor market," they often define boundaries that do not align with relevant markets for employers or prospective workers. Studies that attempt to define labor market concentration are based on a variety of heuristics to facilitate regression analysis across many sectors and geographies. In some work (e.g., Benmelech et al., 2019), the labor market is defined as all workers in a particular industry–county pair, implicitly viewing workers in different occupations within an industry–manager, financial analyst, production line worker, custodian–as competing for jobs, but not companies in different SIC4 industries as competing with one another to hire mechanics or office managers. In other work (e.g., Azar et al., 2017; Azar et al., 2019), markets are defined by workers in the same six-digit Standard Occupational Code and commuting zone. This, for example, assigns four categories of "secretaries and administrative assistants"– Executive, Legal, Medical, and All Other–to four non-competing labor markets. Concentration measures in a number of studies are derived from vacancy postings by firms in a given occupation-commuting zone in a given quarter, a potentially narrow and noisy measure of employers.

Second, though most studies report a negative correlation between measures of labor market concentration and workers' wages, they shed little light on the underlying reasons why wages are inversely related to employer concentration, even if one takes those correlations at face value. Without knowing why these two factors are negatively correlated, it is not clear what the policy implications are. There could be several alternative and inconsistent explanations, many analogous to concerns raised about the statistical studies of price (or markups or profits) and concentration in product markets described above.

Consider one example of variation driving changes in wages and changes in employer concentration in local geographies. Suppose a U.S. industry–say, automotive parts–shrinks or moves offshore, perhaps due to import competition. When one of these plants shut down, there is likely to be less overall demand for labor in its local market. Wages in that local market will likely fall, whether the labor

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19 A sample of recent academic papers on the correlation of wages and employer concentration include: Azar et al. (2017), Azar et al. (2018), Benmelech et al. (2019), Rinz (2019).

20 This section draws heavily from Rose (2019).

market is perfectly competitive or not. The closure also is likely to increase the concentration of employment among the remaining employers, creating an inverse correlation between wages and concentration. But that is only a correlation; the root cause is the demand shock. Similar spurious correlations could arise if there is an adverse productivity shock, perhaps due to more stringent environmental regulation of one of the local employers. This would tend to reduce output, employment, and wages, and raise observed employment concentration. Again, the relationship is not causal but *correlational* with the unmeasured productivity shock.

Even where there are too few employers bidding for a set of potential workers to ensure competitive wage-setting–classical monopsony[21]–there may be little that competition policy can do. A coal company may have labor market power because it is a dominant employer in a rural county, but if that position is not due to acquisition of rival employers or exclusionary behavior, it is unlikely to violate antitrust law. This is the labor market analog of the Supreme Court's opinion in *U.S. v. U.S. Steel Corp.* (1920) that "the law does not make mere size an offense."

Moreover, the term "monopsony," as it is generally used among labor economists, is not reserved for situations with too few employers to be competitive. Rather, the monopsony label often is applied to many deviations from a perfectly competitive outcome that are unrelated to the number or concentration of employers competing to hire from a pool of workers. These are associated with a wide range of frictions in labor markets, such as information failures, transactions and search costs, idiosyncratic match quality, unwillingness of workers to relocate, occupational licensing, and more (Council of Economic Advisors, 2016b). These frictions typically do not arise *from* a reduction in competition among firms, either through merger or coordinated conduct, although the frictions may *lead* to a reduction in competition among employers. Nor is it likely that many of these are created by coordinated conduct by firms to limit competition or by unilateral conduct to exclude or disadvantage rival employers. With some exceptions, antitrust enforcement generally is not an effective or appropriate tool to address problems such as these (Naidu & Posner, 2018; Rogers, 2018; Rose, 2019). But there may be other policies that, by addressing the underlying friction, could improve both the operation of labor markets and outcomes for workers.

These critiques in no way imply the absence of competition problems in labor markets. There surely are monopsonistic markets in which employers restrict hiring to keep wages low, and further consolidation in those markets will likely worsen the problem. For instance, Prager and Schmitt (2019) provide evidence of this in their study of hospital mergers. They show that, consistent with monopsony power, mergers that

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21 Robinson (1932, p. 215) coined the term monopsony for "an individual buyer which will correspond to the name monopolist for the individual seller." In modern usage, monopsony is applied to markets with few buyers (employers).

substantially increased concentration in local hospital markets reduced wage growth by 1.0% to 1.5% per year for specialized health-care workers (pharmacists and nurses) and skilled non-health workers (e.g., hospital administration), while low-skill and unskilled workers appear unaffected.[22] Other examples of anticompetitive practices in some current labor markets include wage-fixing and "no-poach" cases, in which employers agree not to recruit from or hire each other's workers[23]; the increase in noncompete clauses that restrict worker mobility, even for low-skill occupations (Starr, Prescott, & Bishara, 2019); and the explosion of occupational licensing laws that reduce both entry into occupations and mobility of workers in these occupations across markets (Kleiner, 2015; The White House, 2015; CEA, 2016b; Nunn, 2018). Union coverage has declined over the past several decades, and legal protections for workers, particularly for collective bargaining and class action litigation, have been eroded, tilting bargaining power toward employers (Council of Economic Advisers, 2016b).

Understanding the most significant causes of competitive problems in labor markets, as in product markets, is essential to identifying the most appropriate and effective policy interventions.

4. Concentration in the Digital Economy: How Should We Think About This Sector?

The apparent dominance of many of the large tech firms—and their prevalence in the social and political lives of so many—has generated levels of concern that seem to have crossed over to alarm. Calls to break up Google, Amazon, and Facebook, or to subject these and other companies to public utility style regulation, are ubiquitous (Yglesias, 2019). Antitrust investigations of some set of these firms have been announced by both federal enforcement agencies and a coalition of state attorneys general. Understanding the nexus of competition as it currently exists among firms is difficult. Even greater are the challenges of predicting the future contours of competition and credibly documenting that for a judge, which is required for competition policy enforcement in the United States, or designing a regulatory intervention to replace or restore competition.

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22 One might ask why those mergers were allowed by the antitrust agencies. It appears that most of them were too small to be reported to federal authorities, and were not investigated by state antitrust enforcers. Wollman (2019) discusses rising "stealth consolidation," acquisitions that are below the Hart Scott Rodino reporting thresholds, and hence are consummated without antitrust review.

23 See, e.g., complaints in *U.S. v. Arizona Hospital and Healthcare Ass'n* (2009); *U.S. v. Adobe Systems, Inc., et al.* (2010); *U.S. v. Knorr-Bremse AG and Westinghouse Air Brake Technologies Corp.* (2018); *FTC v. Your Therapy Source, Neeraj Jindal, and Sheri Yarbay* (2018). Private litigation includes: *High-Tech Emp. Antitrust Litig.* (2012), *Danielle Seaman v. Duke et al.* (2018). More controversial are no-poach clauses contained in franchise agreements, see, for example, *Arrington v. Burger King Worldwide, Inc.* (2018.); *Butler v. Jimmy John's Franchise, LLC* (2018).

This section describes some of the market nuances that are important for understanding concentration in the digital economy, the nature of competition, and what the implications are for policy.

Many firms that operate in the tech space appear to dominate their space in this ecosystem. Firms like Google, Facebook, Amazon, and Apple operate platform markets,[24] in which the firm connects consumers with content providers, sellers, or advertisers who want to reach them. These markets tend to be characterized by strong network effects–many people want to be on the most popular platform, since that gives them the most others to interact with. In this case, the more popular the platform, the more new users it attracts. These can provide powerful incentives for firms to compete through some combination of better product offerings, user experiences, prices, and innovation, to attract customers to their platforms. The successful firms in most of these examples generally have done just that, delivering substantial value to consumers. Network effects are amplified when user-generated data improves the effectiveness of algorithms used to deliver value to both sides of the platform, permitting larger platforms to develop higher-value products and experiences, increasing users and user data in a positive feedback loop.

But the strength of these network effects can make these markets highly susceptible to "winner-take-all" or "winner-take-most" tipping toward the largest firm. This might entrench the large incumbent, making it difficult for entrants or other smaller competitors to gain users and build scale. Entrenched firms may see less need to provide consumers with innovative or high-value offerings. In these circumstances, competition *for* the market, rather than competition in the market, may be the primary constraint on incumbents. That is, a credible threat of entry and replacement by a new entrant may be the main limit on a dominant firm's extraction of rents from consumers,[25] unlike most conventional markets in which price and quality competition among existing firms generates value to consumers.

Second, it is important to recognize that "tech" is neither an industry nor a market. Business models of each of the large tech firms vary substantially, and even with the understanding that firms may share an emphasis on monetizing the value of consumer data, how firms do that and to what end may be quite different. Google has historically monetized the value of its search engine through sales of advertising

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24 Katz and Sallet (2018) discuss the economics of platform (multi-sided) markets and propose the way courts should evaluate competition harms in such markets.

25 While we are accustomed to thinking about market power being exercised through higher prices, for many of these firms, users are enticed to a platform by "free" services. The platform profits by bundling these services with advertising and/or by collecting valuable data on users that is monetized. This is not a novel business model–radio stations, on-air television broadcasters, and many of the print media sources have for decades provided consumers with free or low-price access to content, paid for through advertising revenues. Payment cards (Visa, MasterCard, Amex) often provide transaction services to cardholders at a negative price (cardholder rewards such as points or cash back on purchases), paid for by higher merchant fees to process debit and credit card transactions.

delivered to the highest-value customers in response to their search terms. It dominates online search and search-based advertising, with global shares in the 70% to 80% range for desktop search and above 90% for mobile search.[26] But is the market in which Google competes "all online search queries"? If the relevant buyers on the other side of the platform are advertisers, is the market search-based advertising, or online advertising, or all advertising? What is Google's position in those larger markets?

It may be tempting to overstate the cleanness of market boundaries, as well as the protection offered by incumbency. For example, e-marketing firms have been reporting for several years that more consumers now start their product-based search queries from Amazon.com, rather than Google (Garcia, 2018). Data on consumer search and purchasing behavior on Amazon's site is especially valuable in predicting what products consumers might buy, and how to increase purchase probabilities on Amazon.com. This may make Amazon a competitor not only to Google in search, but also to the third party sellers it matches to consumers in the Amazon Marketplace.

While the tech firms share some features—platforms that connect individuals and content providers who want to reach them online, generation of valuable data on the behavior of agents on both sides of the platform, business strategies that monetize those data—their individual business models and nature of consumer interactions vary widely. Innovation in this space has been an important driver of both consumer value and monetization of that value for the platform. Any policy intervention must navigate a complex set of sometimes conflicting objectives. For example, privacy protections may create a wedge between services consumers value and platform monetization of consumer data, or correct a failure that occurs when consumers do not fully understand what data firms are collecting and how they use it—or some of each. A number of recent reports to competition authorities and others provide thoughtful discussions of possible policy directions in this area.[27]

5. Competition Policy: Has the Pendulum Swung Too Far to Under-Enforcement?

This brief argues caution in making sweeping inferences on the state of competition in the United States from highly aggregated statistics. But is there more we can glean from examining the state of competition-policy enforcement? U.S. competition

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26 See data from "Search Engine Market Share" (2016-2019)

27 For example, competition authorities in the United Kingdom and EU have sponsored reports on the digital economy (Furman, 2019; Cremer et al., 2019); the U.K. Competition and Markets Authority commissioned an independent review of tech industry mergers (Argentesi et al., 2019); and the University of Chicago Stigler Center established a committee to report on market structure and antitrust for digital platforms (2019).

policy is a deterrence-based system. This recognizes the difficulty of detecting, investigating, and litigating all violations of competition policy, and instead seeks to deter companies from violating the antitrust laws by establishing clear policies and case law, and consequential penalties for firms that step over those lines. If enforcement becomes more lax, or penalties less certain or severe, deterrence is less effective and anticompetitive behavior may proliferate.

U.S. public antitrust enforcement operates in three broad areas.[28] Section 1 of the Sherman Act prohibits "contracts, combinations, and conspiracies" in restraint of trade. This provides civil and criminal penalties for collusion among competitors (price-fixing, bid-rigging, market division, etc.) and restricts contracts found to be anticompetitive (e.g., prohibitions on intermediaries steering customers toward lower cost providers, or certain most favored nations clauses imposed by dominant firms). Section 2 of the Sherman Act restricts unilateral conduct by firms that monopolize or attempt to monopolize a market. Examples include the Microsoft antitrust case decided in 2001, and *U.S. v. AT&T*, which was settled in 1982 with the company's breakup. Merger enforcement is governed by Sherman Act Section 1 and Clayton Act Section 7, with pre-notification of mergers above certain thresholds (roughly $90 million in 2019) required by the Hart Scott Rodino Act.

There are a number of reasons to believe that antitrust enforcement has become less vigorous over recent decades. Many observers suggest a decline in enforcement against anticompetitive conduct, pointing to examples like the dearth of Section 2 monopolization cases over the past 20 years, or the inability of the FTC to deter brand pharmaceutical firms from moving from one exclusionary tactic, like pay-for-delay of generic entry, to another, such as sham citizen petitions or denial of product to generic firms preparing an entry application to the Food and Drug Administration (FDA) (Feldman & Frondorf, 2016; Liu, 2017; Hemphill, 2006). Decisions by the enforcement agencies, particularly the Department of Justice (DOJ), undoubtedly play an important role in this outcome.[29] But agency passivity is likely also due to much greater burdens of proof the courts have placed on plaintiffs across a wide range of anticompetitive behaviors. In some areas of antitrust enforcement, the courts now show great tolerance of behaviors that would have been considered *per se* illegal 50 years ago. Shapiro (2019, p. 80) terms this "the shrinking scope of the

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28 The U.S. statutes also permit private antitrust enforcement, with treble damages if the plaintiff can prove anticompetitive harm. Private enforcement typically focuses on harm from collusion or exclusionary (monopolization) behavior, although a private plaintiff recently prevailed in divestiture it sought in a merger challenge, currently on appeal (*Steves & Sons, Inc. v. Jeld-Wen, 2018*). The courts have narrowed the scope for private antitrust enforcement over time, just as they have done with public enforcement.

29 The Antitrust Division issued guidelines for Section 2 enforcement during the waning days of the George W. Bush administration that were widely seen as affirming the Division's abdication of enforcement against this conduct. See U.S. Department of Justice (2008). These were withdrawn as one of the first actions of Assistant Attorney General Christine Varney in 2009, but many observers note this was not followed by increased filing of Section 2 cases.

Sherman Act." As a consequence, some problematic conduct has become almost unenforced against, if not unenforceable. Among these are predatory pricing and other predatory behavior; vertical restraints such as resale price maintenance and exclusive distribution contracts; and contracts that reference rivals such as most favored nations clauses (Baker, 2019; Shapiro, 2019).[30]   Exclusionary behaviors in most platform or two-sided markets may seem poised to join these categories in the wake of the Supreme Court's decision in American Express (*Ohio et al. v. American Express Co. et al.,* 2018).

There are also signs that merger enforcement has weakened. Some types of mergers have proven difficult for the agencies to prevail against in court. These include vertical mergers, where firms are related along a supply chain, such as the recent AT&T/ Time Warner, Inc. merger, and potential competition mergers, where the parties are not significant active competitors with one another, as is common in much of the tech space. Mergers that fall below the Hart Scott Rodino notification thresholds, which have increased substantially over time, appear more likely to involve competitors and substantially less likely to attract enforcement attention (Wollman, 2019). Cunningham, Ederer, and Ma (2018) analyze mergers in the pharmaceutical space and find that firms are more likely to acquire and terminate competitive drug pipelines—what they call "killer acquisitions"—especially when they can do so below Hart Scott Rodino-reportable thresholds.

Second, the market structure threshold for challenges appears to have increased substantially over recent decades. The FTC periodically reports the fraction of merger investigations that resulted in an enforcement action (including litigated challenges, settlements, and abandonments). Kwoka (2017) analyzes FTC data for the 1996–2011 period, and reports enforcement rates binned by the number of "significant competitors" who would remain in a market were the merger allowed (roughly defined as the number of remaining firms with 10% or greater market share). The probability of a challenge if only one to four competitors would remain is above 50% over the entire period. In contrast, enforcement actions drop to zero for mergers with more than four competitors remaining by 2008–2011. And this is conditional on an investigation being opened, which is done only when staff have a reason to think the merger could be anticompetitive.

Third, this higher threshold for enforcement action is reflected in, and reinforced by, the evolution of the Horizontal Merger Guidelines over time. The HMGs offer guidance on the way the antitrust agencies approach merger investigations and challenge decisions. The first HMGs, issued by the DOJ in 1968, indicated the Division would challenge the acquisition of a 2% competitor by a 10% share incumbent in a highly

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30 See the articles in the May 2018 *Yale Law Journal* "Collection: Unlocking Antitrust Enforcement" for the challenges and potential to bring cases in many of these areas under current case law.

concentrated market (CR4 above 75%), and its acquisition of a 4% share competitor in a moderately concentrated market. This reflected in part the prevailing hostility of courts to horizontal mergers, even in markets with relatively low concentration, and pushed against that hostility to loosen standards at least a bit. Thus, the infamous 1966 Von's Grocery merger would not have triggered a challenge under the 1968 guidelines.[31] The revision to the HMGs put in place by Attorney General Bill Baxter in 1982 ratcheted up the threshold for challenge and calibrated them to HHIs. The 1982 guidelines suggested the government was "likely to challenge" those mergers that increased HHI by more than 100 points *and* to a level above 1800 (on a 0–10,000 HHI scale); neither the acquisition of a 2% competitor nor one of a 4% competitor by a 10% share firm would trigger a challenge under the 1982 guidelines, regardless of other firms' shares (Hovencamp & Shapiro, 2018). By 2010, the guidelines jointly issued by the DOJ and FTC had increased the threshold for highly concentrated markets from 1800 to 2500, raised the threshold for mergers that are "presumed to be likely to enhance market power" (and therefore likely to be challenged) to an increase of more than 200 points in a highly concentrated market, and stated that mergers leading to an increase in HHI of less than 100 "are unlikely to have adverse competitive effects and ordinarily require no further analysis" (U.S. Department of Justice, 2010, p. 19).

The evolution of the guidelines reflects a combination of changes adopted by the enforcement agencies, in part reflecting changed economic assessment of the likely costs and benefits of mergers, and in part a feedback loop between agency practice and court decisions that has ratcheted up the standards applied to merger challenges. The HMGs both inform courts and are informed by court decisions. There is growing concern that the structural presumption of harm for horizontal mergers has been excessively weakened over the past 40 years, both in terms of the level and changes of concentration at which it is applied and the deference given to it by the courts (Baker, 2019; Hovenkamp & Shapiro, 2018; Shapiro, 2019; Nocke & Whinston, 2019).

This appears to reflect in part misplaced concern about the relative costs of overenforcement versus underenforcement, encouraged by an erroneous interpretation of the "Chicago School's" theory that unfettered markets are competitive markets as an empirical fact.[32] The outcome may have been encouraged by some hubris in the economics profession with regard to being able to measure with precision any potentially problematic effects arising from either mergers or anticompetitive conduct, encouraging courts to expect detailed quantitative evidence on competitive effects. This has led to greater roles for complex analyses
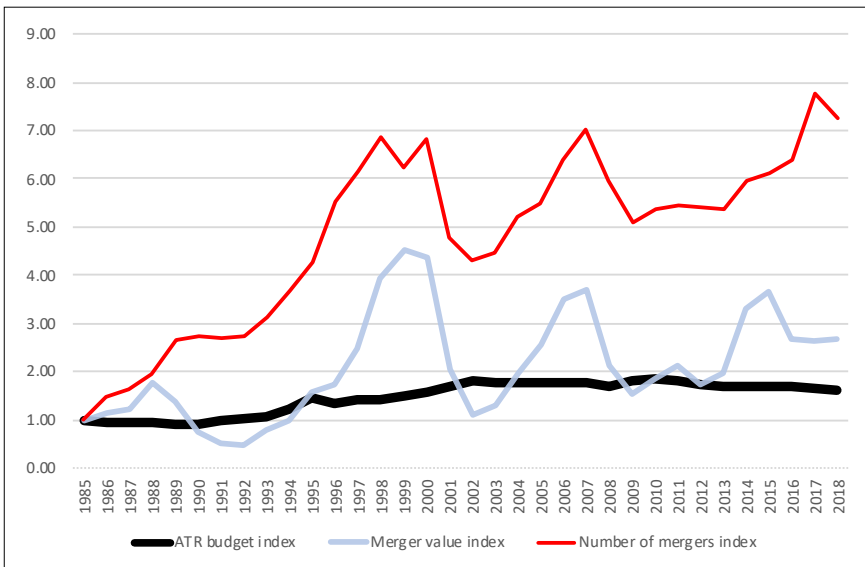
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31 The Supreme Court, in *U.S. v. Von's Grocery Co.* (1966), upheld the FTC's challenge of a supermarket merger by the third and sixth largest firms in the Los Angeles market, that would have led to a combined market share of 7.5%.

32 See Bork (1978) on the Chicago School and Baker (2019) on its influence and relative error costs.

by dueling economic experts and a movement away from structural presumptions. It is far from clear that this approach leads to better decision-making by lay judges untrained in economics and unaccustomed to antitrust cases on their dockets.

Fourth, strained agency resources likely contribute to underenforcement. Budgets are not keeping pace with challenges to competition. The budgets of the DOJ Antitrust Division and the FTC have increased only modestly in real terms over the past 20 years, while merger activity has skyrocketed, as shown in Figure 5. While the number of mergers in the U.S. economy has increased five- to seven-fold since 1985, the Antitrust Division budget has increased less than 60% over the same period and has declined in real dollars over the past decade. Budget-constrained staffing and the adverse effects of various federal hiring freezes limit the number of investigations that can be carried out simultaneously. Compensation for the professional staff— lawyers and Ph.D. economists—has been falling further behind private sector starting salaries, with likely consequences for both hiring and retention. Moreover, the rise of multi-billion-dollar megamergers, for which the cost of antitrust clearance is a small fraction of the total deal costs, creates significant asymmetries between the government's available resources and the litigation teams the merging parties can and do assemble on the other side. In fiscal 2017, for example, 255 of the 1,992 Hart Scott Rodino merger notifications involved transactions in excess of $1 billion.

Figure 4: DOJ Antitrust Division Budget Compared to Merger Activity, 1985-2017

Source: Author's calculations from Department of Justice (2018); All-Urban Consumer Price Index; IMAA Institute, https://imaa-institute.org/mergers-and-acquisitions-statistics/

The Hart Scott Rodino Act puts merger review on a tight time clock; if the agencies don't have the lawyers and economists to review an acquisition within those time limits, the parties are free to close on the transaction. One might expect the effects of budget constraints to show up as declining investigation and challenge probabilities during merger waves. These pressures also may impede conduct investigations, which often require considerable input of staff time to obtain and review documents and data, develop theories of harm, and assess the evidence. In a resource-constrained environment, there may be strong incentives to pull staff off a conduct investigation proceeding on an agency's timetable to investigate a merger that will otherwise be consummated in 30 days.

5.1 Is U.S. Competition Policy Enforcement Lagging That in Other Developed Economies?

Resources aside, approaches to merger analysis, including consideration of theories of harm, the use of economic analysis, and application of a consumer welfare standard are broadly similar between the U.S. DOJ and FTC and their counterparts in the European Commission's Directorate General for Competition (DG Comp) and the U.K. Competition and Markets Authority (CMA). It is uncommon for these authorities to reach substantially different outcomes in investigations of mergers that affect multiple jurisdictions, unless the competitive impact across those jurisdictions differs substantially due to different fact sets. There are some significant differences in process. For example, in the European Commission, merger enforcement is an administrative, not judicial process, so DG Comp is not required to convince a lay judge of the merits of its case in order to block a merger.[33] Non-litigation based processes like this could at the margin change the evidentiary standard, but this generally has not opened substantial gaps between U.S. and E.U. jurisdictions in merger enforcement.[34] It is noteworthy that in the tech space, for example, both the U.K.'s Office of Fair Trading (precursor to the CMA) and the FTC cleared Facebook's acquisition of Instagram, now frequently cited as an acquisition by Facebook to co-opt a competitive threat (Baker, 2019); some decisions may look different with 20:20 hindsight. Given the different enforcement environments, it is interesting to speculate whether the observed convergence reflects a common emphasis on economic quantification, and its inherent limits in defining such a challenging counterfactual.

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33 In principle, European Commission competition authority decisions can be appealed to the judiciary, but the delays this generates are generally seen as so costly that its merger decisions are rarely appealed. The FTC has a similar administrative process with internal Administrative Law Judges who could hear an FTC challenge, but the FTC increasingly enforces its merger actions through Preliminary Injunction hearings before a federal District Court judge.

34 Some argue that non-price harms, such as harms to innovation, are easier to act upon in European Commission merger investigations. This was argued in the Dow-DuPont merger, which the European Commission cleared with required divestiture of DuPont's global research and development assets to preserve innovation competition that the United States did not insist upon. Officials from the DOJ and DG Comp disagreed with this characterization of the reason for that divergence (Guniganti, 2017).

Differences between the European Union and the United States are more significant in conduct enforcement—what the United States would term unilateral action or monopolization and the European Commission terms "antitrust" (Sokol, 2017). The European Commission operates with an "abuse of dominance" standard that is broader than the U.S. Section 2 monopolization standard, enabling the commission to enforce against behaviors that would not be a violation of U.S. law. Knowledgeable and reasonable voices disagree over whether some European Commission sanctions against U.S. tech companies like Amazon, Apple, and Google reflect more assertive antitrust enforcement or action against legitimate competitive conduct (Sokol, 2017; Shapiro, 2019). But it also may be easier for DG Comp to meet standards of proof under its standard than it would be for U.S. enforcers to invoke Section 2, and increasingly so given the U.S. Supreme Court's higher evidentiary thresholds for Section 2 cases, even for exclusionary behavior that could be considered illegal under both regimes.

6. Restoring Competition Policy for a 21st Century Economy: What Are the Most Promising Directions?

There are myriad proposals for how to address concerns about increased market concentration or decreased competition in one or more sectors of the economy. These range from modest tweaks to the current system to dramatic overhauls that would change the objectives of antitrust as well as the processes.[35] In the tech sector, proposals run the gamut from setting interoperability standards to requiring data exchange, imposing codes of conduct to limit exclusionary behavior, suing to unwind past mergers, breaking up large tech firms in the model of AT&T's 1982 settlement, or creating public utility style regulation of platforms. Some of these offer the promise of more effective competition policy; others may reflect a naiveté about the constraints of antitrust enforcement or efficacy of regulation, or could do more harm than good. I offer below a number of promising directions for reform, distinguishing between what invigorated enforcement agencies could do and what is likely to require legislative intervention.

6.1 Increase Enforcement Agency Resources

Substantially increasing the Antitrust Division and FTC budgets is a straightforward and direct remedy to the stagnant resources enforcers have had to work with amid an increase in both the number and scale of merger activity. This can be made budget neutral by restructuring Hart Scott Rodino filing fees to move with the scale

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35 Some of this work is by scholars with deep roots in legal antitrust scholarship or industrial organization (or both), often with enforcement experience at the DOJ or FTC (or both). See Baker, Sallet, and Scott Morton (2018) and the articles in "Collection: Unlocking Antitrust Enforcement"; Baker (2019); Sallet and Scott Morton (2018); Shapiro (2018, 2019).

of the proposed transaction, as proposed in recent legislation co-sponsored by Senators Amy Klobuchar (D-Minnesota) and Chuck Grassley (R-Iowa). Exit of career staff appears to be particularly high in the Antitrust Division under the present administration, and the DOJ has maintained a partial hiring freeze,[36] which likely will make it necessary to invest significantly in rebuilding staff and capabilities. Restoring competitive pay scales, particularly for Ph.D. economists in the enforcement agencies, could help tremendously with that effort.[37]

Of course, increased resources will lead to more enforcement activity only if the agency leadership is committed to vigorous enforcement. Increased agency budgets could usefully be accompanied by an earmark for review and assessment of past enforcement decisions. The FTC has a small research group, and FTC economists have had a merger retrospective research program for some time. DOJ could be encouraged or required to establish a similar program, and both agencies given authority to compel limited data production from parties to past investigations. These studies could provide information on whether anticipated outcomes were realized in markets, leading to improved agency decision-making, and possibly highlight when enforcement was too lax.

6.2 Empower Agencies to Pursue More Assertive Enforcement Profiles

While courts have increasingly narrowed the range of antitrust violations and increased the difficulty of winning cases for plaintiffs, there is both economic and legal support for more vigorous enforcement by the agencies. For example, the Baker et al. (2018) collection of articles in the *Yale Law Journal* highlights ways enforcers could bring and win more cases within the constraints of current case law, across a range of anticompetitive activity.

Innovation is not new in the agencies; staff adapt their understanding of the competitive dynamics of markets to new realities, revising their theories of harm and testing those against new evidence. Promoting a robust interaction between agency economists and academic researchers can be important in developing new theories and tools for enforcement and encouraging academic research to educate and validate these for enforcers and the courts. For example, bargaining leverage models were developed by the FTC to measure the anticompetitive effect of hospital mergers. This theory of harm has been adapted to a number of industry settings by both agencies and the Federal Communication Commission (FCC), which shares

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36 The Division declines to make employment data available, so this is based on incomplete press reports of career staff exits.

37 Government salaries for the agencies' Ph.D. economists lag shockingly behind academic and private sector salaries for new Ph.D.s. Requiring the Office of Personnel Management (OPM) to align their compensation with that for Ph.D. economists in financial agencies like the Treasury's Office of Financial Research or the Federal Reserve Board would be a start. This could be done in conjunction with establishing a new economist employment category for federal hiring that would require a Ph.D., something OPM has vigorously resisted.

responsibility with the DOJ for many telecomm mergers, and an increasing academic literature illustrates its predictive power.

A number of avenues for invigorated enforcement are described below.

(i) More quickly embrace new economic models and new understandings of competitive dynamics.

In some cases where an agency's decision not to challenge a merger has generated ex-post regret, it seems in part due to evolving understanding of the nature of competition in a particular market. More quickly recognizing and adapting to these new understandings could involve bringing cases that incur more litigation risk, but also with greater potential to extend the protection of competition policy. Early applications of new theories of harm may pose particular challenges for sorting out how to explain effectively the theory and evidence to a judge. That may be part of the reason the judge in the AT&T/Time-Warner merger litigation seems to have struggled to understand or accept the basics of the bargaining leverage framework (*U.S. v. AT&T Inc.,* 2018). This is a price the agencies should be willing to pay for better grounded and more effective enforcement actions. Targets for this might include challenges to: vertical mergers (those between a firm and its supplier, or a firm and its distributor); mergers between competing employers that reduce competition for workers, or more generally buy-side mergers with the potential to harm upstream sellers (Hemphill and Rose, 2018); mergers that increase the probability of tacit collusion among firms (Baker et al., 2019); and mergers that harm innovation competition, particularly between firms without many current product overlaps but that are spurs to each others' innovation activities. In some cases, this may move enforcers away from readily quantifiable harms, like increased price, to more qualitative harms, like diminished innovation competition. This would be a significant deviation from a 40-year trend toward increasing quantification of economic arguments in merger litigation, but it could be vital to agencies blocking important anticompetitive outcomes.

(ii) Adopt lower thresholds to determine merger challenges.

The HMGs say that agencies are likely to challenge further mergers in highly concentrated markets, but do not preclude a challenge of mergers below the 2500 HHI threshold for highly concentrated markets. Agencies could increase enforcement actions, starting with the moderately concentrated range, from roughly none today. This could be done without revision to the merger guidelines. But given the deference the courts give to the HMG, it may be better to issue a revision that acknowledges economic evidence that shows unilateral harms at levels below the current 2500 HHI cutoff and, in some markets, increased risk of tacit collusion.

(iii) Be less willing to settle problematic mergers.

The legal system prefers settlements to litigation. This is especially problematic in merger enforcement. If agencies identify a merger as anticompetitive, any negotiated settlement risks adverse effects from asymmetric information. That is, firms have much better information than does the DOJ or the FTC on what remedies will minimally constrain their ability to profit from the merger and will agree to remedies that tilt the outcome in their favor. Failure to recognize this is particularly dangerous in conduct remedy negotiations, in which firms agree to behavioral restrictions that are supposed to limit their ability to act on merger-created incentives to reduce competition. It is also problematic in so-called structural remedies, which involve divestitures of some assets. Even if the divested assets remain in business, many divestiture remedies, particularly partial or piecemeal ones, fail to restore fully the vigor of competition lost by the merger.[38] And even where that is successful, if enforcers clear mergers with divestitures in selected markets that simply reduce any post-merger concentration level to 2499 or below in all markets affected by a merger, they may find over time that all markets converge to just below the threshold of high concentration.

If a merger is anticompetitive in more than a *de minimis* number of markets, agencies could sue to block the entire merger based on those affected markets, avoiding the potential for a failed divestiture and preserving competition. Antitrust is a deterrence system. If mergers that create anticompetitive harm are challenged rather than settled piecemeal, firms considering a merger that harms competition in some set of markets may be more reluctant to gamble on clearance or to face litigation.

The Antitrust Division recently took a significant step back from accepting behavioral remedies to vertical mergers. If this leads to challenges rather than settlements or clearances, it will be a welcome improvement: If a merger creates the incentive and ability to exclude rivals or raise their costs, enumerating in a consent decree a list of behaviors the firm agrees not to engage in postmerger is unlikely to eliminate the threat to competition. Antitrust agencies and courts are not regulators. If the firm has agreed not to take action A, which is profitable, it has every incentive postmerger to find action A′, which was not ruled out in the decree.

(v) Consider adoption of new frameworks for assessment of vertical mergers like AT&T/Time Warmer, Inc. or CVS/Aetna.

The DOJ had not litigated a vertical merger challenge in 40 years when the Division sued to block AT&T/Time Warner. That case faced a number of challenges, some of which arose from disagreement over how to analyze efficiencies and exclusionary

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38 The recent DOJ settlement proposed for the Sprint–T-Mobile merger is viewed by many observers as an exemplar of a remedy that in no way resolves the anticompetitive harm of the merger. The state attorneys general who are suing to block this merger in federal district court apparently agree.

incentives in a vertical combination. There is broad consensus that the DOJ's Non-Horizontal Merger Guidelines, issued in 1984, are badly out of sync with economic understanding of vertical mergers and potential exclusionary behavior, and provide little helpful guidance to agency staff or the courts. While vertical guidance may be difficult to generalize, given the deference the courts have shown for the Horizontal Merger Guidelines, it may be worthwhile to enunciate a set of principles to guide challenges in vertical mergers. Baker et al. (2019) suggest principles that could ground such an effort.

(vi) Develop tough standards for efficiency defenses

The agencies consider in their assessment of mergers whether credible merger-specific efficiencies would sufficiently lower costs so as to offset any upward pricing pressure from a merger of competitors. Agency economists and financial analysts evaluate these claims through a skeptical, but sophisticated, analytic lens. Efficiency defenses are harder to adjudicate in court given the complex evaluations needed to assess most efficiency claims. The Supreme Court has yet to accept efficiencies as a defense against an anticompetitive merger, although this may be primarily due to how long it has been since a merger case reached the Supreme Court. Lower courts have been moving in that direction and there is reason to think the current Supreme Court may be sympathetic to that defense.[39] There is substantial danger that court rulings sympathetic to firms' claims of efficiencies could give companies a path to consummate almost any anticompetitive merger. Given how little economic evidence exists to support ex-post efficiency gains from most mergers, it would be appropriate for the agencies to clarify and toughen the standards for when, if ever, and which efficiencies could be appropriately weighed to defend an otherwise anticompetitive merger.

6.3 Consider Legislation to Re-Set Presumptions and Burdens of Proof.

Even if the DOJ and FTC adopt a more vigorous enforcement profile, the roadblocks created by case law over the past 40 years and an increasingly conservative judiciary that has been educated to accept the Chicago School's skepticism of antitrust enforcement will be significant impediments to success. We may not have the luxury of 40 more years to attempt to gradually nudge the antitrust pendulum back. More timely progress likely requires legislation that re-establishes Congressional intent to enforce against a range of anticompetitive behaviors.

In mergers, this legislation may be most productively directed toward tightening the structural presumption, which benefits firms, enforcement agencies, courts, and the public, by making enforcement more transparent and redefining the expectations

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39 See Judge (now Justice) Kavanaugh's D.C. Circuit Court of Appeals' dissent in the DOJ's suit to block the health insurer merger between Anthem and Cigna.

around certain burdens of proof. Progress on some of the thorniest antitrust enforcement challenges—potential competition and vertical mergers, predation, exclusionary conduct, and perhaps expectations for burdens in multi-sided markets— is likely to make little headway absent legislative intervention.

While it may be tempting to add additional objectives into the legislation (some have suggested a "public interest" standard for mergers, for example), experience with agencies or jurisdictions that have such expansive sets of objectives should give one considerable pause. The FCC has such a public interest standard; its merger investigations are sometimes characterized as holiday shopping expeditions for affected interests, as rent-seeking gives rise to "trades" of benefits in exchange for not opposing a merger. Similar concerns arise in proceedings before South Africa's and China's competition authorities. The current "consumer welfare" standard, properly understood to mean "trading partner welfare," has been a serviceable standard, and is fully compatible with enforcement against non-price harms to customers, such as reduced quality, service, innovation, or other terms of trade, or upstream harms to seller, like reduced input prices due to a reduction of competition among buyers or employers.

Should policymakers want to break up tech firms, or unwind large numbers of past mergers, as Senator Elizabeth Warren (D-Masachusetts) has proposed,[40] they are likely to find it difficult to do so through the courts. Those who would point to the 1982 AT&T disintegration as an example should recall that the DOJ began two monopolization investigations in the late 1960s—filing suits against IBM in 1969 and against AT&T in 1974—and reaching outcomes in each only in 1982, with abandonment of the IBM case after years of litigation and settlement of AT&T. And those took place in a legal environment that was much more conducive to conduct cases than is today's environment. Even unwinding a completed merger may be extraordinarily difficult, as the government may have to prove not that the two parts of the firm would compete today, but likely that they were at least potential competitors or competitive threats at the time of the acquisition. There are many open questions about whether restructuring tech is wise or beneficial; there are even more about the efficacy of likely court challenges under current antitrust law.

6.4 Is There a Role for Regulation?

Some have advocated regulation of digital platform companies, rather than attempting to break them up. In this vein, antitrust and regulation could be seen as alternatives means to address a common problem—market power. Antitrust is

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40 Warren's platform proposes to "appoint enforcers" committed to unwinding a number of specific mergers in the tech space, including Facebook/Instagram and WhatsApp; Google/Doubleclick, Waze, and Nest; Amazon/WholeFoods and Zappos. It also proposes to require companies to divest digital platforms to a separately owned firm that does not participate on either side of the market.

the prophylactic, intended to prevent market power from arising, at least through anticompetitive means. Regulation is the curative, imposed on a firm or sector with market power to limit its exercise. If a large digital company has already acquired market power, is regulation the appropriate response?

Regulation is far from a cure-all, and there is considerable evidence from the history of economic regulation to suggest that in many cases, the remedy may be worse than the disease. A rich literature in regulatory economics warns of the costs of regulatory rent-seeking that raises entry barriers, facilitates legal collusion among firms to raise prices, and may impede innovation and dynamic efficiency (Joskow & Rose, 1989; Rose, 2014a, 2014b; and the references therein). Asymmetric information between regulators and firms creates opportunities ripe for rent-seeking behavior and regulatory distortions that may interfere with efficient operation (Laffont & Tirole, 1993). These failures appear particularly likely in highly dynamic sectors, in which innovation is important. Interest group capture tends to be most prominent among sector regulators; the breadth of antitrust agency authority has long been held to be one of the defenses against such capture of antitrust processes.

If regulation is desired as a policy response to unavoidable market power, the most promising direction is likely to be interventions such as the "light touch" approach outlined in the Furman Report (2019), perhaps focused on creating interoperability and data portability that facilitate entry and competition. Giving a regulator limited authority may help to reduce capture by the regulated firms. Replicating the academic expertise of leadership in a number of the U.K. authorities, rather than the political connections that are common in U.S. regulatory agencies, could be another way to reduce capture and improve decision-making, though this is not a model that has been used for many U.S. regulatory appointments in recent decades.

In some settings, it may be current regulation that impedes competition. Regulation that is motivated by rent-seeking or that is misdirected can lead to a variety of adverse market outcomes, as is likely for much of the growth in occupational licensing that impedes labor market entry. Mitigating these effects suggests reducing or eliminating licensing requirements where they serve little purpose in protecting consumers, such as licensing of florists, interior designers, or beekeepers. In cases where some oversight may be desired to protect consumers from their inability to discern the quality of providers—say in health-care provision or plumbing or electrical work— designing programs with minimally sufficient criteria to ensure appropriate training can achieve desired outcomes at lower costs. Another example of rent-seeking regulation are the state health-care laws passed to insulate hospitals from FTC merger review, allowing consolidation that reduces competition and raises prices. Antitrust agencies serve important competition-advocacy roles in settings such as these, but it requires politicians to put competition goals ahead of rent-seeking by important, and often well-funded, constituent interests.

7. Conclusion

In conclusion, as Baker (2019), Shapiro (2019), and many others have argued, government has likely retreated too far from the role it assumed almost 130 years ago with the passage of the Sherman Antitrust Act to ensure open, fair, and competitive markets. Rebalancing competition law to invigorate enforcement will require a combination of agency action and legislative intervention. But some competition problems may not be actionable through antitrust enforcement. In these cases, recognizing that both markets and regulation are imperfect is essential to determining whether intervention is likely to improve outcomes, and to designing effective policy in those cases.

Appendix A1: Industry Classification

For many classifications, the errors introduced by using three- or four-digit NAICS codes to define an industry can be substantial. Consider Food Manufacturing: In the multinational KLEMS ([K]apital-Labor-Energy-Materials-Services) databases, this would fall under KLEMS 10-12, which includes all manufacturing of "Food products, beverages and tobacco." That level of aggregation combines a large number of industries that are neither rivals in consumer choices nor similar in production techniques or assets. The three-digit NAICS industry 311, "Food Manufacturing," illustrates the problem.

KLEMS 10-12: Food products, beverages and tobacco

NAICS three-digit: 311: Food Manufacturing, which includes among others

- 311111 Dog and Cat Food Manufacturing
- 311230 Breakfast Cereal Manufacturing
- 31135   Chocolate and Confectionery Manufacturing
- 311511 Fluid Milk Manufacturing
- 31161   Animal Slaughtering and Processing
- 3117   Seafood Product Preparation and Packaging
- 311942 Spice and Extract Manufacturing

It is immediately apparent that this three-digit NAICS aggregation combines products and firms that are not in the same market: While one could debate whether Hershey's cocoa powder competes with Teuscher truffles for consumer purchases, no one would likely suggest it competes with Purina Cat Chow, Tyson's chicken carcasses, or Stonyfield organic yogurt. But the problem is far from eliminated by moving to the four-digit NAICS level. Consider NAICS code 3112, Grain and Oilseed Milling. It includes the following products:

- 3112   Grain and Oilseed Milling
- 31121   Flour Milling and Malt Manufacturing
- 311211 Flour Milling
- 311212 Rice Milling
- 311213 Malt Manufacturing
- 31122   Starch and Vegetable Fats and Oils Manufacturing
- 311221 Wet Corn Milling
- 311224 Soybean and Other Oilseed Processing
- 311225 Fats and Oils Refining and Blending
- 31123   Breakfast Cereal Manufacturing

Flour, soybean oil, and high-fructose corn syrup are likely inputs in the production of breakfast cereals, and none of these products would appear to compete with one another. Nor are six-digit industries "correct." The market for corn syrup, a ubiquitous sweetener, likely requires not only NAICS 311221 but also cane and beet sugar manufacturing (combined in NAICS code 31131; but in different four-digit SIC codes) and perhaps for some uses, honey processing (311999) or artificial sweeteners (325199 and 325998, within the chemical manufacturing sector of the NAICS codes).

Appendix A2: Firm Revenue Assignment

Studies generally do this one of two ways, based either on establishment-level information from the United States Economic Census or private data sources such as the NETS database (United States) or Orbis, or firm-level data, such as Compustat. Studies using firm-level data typically assign the firms' entire reported global revenue to their primary reported industry category and home country.[41] For larger firms that produce multiple products or operate across multiple markets, this can be quite misleading.

Consider three examples of multiproduct firms with segment reporting:

3M (2015 10K)	Revenue
TOTAL FOR FIRM: Primary NAICS Code 322220: Cutting and coating paper and paperboard	**$31.8B**
Industrial: Tapes, coated, nonwoven and bonded abrasives, adhesives, advanced ceramics, sealants, specialty materials, filtration products, closure systems for personal hygiene products, acoustic systems products, automotive components, abrasion-resistant films, structural adhesives and paint finishing and detailing products	**11.0B**
Safety and Graphics: Personal protection products, traffic safety and security products, commercial graphics systems, commercial cleaning and protection products, floor matting, and roofing granules for asphalt shingles	**5.7B**
Electronics and Energy: Optical films solutions for electronic displays, packaging and interconnection devices, insulating and splicing solutions for the electronics, telecommunications and electrical industries, touch screens and touch monitors, renewable energy component solutions, and infrastructure protection products	**5.6B**
Health Care: Medical and surgical supplies, skin health and infection prevention products, drug delivery systems, dental and orthodontic products, health information systems and food safety products	**5.6B**
Consumer: Sponges, scouring pads, high-performance cloths, consumer and office tapes, repositionable notes, indexing systems, construction and home improvement products, home care products, protective material products, and consumer and office tapes and adhesives	**4.5B**

41 Some studies adjust global revenues for imports and exports to yield U.S. revenues; occasionally this is done at the firm level to yield U.S. sales, more often at the industry level to adjust concentration for import competition. In almost all studies that do this, the adjustments are based on aggregate import/export statistics by industry.

Archer Daniels Midland (ADM; 2017 10-K)	Net Revenue
TOTAL FOR FIRM: Primary NAICS code 31122: Starch and Vegetable Fats and Oil Processing	**$62.3B**
Agriculture Services: Grain storage, transportation networks, food and feed ingredients, structured trade finance, flour milling	**27.9B**
Corn Processing: Corn wet milling and dry milling, ethanol production, bioproducts, feed additives	**9.5B**
Oilseeds Processing: soy, canola, sunflower, etc. processing for food, feed, energy, and industrial products	**22.2B**
Wild Flavors and Specialty Ingredients: mfg, sales, distn of natural flavor ingredients, flavor systems, natural colors, proteins, etc.	**2.5B**
Other: primarily financial, futures and insurance	**0.4B**

DuPont (2015 10-K)	Net Revenue
TOTAL FOR FIRM: Primary NAICS code 3252: Resin, Synthetic Rubber, and Artificial Synthetic Fibers and Filaments Manufacturing	**$35B**
Agriculture: seeds, crop protection chemicals (54% outside US)	**11.3B**
Performance Chemicals: Titanium tech, chemicals & fluoroproducts, Teflon, commodities	**6.5B**
Performance Materials: Polymers, resins, elastomers (70% sales outside US)	**6.2B**
Safety & Protection: Personal and environment protection, incl. Kevlar, Nomex, Tyvek; homeland security consulting; solutions for construction, transportation, communication, etc.	**3.9B**
Nutrition & Health: specialty food ingredients, food nutrition, health and safety	**3.5B**
Electronics & Communications: for photovoltaics (PV), consumer electronics, displays and advanced printing	**2.4B**
Industrial Biosciences: biobased products for animal nutrition, detergents, food manufacturing, ethanol production and industrial applications	**1.3B**

A decision to assign firm-level revenues to the reported primary NAICS/SIC code would substantially misrepresent each of these firm's activities, both in the primary market and in all others in which it operates. Even with the much-abbreviated descriptions of segments included in the tables above, it is clear that most reported segments are an agglomeration of many different products, markets, and sectors that are not competitive with each other from the standpoint of customers, and may not be close substitutes in terms of production facilities and technologies. Finally, the mix of U.S. and global sales reported for some of the segments highlights the danger in assuming all or most revenue is U.S. revenue.[42]

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42 While some studies attempt to adjust for imports and exports using U.S. aggregate import/export shares by industry, there is no reason to think applying these high-level aggregates to firm-level data will produce accurate adjustments.

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