Trends in Competition in the United States: What Does the Evidence Show?*

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Abstract

Has the United States economy become less competitive in recent decades? One might think so based on a body of research that has rapidly become influential for antitrust policy. We explain that the empirical evidence relating to concentration trends, markup trends, and the effects of mergers does not actually show a widespread decline in competition. Nor does it provide a basis for dramatic changes in antitrust policy. To the contrary, in many respects the evidence indicates that the changes observed in a number of industries are likely to reflect competition in action. We highlight research that points to targeted interventions that can enable antitrust enforcement policy to better promote and protect competition. Throughout the paper, we identify open questions and opportunities for future research in the cross-industry evidence-at-scale paradigm, the industry-specific study paradigm, and their intersection.

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1. Introduction

> "*Capitalism without competition isn't capitalism. It's exploitation*." President Joe Biden

One of the bedrock principles of economics is that competitive markets perform better than monopolized ones in delivering lower prices, better products, and faster innovation. The policy of the United States since at least the Sherman Act of 1890 has been to promote competitive markets and control monopolies. This basic goal has extremely broad and bipartisan support.

How are we doing with that?

Many would say we are doing poorly. They believe there has been a widespread and significant decline in competition in the U.S. economy in recent decades which has caused substantial harm to the public. We call this the "decline-in-competition" hypothesis.

In support of the decline-in-competition hypothesis, some point to recent research showing that economic activity has become more concentrated. Others point to findings that price/cost markups have grown. Yet others point to additional metrics, such as the decline in the labor share, a lower rate of new-business formation, or rising common ownership of publicly traded firms. The research underlying these claims has not generally followed the approach usually taken in the field of industrial organization to evaluating market power, which involves looking at individual firms, markets, or industries in some detail to understand the forces driving change and to detect any anticompetitive conduct or mergers. Instead, these claims are about the U.S. economy overall based on *evidence at scale*, by which we mean aggregated data available across many industries.[1]

In this paper, we take a close look at the empirical evidence regarding trends in competition and market power in the United States to see how the decline-in-competition hypothesis holds up. We do not address the critically important but distinct issue of whether the *political* power of large firms has grown, or how political power interacts with economic power. Assessing trends in the political power of large companies would require very different types of empirical evidence than those used to assess trends in economic power. Furthermore, very different policies are used to directly control the political power of large companies, notably the rules regarding campaign finance, lobbying, and media ownership.

We especially pay attention to the implications of the empirical evidence for *antitrust policy*. In the end, while we favor strong antitrust enforcement and have serious concerns that some court decisions have hindered that objective, we do not believe that the recent research using evidence at scale comes close to supporting dramatic changes in antitrust policy.[2]

The speed with which the decline-in-competition hypothesis has been accepted as ground truth and used to justify major changes in antitrust policy is striking. Very quickly upon taking office, the Biden Administration embraced the view that competition has declined substantially throughout the U.S. economy. President Biden's July 2021 Executive Order on Promoting Competition in the American Economy states: "Yet over the last several decades, as industries

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[1] See Syverson (2019) for a thoughtful discussion of the use of evidence at scale vs. more detailed industry studies.

[2] Miller (2024) critiques the "rise in market power" hypothesis. His overall policy conclusions align well with ours. Gilbert (2023) discusses the evidence about rising market power and the implications for antitrust policy. Shapiro (2018) raised questions about the decline-in-competition hypothesis as it was gaining popularity.

have consolidated, competition has weakened in too many markets, denying Americans the benefits of an open economy and widening racial, income, and wealth inequality." That Executive Order deemed decades of antitrust policy to have been a failure. "Federal Government inaction has contributed to these problems, with workers, farmers, small businesses, and consumers paying the price." In case the message was not clear enough, President Biden added this zinger: "We're now 40 years into the experiment of letting giant corporations accumulate more and more power. And where — what have we gotten from it? Less growth, weakened investment, fewer small businesses. Too many Americans who feel left behind. Too many people who are poorer than their parents. I believe the experiment failed."[3]

The leaders appointed by President Biden to run the Federal Trade Commission (FTC) and the Antitrust Division of the Department of Justice (DOJ) have followed President Biden's lead. They have criticized antitrust policy over the past 40 years as timid and misguided and pledged to depart sharply from the policies taken by their own agencies for decades.[4]

Is this an instance of policy makers learning quickly from economic research? Many economists can only dream that their research will be put into action so quickly, if ever. Alternatively, and far less happily for economists, is this an instance of policy makers citing research findings to give credibility to policies they are adopting for political reasons that are not actually warranted based on those and other research findings?

As we assess the empirical evidence and identify key areas for future research, we find it useful to contrast the decline-in-competition hypothesis with the much cheerier view that many of the changes we have seen in the structure and performance of U.S. industries represent healthy competition that has delivered benefits to the public. We call this the "competition-in-action" hypothesis. For example, if a few "superstar" firms in an industry grow by delivering greater value to customers based on their superior ability to adopt and use new technologies that involve higher fixed costs and lower marginal costs, we would expect both concentration and price/cost markups to rise, along the lines developed brilliantly by Sutton (1991 and 1997).

The decline-in-competition hypothesis and the competition-in-action hypothesis are both statements about what has happened *generally* in the U.S. economy in recent decades. In reality, competition has declined in some markets and increased in others, so one should not be looking for a single across-the-board victor in the duel between these two hypotheses. Rather, economic research can help us learn *which* markets have experienced a decline in competition, and why.

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[3] Remarks by President Biden At Signing of An Executive Order Promoting Competition in the American Economy, July 9, 2021.

[4] "Evidence suggest that decades of mergers have been a key driver of consolidation across industries, with the latest merger wave threatening to concentrate our markets further yet. … While the current merger boom has delivered massive fees for investment banks, evidence suggests that many Americans historically have lost out, with diminished opportunity, higher prices, lower wages, and lagging innovation." Khan (2022), p. 2. "For more than 40 years, antitrust enforcement has not kept pace with the need to rein in anticompetitive mergers and business conduct. As a result, in too many sectors a few powerful companies dominate products and services – many of which are core to the everyday experience of the American people and the global economy. We see this in higher consumer prices, lower wages, and fewer new businesses being created." Kanter (2022) "Corporate power has grown to levels that leave our fellow citizens concerned and confused. On a daily basis, I am asked how the laws meant to protect competition went astray, and what we can do to reinvigorate antitrust enforcement and meet our nation's challenges. … In my view, we are living through the error costs of underenforcement, and we owe it to our future to learn from those mistakes and take action to correct our path." Kanter (2023a).

Armed with that knowledge, we can diagnose what caused that decline and evaluate possible policy responses.

Evidence at scale has the great advantage of allowing one to look across many markets and thus to detect broad trends in certain metrics. Credible evidence at scale can thus serve as a valuable "early warning system" about changes in industry structure and performance. However, that great advantage comes hand-in-hand with a major limitation for policy purposes: observing trends in concentration or price/cost markups at scale does not allow us to distinguish between the decline-in-competition hypothesis and the competition-in-action hypothesis, either in individual markets or overall. Critically, observing how concentration in an industry has changed over time, or how price/cost markups in an industry have changed over time, does not tell us what *caused* those changes, whether they represent competition in action or competition in decline and, if the latter, what policy responses would be warranted.[5] Therefore, while the evidence at scale can usefully alert us to general trends in certain metrics and help us identify industries that warrant further study, taken alone it cannot offer a valid basis for making major changes in antitrust policy.

We focus on monopoly power in product markets rather than monopsony power in input markets. The analysis of monopsony shares much in common with monopoly, but data on intermediates is generally harder to come by and the supply chain is harder to analyze than final goods. That said, there is a growing literature on empirical models of market power in input markets (Lee et al., 2021) and on applying production function methods to estimate markdowns in input markets (Rubens, 2023). There also is a resurgent interest in monopsony power in labor markets (Manning, 2021) and on the effect of mergers on wages (Prager and Schmitt, 2021).

Section 2 considers evidence about the trends in the *concentration of economic activity* in the United States. Politicians and the press often point to rising concentration in the U.S. economy as a cause for concern. However, setting aside issues relating to political power, concentration metrics have no chance of being informative regarding product-market power unless calculated over a set of products that are reasonable substitutes for each other.[6]

The data typically used to measure concentration use Census production data, and define markets following the North American Industry Classification System (NAICS) which was not designed to capture collections of substitute products and does not do so. As a result, the measures of concentration typically cited are not informative regarding market power. Period. If anything, the evidence at scale indicates that large and efficient "superstar" firms in many sectors of the economy have grown, as documented by Autor, et. al. (2020), and that increases in concentration are correlated with faster productivity and real output growth, as shown by Ganapati (2021). Research that measures concentration in more narrowly defined markets (Benkard et al., 2023) or that accounts for imports (Amiti and Heise, 2024) find decreasing or flat trends in

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[5] Bresnahan (1989) and Schmalensee (1989) provide thoughtful discussions (some 35 years ago) of the pros and cons of using industry studies vs. cross-sectional evidence to identify and address market power.

[6] As one example of how concentration measures can be misleading if not based on a set of products or services that are reasonable substitutes, suppose a handful of regional retailers expand geographically and become national firms. Suppose these expansions benefit consumers by injecting more competition into many local retail markets. Concentration measured at the national level would rise substantially, giving a misleading signal of diminished competition because a retailer just in one region does not compete against a retailer just in another. The error would be compounded if over the same time period a few large online retailers that operate nationally grew rapidly.

concentration. More work is needed to measure trends in concentration using products and services that are reasonable substitutes and to see how that metric correlates with outcome variables such as prices, productivity growth, or the pace of innovation.

Section 3 looks at evidence about trends in *price/cost markups.* The ratio of price to marginal cost is a far more direct and meaningful measure of market power than market concentration. Industrial organization economists often use price/cost markups as a measure of market power. After all, the simplest pricing rule for a profit-maximizing firm is $P = MC \frac{\varepsilon}{\varepsilon-1}$, where P is price, MC is marginal cost, and ε is the firm-specific elasticity of demand. For most products, we do not expect price to equal marginal cost, because some gap between price and marginal cost is typically necessary to allow the recovery of fixed costs, including R&D costs. Still, along with other evidence, changes in price/cost markups over time can be informative about how a market is evolving. For example, price/cost markups can rise as firms adopt new information technology that reduces marginal costs, raises fixed costs, and increases minimum efficient scale, but also as a result of increased cartel activity or horizontal mergers that reduce competition.

There has been a vigorous debate about trends in price/cost markups in the United States. The seminal paper in this literature is De Loecker, et. al. (2020). They estimate that the revenue-weighted average markup has risen from around 1.21 in 1980 to 1.61 in 2018. This paper has been heavily cited by those who believe there has been a widespread decline in competition in the United States in recent decades. This literature has made important contributions, but it does not provide a reliable basis for setting antitrust policy. Our reservations are based on problems with both measuring and interpreting trends in price/cost markups.

Regarding measurement, the basic challenge facing this line of research is that marginal costs are not observed, so researchers have resorted to inferring them based on observable variables, such as reported revenues and accounting costs, or market shares and prices, which requires making certain assumptions about how accounting data should be interpreted and how oligopolistic firms behave. Moreover, the estimated levels and trends in price/cost markups are not very robust: they are sensitive to the specific approach taken and assumptions made. Further work is needed to achieve more reliable measurements, especially by comparing the evidence-at-scale about price/cost markups with the estimates obtained from detailed industry studies.

Compounding this problem, the unit of analysis in this literature is the firm rather than the product, geography, or even the line of business. This is not a minor difference for large firms that sell many different products and have numerous distinct lines of business. For example, Sony is assigned to Semiconductor and Other Electronics Manufactures (NAICS Code 3344). That category itself covers quite a range of different products, themselves highly varied. Moreover, Sony owns a huge gaming business, a large studio that makes movies and television shows, a major music label, and even a life insurance company and a bank in Japan.[7] The idea that a single price/cost markup applies to Sony is unpalatable.

Suspending one's skepticism and taking the results at face value, the central finding of this literature is that the economy-wide ratio of revenue to the "cost of goods sold" that firms report has gone up in recent decades, mostly because firms with high markups have grown more

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[7] In 2022, Sony earned $26B revenue from games and network services, $18B from electronics products and solutions, and $10B from each of financial services, music, pictures, and imaging and sensing solutions. See https://www.statista.com/statistics/297533/sony-sales-worldwide-by-business-segment/.

rapidly. The competition-in-decline interpretation of this finding is that many firms with market power consolidated that power over time through anti-competitive means and exploited their enhanced power by raising prices. The competition-in-action interpretation is that many highly efficient "superstar" firms with lower costs and thus higher price/cost markups grew by competing effectively against their less efficient rivals and/or by expanding geographically. Simply observing that price/cost markups rose as revenue was reallocated to firms with higher markups does not help us distinguish between the decline-in-competition hypothesis and the competition-in-action hypothesis.

As a matter of arithmetic, price/cost markups can go up because prices go up, because costs go down (with less than full pass-through to lower prices), or both. Distinguishing between price increases and cost decreases is essential for understanding whether customers have been harmed by any increase in markups and hence for antitrust policy purposes. More empirical work that makes this distinction, either at scale or market-by-market, would be highly informative.

Section 4 turns to a far more direct test of antitrust policy: evidence from merger retrospectives. Those who argue there has been a substantial decline in competition often attribute this to an excessively permissive policy toward mergers. They point to the literature on merger retrospectives as proof that mergers allowed by the antitrust agencies in recent decades have systematically led to widespread harms including higher prices, lower wages, and slower innovation. We agree that many mergers have been shown to lead to higher prices or other harms to customers, but others have been shown to lead to lower prices for customers.

The policy lessons we draw from this body of evidence are nuanced and vary by industry. For example, there is ample evidence supporting a stricter policy toward hospital mergers, but the evidence from airline mergers and retail mergers is mixed. Convincing studies find that the merger between Miller and Coors led to higher prices for beer and the acquisition of Maytag by Whirlpool led to higher prices for some appliances, but these findings do not have clear implications for other industries. In the end, while we favor strict enforcement for horizontal mergers, the evidence from merger retrospectives does not provide a basis for major changes in the methods used to evaluate mergers, such as a return to the highly structural policies of the 1960s. Detailed case studies of recent mergers that were closely investigated but allowed to proceed could be highly informative regarding the accuracy of the methods used to predict the effects of mergers, even if the data do not allow one to measure the actual price effects.

Section 5 addresses three other metrics that have been cited as supporting the decline-in-competition hypothesis: the decline of the labor share, reduced business dynamism, and increased common ownership of publicly traded firms.

Section 6 discusses the implications of all this evidence for antitrust policy and makes suggestions for where future research would be most informative for identifying those markets in which competition has declined and diagnosing what caused that decline. Further progress can be made by using evidence-at-scale to guide where industry studies are most likely to bear fruit.

2. Market Concentration

Industrial organization economists focused on market concentration during the middle of the last century, and market concentration remains important in the field today. Undergraduate industrial organization courses often begin by classifying markets based on their structure. Monopoly, with maximal market concentration, is at one extreme. Perfect competition, with minimal

concentration, is at the other extreme. Oligopoly, with a few large firms and a high level of concentration, is in the middle. One standard measure of market concentration is the Herfindahl Hirschman index (HHI), which equals the sum of the squares of each firm's market share (measured in percentage points). Another is the four-firm concentration index (C4), which equals the combined market share of the top four firms.

The assertion that market concentration has been rising throughout the U.S economy in recent decades has been a key ingredient in calls for antitrust reform. What does the evidence show?

In recent years, conventional wisdom has calcified around findings of increasing concentration in many sectors of the U.S. economy. Peltzman (2014), Council of Economic Advisers (2016), Barkai (2020), Autor et al. (2020), and others all report increasing sectoral concentration using data from the Economic Census. Grullon, et al. (2019), Covarrubias et al. (2020), and others report increasing sectoral concentration using financial data from Compustat. These results have been cited in a wide variety of prominent popular publications and in survey and overview papers in economics such as Syverson (2019) and Akcigit and Ates (2021).

In this section, we ask what is known empirically about the concentration of sectors and markets in the United States and how it has evolved in recent decades. We begin by discussing the formidable challenges to measuring market concentration "at scale" – meaning in many markets throughout the U.S. economy. We then consider how best to interpret evidence about market concentration, with an eye to policy implications for antitrust.

One needs to be careful interpreting evidence about changes in concentration over time because the factors that have *caused* those changes matter a great deal for fashioning the best policy response. In particular, if a market has become more concentrated over time because some firms became increasingly efficient and thus have gained share from other firms by offering better products at lower prices, that is properly seen as competition in action, not a failure of competition policy. Alternatively, if a market has become more concentrated a result of mergers between competitors that have led to higher prices without offsetting quality or variety gains, that would indicate a failure of merger enforcement. The need to examine the mechanisms that are causing changes in market concentration has been well understood for at least 50 years; see Demsetz (1973). We close this section by addressing implications for antitrust policy.

A. What Products Are Included in the "Markets" Being Studied?

Logically, any measurement of market concentration must begin by specifying which products are included in the market. For example, is one measuring concentration for all breakfast foods, just ready-to-eat cereals, or just non-sweetened ready-to-eat cereals? Does one include breakfasts eaten in restaurants or just at home? Is one looking nationwide or at local areas one-by-one?

For the purpose of antitrust policy, market boundaries are most informative if greater concentration within each "market" is likely to imply greater exercise of market power over the products in that market. Ideally, any market used to measure market concentration should include a collection of reasonable substitutes, but not other products. In antitrust, this is accomplished using the hypothetical monopolist test (HMT) to define the "relevant market,"[8] as

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[8] The Merger Guidelines issued by the DOJ and the FTC explain in detail how the HMT works. The Merger Guidelines have used the HMT to define markets since 1982.

well as commonsense factors such as firms' internal assessments of which products are direct rivals. However, using the HMT is not feasible when looking at a large number of markets.

The studies cited above rely on NAICS codes to define markets nationally, together with Economic Census or Compustat data to measure market shares.[9] Unfortunately, as is well known in some circles, these data are just not capable of identifying collections of products for which concentration is informative about market power. Two examples serve to illustrate the problem.

> **Underestimating Market Concentration by Using Overly Broad Categories:** NAICS code 325412 is "Pharmaceutical Preparation Manufacturing." Using this as a "market," a drug which treats one disease would be in the same "market" as all other drugs which treat other diseases. In the extreme, if there were many diseases of similar prevalence and severity, and each disease class had a single patented monopolist, measuring concentration in NAICS code 325412 would misleadingly find low concentration. By contrast, researchers studying the industrial organization of pharmaceutical markets have tended to define markets far more narrowly. For example, Cunningham, Ederer, and Ma (2021) define markets as a combination of therapeutic class and mechanism of action. This sensible procedure results in hundreds of separate pharmaceutical markets.

> Similarly, NAICS code 513210 is "Software Publishers." This code lumps together all software whether it be desktop operating systems, enterprise databases, mobile apps, computer games, or specialized technical software.

> **Missing a Decline in Market Concentration by Using Overly Broad Regions**: NAICS code 444130 is "Hardware Stores." Consider competition among hardware stores before and after the expansion of Home Depot and Lowe's. Suppose each city starts with its own monopoly hardware store with a different local owner. New technology then enables economies of scale across geographies, causing the most efficient hardware stores to expand nationally. Suppose the result is that each city is served by two big-box hardware stores, Home Depot and Lowe's. Concentration measured at the national level will have increased dramatically, from a very fragmented industry to a duopoly. But consumers would benefit from greater local competition, having two choices rather than just one.

The Economic Census does include geographic information, measuring output at the point of production. But using these data to look at local "markets" will also result in misleading measurements. For example, at the county level, a large beer brewery such as Anheuser Busch in St. Louis will have a market share near 100% in the county of production, and zero in a county where it does not have a brewery location, such as in New York County containing Manhattan. But the relevant measure for local market power is the market share among purchasers, not the share of production near the locations of the plants.

Measurement at the location of production also creates two other major problems. First, the Census data does not account for imports, which have become increasingly important in recent decades, especially for manufacturing, where competition from inexpensive imports has caused many domestic firms to decline or exit. Amiti and Hesse (2024) show that accounting for imports eliminates the measured increase in manufacturing concentration found in the Census data, even when defining markets based on NAICS codes. Second, even for retail, where one might hope

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[9] See also Pellegrino (2024) which uses text analysis methods from Hoberg and Phillips (2016) to model fuzzy market definitions with the Compustat data.

that the Census concentration metrics would more closely resemble sales concentration among consumers, online retail scrambles the location of production and consumption.

B. Concentration Measures Using Economic Census Data

With this context in mind, what do the data tell us? Barkai (2020) and Autor et al. (2020) document that median concentration rose between 1982 and 2012. In the manufacturing sector, for example, Autor et al. report that the median C4 rose from about 39% to about 43%. What is immediately striking to us about these numbers, as industrial organization and antitrust economists, is not the rather modest increase in C4, but its low level. Customers in such markets have many choices: there must be at least six rivals in addition to the top four. We are unaware of evidence that firms in markets with a C4 of around 40% generally have significant market power. And this is before accounting for imports, which have put substantial competitive pressure on domestic manufacturers for at least the past 25 years.

If one looks outside of manufacturing, the measured concentration levels are even lower. Autor et al. (2020) report that the median C4 in services rose from about 11% to about 14%. A C4 of 14% implies at least 30 firms in the market. If these markets were defined for antitrust purposes, the interpretation of these data would be that concentration is rising by small amounts, but the levels are so low to begin with that these small increases are far from triggering worry about market power, much less a failure of antitrust policy.

As discussed earlier, the NAICS codes do not define sensible markets for the purpose of assessing market power. As with the pharmaceuticals example, they are often far too broad. This is one reason why the measured levels are so low in the Census data. As Peltzman (2014) puts it, "One clear question for further research is whether concentration in economic markets has increased... along with the increased concentration in Census Bureau industries." In this formulation, "economic markets" refers to markets defined as would be for antitrust purposes and "Census Bureau industries" refers to NAICS codes.

C. More Informative Measures of Concentration

Benkard et al. (2023) seek to measure market concentration at scale using data that line up much better with properly defined markets than do NAICS codes. More specifically, they use data and market definitions constructed by a private sector firm, MRI, which surveys a rolling panel of individuals about hundreds of product choices. The main use case for MRI data is for firms doing competitive analysis and media planning for consumer products. For example, Budweiser or Toyota might use MRI data to see which TV shows or websites are viewed by its own or its rivals' customers so as to plan their advertising campaigns. MRI defines markets based on their perception of what MRI's customers, the firms in the market, demand. This is likely to yield results that mimic the practice in merger review of using the merging firms' internal documents to identify their most significant rivals.

One can also examine the definitions provided in Benkard et al. (2023) and compare them to corresponding NAICS code definitions and apply an eyeball test. Benkard et al. (2023) provide the example of NAICS code 32620, "Toilet Preparation Manufacturing" which they match to 42 different MRI markets including deodorant, mouthwash, dental floss, and sunscreen—none of which are substitutes for each other, to say the least. Similarly, NAICS code 325611, "Soap and Other Detergent Manufacturing" contains hand soap, dish soap, toothpaste, and laundry

detergent, all of which are separated in the MRI data. Returning to the original pharmaceuticals example, MRI has a distinct category for cold, sinus, and allergy remedies; for diarrhea remedies; for headache and pain relievers; for medicated skin ointments; and for non-prescription sleep tablets, among others—again, not remotely substitutes for each other.

Benkard et al. (2023) makes two points about concentration as measured using MRI data. First, concentration levels are much higher than one gets using NAICS code market definitions. The median HHI across markets in their data set is 2279 and the median C4 exceeds 75%, more than double that in the Census data for manufacturing. These are the sorts of levels where antitrust jurisdictions around the world pay attention to merger activity. Second, concentration levels have *fallen* over the period 1994 to 2019. Median C4 fell from about 77.5% to about 72.5%, with the largest decreases in the highest percentiles of the distribution. Both of these facts are in stark contrast to the results using Census data where levels are low and increasing. When Benkard et al. (2023) aggregate the MRI markets into larger sectors, they find lower levels and increasing concentration over the time sample, consistent with the Census data analysis.

The MRI data cover several hundred markets and include services such as credit cards, airlines, car rental, hotels, operating systems, health insurances, and restaurants in addition to many manufacturing markets in food, consumer packaged goods, health and beauty, automobiles, and electronics. 71 of the Fortune 100 firms in 2019 appear in at least one market of the full data set. However, MRI does focus on consumer facing products with national reach. The MRI data thus misses the large business-to-business sector (Fortune 100 companies not found in the data include Oracle, Caterpillar, Boeing, and Lockheed Martin). The MRI data also misses more locally disaggregated services such as hospitals, dentists, plumbers, ice cream parlors, hairdressers, and similar, whereas the Census covers the universe of production in the United States. In contrast to the Census data, however, the MRI data does include imports.

Benkard et al. (2023) show that the difference in results between MRI and Census is due to how "markets" are defined, not due to the set of products under study. In particular, when the Census analysis is limited to NAICS codes that match at least one MRI market, concentration is low and increasing, as in the full sample.

Turning to geographic market definition issues, Benkard et al. (2023) find no difference in the trends for national and local measures of concentration. This particular finding may be specific to the coverage of their data set, which focuses on product markets where brands tend to have national reach. Rossi Hansberg et al. (2021) use data from Dun and Bradstreet with NAICS code market definitions, but for markets as local as zip codes. They find decreasing concentration at the local level and increasing concentration at the national level, the latter being consistent with Census data. One downside of this analysis is that the Dun and Bradstreet sales data at the local level are mostly imputed by the data provider based on more aggregate data. Crane and Decker (2019) report imputation rates exceeding 90% for large firms. With this caveat in mind, a strong warning emerges: concentration measures for retail and local services using national Census data do not match those that would be useful for antitrust analysis.[10]

Benkard et al. (2023) decompose the changes in HHI over time into components corresponding to mergers, divestitures, entry, exit, and a residual term that captures the reallocation of market

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[10] For many retail markets, how best to deal with ecommerce when measuring market shares remains an open question, so far as we are aware. And a big one, given that e-commerce grew enormously in the last twenty years.

shares among incumbents. The biggest single contributors to changes in HHI are entry and exit, which largely cancel each other out. Mergers on their own consistently raise HHI over time and outweigh whatever reductions come from divestitures. The reallocation of shares among incumbents has significantly *reduced* HHIs in recent years which drives the net effect of decreasing overall HHI.

Lastly, Benkard et al. (2023) find that concentration decreases where most pronounced at the higher levels. The 50th, 75th and 90th percentile of concentration drop substantially while the 10th and 25th percentile are flat. Such a pattern is consistent with highly concentrated markets attracting new entry or investment from firms that are not leaders in those markets.

Viewed alongside the Economic Census data, these findings indicate that concentration as measured using NAICS codes for consumer products has risen because successful firms often expanded into adjacent markets within this sector. This pattern strongly suggests that increases in concentration in the sale of these consumer products represents competition in action, not a decline in competition. Similar research in other sectors of the economy to measure changes in concentration and to decompose the sources of those changes would be highly informative.

D. What Do We Learn from the Concentration Evidence?

For the reasons given above, we do not believe that the concentration evidence based on the data from the Economic Census is informative regarding the overall level or trend in concentration in well-defined "markets" in the United States, much less market power in those markets.

This literature does provide significant support for the proposition that larger firms are accounting for a greater share of economic activity over time. But this literature alone cannot tell us what forces are behind this trend. If larger firms are systematically growing by acquiring their rivals, that could well indicate a failure of antitrust enforcement. Alternatively, if they are growing based on greater efficiency, that would represent competition in action.

Consider, for example, a market in which C4 is 90%, having grown from 50% a decade ago. Surely the interpretation of this increase in concentration—and any antitrust policy implication— is very different if it resulted from internal growth by several large, efficient firms, leading to better products and lower prices, rather than from horizontal mergers that led to higher prices. To make normative statements about changes in market concentration requires the analyst to determine the underlying mechanisms that generated those changes.

There exist numerous simple and standard models in economics that collectively generate ambiguous relationships between changes over time in concentration and changes over time in consumer welfare, depending on what is driving those changes.[11] A common refrain amongst IO economists is that concentration is an outcome, not a primitive.

Ganapati (2021) provides important empirical evidence for discriminating between these theories in the current context. Using NAICS market definitions and Economic Census data, he finds robust positive correlations over time between concentration and measures of productivity and

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[11] A horizontal merger can easily cause an increase in concentration and a decrease in consumer welfare. In a model of homogeneous products with Cournot competition and linear marginal costs, the decline in consumer surplus from a merger is monotonically increasing in the change in concentration. See Nocke and Whinston (2022). By way of contrast, a decline in trade costs can easily cause an increase in concentration and an increase in consumer welfare. This can happen as efficient firms grow and inefficient firms exit the market. See Melitz and Ottaviano (2008).

between concentration and measures of real output. In other words, the NAICS codes where concentration increased more also tended to experience greater output expansion and higher productivity. One simple theory consistent with Ganapati (2021), Benkard et al. (2023), and the Economic Census concentration papers is that efficient firms have expanded across a number of antitrust product markets within NAICS sectors.[12] These expansions appear to have injected additional competition into highly concentrated markets. In sectors where successful firms are expanding in this way, antitrust enforcement has an important role to play to stop mergers between actual and potential competitors that would weaken this dynamic.

Turning more directly to the role of antitrust policy, proponents of the decline-in-competition hypothesis often point to competition authorities in the European Union as role models for stronger enforcement (Philippon, 2019). A comparison between the U.S. and the EU thus provides a test of sorts for the role antitrust policy. What researchers have found in the EU data is very similar to the U.S. data. Using data sets similar in nature to the Economic Census, both Koltay et al. (2023) and Calligaris et al. (2024) document increases in C4 at industry-code levels of between 4% and 7% at average levels of around 30%. In addition, Figure 5 of Koltay et al. (2023) documents that the share of industry-codes with C4 above 50% increased from 15% to 28% from 1998 to 2019. These results suffer from the same challenges as do the results from the Economic Census in defining markets, accounting for imports, and separating the location of production from the location of consumption. The main take-away from the headline results is that concentration in Europe measured in this way is on average low but increasing, quite similar to the United States.

Calligaris et al. (2024) uses data from Euromonitor to measure concentration for some more narrowly defined product markets, similar in objective to what Benkard et al. (2023) does for the United States using consumer survey data. Euromonitor is a market research firm which aggregates diverse sources of data and market research into market share estimates at the country level. While the exact methodology is unknown, Calligaris et al. (2024) finds that in the Euromonitor data, the average C4 in markets defined based on Euromonitor is about 60% in the EU. From 2012 to 2019, average C4 in the EU increased by 0.75 percentage points and 0.5 percentage points in the U.S. These data cover a shorter time period, but our main take-away is that using narrower, more antitrust-appropriate product markets greatly lowers the increase in measured concentration, somewhat similar to Benkard et al. (2023) for the U.S.

Looking at more refined results, Bighelli et al. (2023) finds a positive correlation between concentration increases and productivity measures in Europe at the sector level, echoing Ganapati (2021). Figure 6 of Koltay et al. (2023) shows that the most concentrated industries in Europe experienced decreases in concentration over time. This finding is consistent with these industries attracting entry and/or expansion by incumbent firms with smaller shares at the industry level, echoing similar results in Benkard et al. (2023) of concentration declining in the highest percentiles.

The European Commission itself has determined that the trends in Europe over the past 25 years have been similar to those in the United States. Based on a comprehensive study, the European Commission (2024) made the following statement:

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[12] Hoberg and Phillips (2022) provides additional evidence consistent with this explanation using text-based measures of firm scope.

"The trends in the EU regarding concentration, markups and profits seem to have gone in the same direction as in other advanced economies, although they appear to be somewhat less pronounced than in the U.S." (see abstract)

The European Commission attributed these changes largely to underlying economic forces that are common to the United States and Europe:

"An important driver of the developments observed over the past 25 years seems to be that, across many sectors, large first-mover firms can reap most of the benefits ('winner takes most' dynamics), largely due to long-term structural economic shifts: (i) rise of the share of investments in proprietary IT solutions and data or other intangibles (e.g. R&D, patents, brands), (ii) globalisation, and (iii) possibly to a more limited extent rising M&A activity." Regulatory barriers to entry and exit may also have contributed to these trends."

Maintaining the hypothesis that EU merger policy has been strict while U.S. policy has been too lax, the admittedly crude test of comparing concentration outcomes between the U.S. and the EU suggests that whatever changes have occurred were not due to merger policy. Nonetheless, in industries where investments in intangibles and globalization are providing strong first-mover advantages to incumbents, antitrust enforcement going forward is important to ensure that incumbents with strong competitive advantages cannot block or acquire emerging threats.

To summarize, if one were to measure concentration using "markets" based on NAICS codes, then the levels are so low and the increase so modest that traditional concerns associated with market concentration are unlikely to be significant in most U.S. industries. Alternatively, if one uses narrower markets that include reasonable substitutes, as in Benkard et al (2023), then one would conclude that concentration levels in the U.S. economy are such that antitrust enforcers should remain vigilant, but that decreases in the median and in the highest percentiles of concentration do not support a conclusion that there has been a decline in competition or that antitrust enforcement has been inadequate. Analysis of concentration using data from the EU shows essentially the same patterns as data from the U.S., which suggests that the underlying drivers are not related to the strictness of merger control. In short, the existing empirical evidence regarding market concentration does not provide an empirical basis for major changes in antitrust enforcement.

3. Price/Cost Markups and Profits

The second main body of empirical evidence regarding the evolution of market power throughout the U.S. economy seeks to measure market power based on the ratio of price to marginal cost, which is called the *price/cost markup*, for a large number of firms.

This direct approach to measuring market power is more promising than the indirect approach based on market concentration. After all, in textbooks a firm is typically defined to have market power if can profitably set price above marginal cost. Some markups are necessary for the recovery of fixed costs – think of writing a book, creating a piece of software, producing a movie, developing a new drug, designing a more fuel-efficient jet engine, or most any investment, such as building a factory, a hotel, or a pipeline. Even so, a widespread *increase* in markups would warrant further examination as to its underlying causes, especially if observed in conjunction with a widespread rise in profits.

As with concentration metrics, there are challenges both to *measuring* price/cost markups and to *interpreting* them for the purpose of reaching normative conclusions and making antitrust policy recommendations – that is, to determine whether observed high markups are due to a failure of competition or competition in action. We address these challenges in turn.

A. Measuring Price/Cost Markups

One major challenge to measuring price/cost markups at scale is that marginal costs are notoriously difficult to observe based in the firm-level data that is available at scale. First, distinguishing costs that vary with output (over the relevant range and time frame) from those that do not is extremely difficult to do at scale. Second, marginal costs often include hard-to-observe opportunity costs, especially when firms face capacity constraints. Third, multi-product firms typically have variable costs which are shared across different products and hard to apportion. Fourth, just how one aggregates estimated price/cost markups from the product level up to the firm level, and from the firm level up to summary measures for entire sectors or the whole economy, matters quantitatively and for interpretation. For example, a shift toward industries in which intellectual property is more important will itself cause an increase in economy-wide average markups, even without any within-industry changes.

Because firms' marginal costs cannot be directly observed, researchers have developed indirect schemes to infer what marginal costs must have been to generate the realized observations of more easily observed variables such as revenue or input expenditures. Such inferences are only valid under specified assumptions about how firms operate and interact with each other.

There are two leading approaches to the estimation of price/cost markups.

Under the "demand approach," one estimates a consumer demand system and makes assumptions about firm conduct to infer what marginal costs must have been to generate the observed prices, given that demand system and the assumed firm conduct. Applying the demand approach to many markets over many time periods is challenging if not impossible, given data availability and the requirements to estimate many reliable demand systems.

Under the "production approach," one uses data on inputs and outputs to infer what the price/cost markup must have been such that a cost-minimizing firm would choose to produce the observed amount of output using the observed amount of the inputs. The production approach has been modified and applied at scale to both Census and Compustat firm-level data.

The production approach follows Hall (1988) and De Loecker and Warzyinski (2012). To see how it works, consider an idealized setting of a single-product firm that uses a single flexible input. This simple setting abstracts from the challenges noted above regarding the time frame, opportunity costs, joint costs, and aggregation. In this setting, when output changes, all changes in total costs are due to changes in the payments to the one flexible input. The key behavioral assumption is that the firm minimizes the cost of producing whatever quantity it chooses. We consider cost minimization to be a mild and reasonable assumption. Cost minimization implies a relationship between the quantity produced, the total revenue of the firm, the total outlays for the flexible input, the elasticity of output with respect to that input, and the price/cost markup. If one observes the quantity produced, the total revenue of the firm, the total outlays for the flexible

input, and has an estimate of the elasticity of output with respect to that input,[13] then one can recover an estimate of the remaining piece in that relationship, the price/cost markup.

The pioneering study by De Loecker, Eeckhout, and Unger (2020) ("DLEU") using the production approach has been highly influential in this literature. DLEU use Compustat data to estimate price/cost markups for a large number of publicly traded firms. Their headline finding is that revenue-weighted average markups have risen from around 1.21 in 1980 to 1.61 in 2018. This finding has frequently been cited in support of the claim that antitrust enforcement in the United States since 1980 has been a failure and hence in need of a major overhaul.

We now look under the hood at how these influential estimates were derived.[14]

Underlying this sharp headline rise in average price/cost markups is an estimate of the price/cost markup for each firm in each year. To understand what is driving the headline result, one must start with these underlying firm-level measurements.

The application of the production approach to Compustat data departs in important ways from the idealized setting described above. First, the variable used as the flexible input, the accounting variable "cost of goods sold," includes some inputs that are not flexible. Second, most firms, especially large ones, sell multiple products, and their product mix shifts over time. Third, the researcher observes revenue instead of quantity, which presents challenges for estimating the elasticity of output with respect to the flexible input.[15] A critical question is whether these departures are significant enough to meaningfully undermine the results, or whether they are merely the type of acceptable measurement errors that are unavoidable in any large-scale empirical analysis.

1. Cost of Goods Sold

Cost of Goods Sold (COGS), together with Sales, General, and Administrative (SG&A), make up operating costs in the financial statements filed by publicly traded firms.

A key observation is that the estimated increase in markups found by DLEU is essentially the same as the weighted average ratio of revenue to COGS in the Compustat data, which requires no econometrics and only simple arithmetic to calculate. As DLEU state "the time-series markup pattern is dominated by the dynamics in the sales-to-expenditure (here the wage bill) ratio, and the output elasticity mostly affects the level." (p. 589)

What is COGS? The name suggests that it consists solely of items like raw materials—in which case COGS might function well as an analogue of the variable input in the idealized scenario. In reality, however, COGS is much broader. By Generally Accepted Accounting Practices (GAAP)

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[13] To obtain such an estimate, researchers can rely on econometric methods to estimate production functions, such as those surveyed in Ackerberg, Benkard, Berry, and Pakes (2007). These methods address econometric issues in estimating relationships between the quantity produced on the left-hand side and inputs such as capital and labor on the right-hand side. The main challenges are endogeneity of the right-hand side variables due to unobserved productivity shocks observed by the firms when choosing their inputs and non-random sample attrition due to entry, exit, and mergers. Additional substantial challenges arise as one moves away from the idealized setting to situations featuring multiproduct firms or data sets that record revenue instead of quantity.

[14] Basu (2019) provides an alternative overview and discussion of challenges with markup estimates from the production approach. In particular, he notes that the implied changes in returns to scale that would be necessary to rationalize the large estimated markup increases are implausible given other evidence. See also Syverson (2019).

[15] Points (2) and (3) interact. One cannot meaningfully add up quantities of very different products.

definitions, COGS for a manufacturing firm includes factory overhead such as rent on the factory building and lease payments on machinery. Firms also have discretion in how they allocate expenditures between COGS and SG&A. As Grieco et al. (2024) document, major automobile manufacturers sometimes report zero SG&A and classify all of their operating expenses in COGS, while at the same time describing their business as heavy on fixed costs. Outside of manufacturing, the line between COGS and SG&A blurs substantially, and it is common for all operating expenses to be reported in COGS. Furthermore, some costs which arguably are variable may be reported in SG&A rather than COGS. For example, given that substantial sales effort is often needed to generate a purchase and that sales agents are often paid on commission, an economist would consider these commissions to be marginal costs. By accounting standards, however, they would be counted in SG&A rather than COGS.[16]

The upshot for the DLEU estimates is two-fold. First, the assumption that COGS is a flexible input is not attractive. Second, given that the markup estimates are essentially the same as revenue divided by COGS, and that COGS includes many costs that economists and the firms themselves consider fixed costs, what DLEU are actually measuring is something more like a scaled version of the firm's operating profitability than its price/cost markup. Consistent with this, Grieco et al. (2024) finds that the DLEU estimate for automobile manufacturers resembles the time series pattern of their estimate of variable profits noticeably more than their estimate of markups.

Building on DLEU (2020), several other recent papers have examined some additional challenges in markup estimation in greater detail. Raval (2023) considers markup estimation in manufacturing datasets where he observes expenditures on multiple plausibly flexible inputs, and compares the resulting markup estimates when each is employed as the flexible input. He finds coherent markup estimates only after specifying a richer production function that allows for labor augmenting productivity shocks. Demirer (2022) develops an estimator for a richer production function and applies it to Compustat data for manufacturing, finding an increase from about 1.15 in 1980 to about 1.35 in 2015 whereas the production function specified in DLEU would find a larger increase from about 1.25 to about 1.55. Bond et al. (2021), Dorazelski and Jaumeandrau (2021), and Foster et al. (2022) raise various issues within the production approach related to the elasticity estimation and observing revenues instead of quantities. For example, Foster et al. (2022) shows that estimating output elasticities using finer industry aggregation[17] leads to a substantial dampening, and sometimes the elimination of any increase in markups in Census data. They also find that the observed changes in markups are driven by changes in technology.

2. Multiproduct Firms and Aggregation

Moving beyond the COGS variable, there are several other significant measurement issues related to the Compustat data.

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[16] Traina (2018) documents a much smaller change, from about 1.1 to about 1.16 over forty years, in production function markups by combining SG&A and COGS into a single operating expense measure for use as the flexible input. Furthermore, the increase is eliminated when he reweights the publicly traded firms in Compustat by size to match the unconditional size distribution of firms.

[17] The main DLEU results are based on production function estimates which pool firms in the same two-digit NAICS code. This pools, as one example, under NAICS code 33 the production of automobiles, computers, furniture, medical equipment, aircraft, boats, and elevators.

DLEU effectively treat each firm in Compustat as a single-product firm. For example, the methods they employ produce an estimate of the "markup" of Alphabet, the parent company of Google, which sells search advertisements for millions of keywords, YouTube advertisements, YouTube subscriptions, Play Store and other Android apps, Google Cloud services, and Pixel handsets, among other lines of business. For some of these products and services, even defining what constitutes a unit of quantity is not straightforward. Estimating marginal cost is even more difficult. In our view, estimating a single markup for a firm like Alphabet using only firm-level data is *a priori* conceptually ill-defined. This is major problem, in part because it is currently unknown what type of average emerges for a multi-product firm with shared variable costs, such as computer equipment, if one uses the production approach and treats the firm as a single-product firm. We also do not yet understand how the estimated average changes over time as the firm adopts new technology or changes its product mix.

Additional challenges arise when one seeks to aggregate markups from individual firms to the economy as a whole. What is the most useful way to combine the markups of different firms of varying size? DLEU weight each firm's estimated markup by its revenue. This has the reasonable property of putting more weight on firms that are larger. However, there are other reasonable options that also give more weight to larger firms. Edmond et. al. (2023) constructs a macroeconomic model in which economic welfare is better summarized by weighting firms by their *cost* shares rather than by their revenue shares. When applying cost weighting to Compustat data and otherwise using the methodology of DLEU, Edmond et. al. (2023) reports an increase in markups from about 1.1 in 1980 to about 1.25 in 2015.

3. Sampling

There also are a number of important sampling issues. Compustat is based on financial statements for publicly traded companies. Schlingemann and Stulz (2022) estimate that the value-added of publicly traded companies collectively made up about 25% of GDP in 2019, down from about 30% in 1980. To address these concerns, DLEU turn to U.S. Census data, which in principle covers the full population of firms. However, due to data limitations in the reported costs, the independent estimates using Census data are only for manufacturing firms, which has been less than 15% of U.S. GDP for two decades.[18] Census data also do not cover production outside of the United States. If the manufacturing activity that has remained in the United States in recent decades is the more advanced and higher value manufacturing, as seems to be the case, then one could observe an increase in Census markups without any change, or even a decrease, in the unconditional distribution of markups experienced by U.S. consumers. Moreover, if this pattern intensified over the sample period as the U.S. share of manufacturing has been steadily falling, it would mechanically produce rising markups over time.

DLEU and other studies employing Compustat data generally use global revenues and costs, raising further issues about estimating price/cost markups in the United States, which are most relevant for any discussion of U.S. antitrust policy. Given the measurement issues with COGS, expanding internationally can also have a spurious effect on the measured price to cost ratio in the production approach applied to Compustat data. To see how this can happen, assume constant marginal costs and equal markups in domestic and foreign markets. If COGS includes

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[18] DLEU present Census estimates for retail and wholesale trade using output elasticities estimated from the Compustat data.

some fixed costs, then $\frac{Revenue}{COGS} = \frac{P*Q}{F+MC*Q}$, where Q is the firm's total output. A firm that increases output by expanding into international markets will experience an increase in $\frac{Revenue}{COGS}$, for given levels of price and marginal cost, because of the fixed cost in the denominator.[19]

Below we show that national accounts data indicates increases in profits earned by the foreign operations of U.S. firms. Compustat provides domestic sales for about three quarters of the sample going back to 1980.[20] The average share of sales in the domestic market decreased from 93.7% in 1980 to 75.1% in 2021. Moreover, the share of sales in foreign markets is strongly positively correlated with the total sales of a firm.[21] This suggests that the growth in the sales-weighted average should be partly understood as reflecting global expansion by superstar firms.

4. Comparison with Estimates from the Demand Approach

Motivated by the measurement issues and policy ramifications of aggregate markup measures such as those in DLEU, a burgeoning literature has emerged applying the demand approach to markup measurement in specific industries over longer time periods than industrial organization studies typically use. By focusing on a specific industry, researchers may potentially employ richer data and institutional knowledge to specify models tailored to that industry using market definitions more similar to antitrust markets than those defined by NAICS codes. Whereas the production approach with Compustat data uses, to a first approximation, two numbers per firm per year (revenue and COGS) to estimate trends in markups, the demand approach can use tens or even hundreds of market shares, prices, product characteristics, and consumer level data per firm per year to estimate markups. The resulting estimates are often interesting in their own right given the superior market definitions.[22] In other cases, they provide useful comparison estimates to probe and contrast with the production approach estimates. In addition, as discussed below, they provide a much richer foundation for the *interpretation* of any changes observed in markups: do they represent competition in decline or in action?

The general methodology of these papers is to (1) estimate a demand system for the market in question and (2) assume a model of firm conduct to reverse-engineer what marginal costs must have been to observe the prices in the data under the assumed model of firm conduct. For example, given an estimated demand system for beer, a researcher can compute what counterfactual sales would be at prices not observed in the data, and furthermore, what profits would be under hypothetical marginal costs. Under the conduct assumption of static Bertrand competition and the imposition of some regularity conditions, there is a unique set of marginal costs for each firm that makes the observed prices of that firm a best response to the observed prices of all the other firms in the market. Under an alternative conduct assumption of full

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[19] The price/cost markup is measured using $x = \frac{P*Q}{F+MC*Q}$. If all sales occur at the same price and marginal cost, then increasing quantity causes this metric to go up: $\frac{dx}{dQ} = \frac{x}{Q}\frac{F}{F+MC*Q} > 0$.

[20] Pellegrino (2024) scales Compustat revenues and COGS by the US sales share when possible. However, the key challenge is how to apportion fixed costs included in COGS that are shared between U.S. and international operations.

[21] Authors' calculations, available upon request.

[22] Relatedly, these studies are able to focus their analysis on revenues earned from U.S. customers, which is the relevant population for debates on U.S. antitrust, and customer demand data naturally includes imports.

collusion, a different set of marginal costs makes the observed set of prices optimal for the industry-wide cartel. By pairing an estimated consumer demand system with a conduct assumption, one can thus recover estimates of marginal costs and implied markups.

There are significant limitations to the demand approach. First, estimating a credible demand system even with rich data on prices and market shares can be challenging due to unobserved product characteristics, lack of exogenous variation in prices, and lack of exogenous variation in product sets to estimate realistic substitution patterns. Instruments are required, but credible instruments may not always be available. Second, assuming that oligopolistic conduct does not vary over time rules out that markups could have increased due to more effective collusion, tacit or otherwise. Third, demand data is often not available over long time periods such as those in DLEU, limiting its usability for evaluating markups over long time periods.

We focus attention here on industry studies that explicitly compare their estimates from the demand approach to those from the production approach for the same industry. These are Grieco et al. (2024) for the new automobile market, De Loecker and Scott (2022) in the beer industry, and Bet (2021) on domestic airline routes. For new automobiles and domestic airline routes, one can compare the approaches using time series spanning decades. The main takeaway is that the two approaches do not agree with each other for new automobiles or domestic airline roues. In the beer study, for the handful of years of overlap between production and demand data, both series exhibit sharp increases, with the demand approach estimates increasing faster than those from the production approach. The authors of these studies differ in how they explain these patterns. Grieco et al. (2024) prefer the demand approach estimates and appeal to measurement errors in the automobile data for the production approach. Bet (2021) reconciles the two approaches by taking the production estimates as ground truth and adding a conduct parameter to back out implied changes in conduct over time. De Loecker and Scott (2022) argue that the approaches agree well, and to the degree that they do not, one can reconcile the difference using an additional parameter that measures retail competition. Clearly, more detailed industry studies are necessary to understand whether and, if so, why production-based markup estimates differ from demand-based markup estimates.

In addition to studies of individual industries, further probing of how the production-based measurements from DLEU correlate with other outcomes is a useful direction, similar to how Ganapati (2021) examines how productivity varies with concentration. In this spirit, Conlon et al. (2023) show that the sector-level markup changes from DLEU do not correlate with sector-level price indices as measured by the Bureau of Labor Statistics. Under the hypothesis that lax antitrust has led to firms merging and raising prices or colluding more, this finding weighs against the decline-in-competition hypothesis.[23]

5. Summary

Taken together, the measurement challenges for markups estimated at scale are substantial. This is not to say that the research in this area has not been useful or successful. DLEU and related papers are undeniably influential and raise important questions. Measuring markups at scale is a worthy long-term objective, and one needs to start somewhere. The perfect should not be the

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[23] This finding is consistent with a number of different explanations, including: mismeasurement in markups; poorly defined sectors; or significant changes in technologies and cost structures that confound the relationship between prices and markups.

enemy of the good, certainly not in empirical social science. Still, the results do not reliably provide a basis to reach clear conclusions about the evolution of market power in the United States, much less to distinguish between the decline-in-competition hypothesis and the competition-in-action hypothesis, a predicate for making antitrust policy recommendations.

B. Profits

Some commentators also cite rising corporate profits as evidence of a decline in competition in recent decades. Persistent excess profits, meaning profits in excess of a normal, risk-adjusted rate of return on invested capital, do suggest market power and barriers to entry. Looking at profits rather than price/cost markups has the advantage that one does not need to observe or infer marginal cost and the results do not depend on how firms classify their costs as between COGS vs. SG&A. On the other hand, it is well known that accounting measures of profits may depart significantly from economists' preferred measure of excess profits after accounting for risk.

The left-hand panel of Figure 1 shows corporate accounting profits before tax as a share of GDP. Corporate profits averaged 9.0% of GDP during the 1970s, 7.7% during the 1980s, and 8.6% during the 1990s, then rose to 9.8% during the 2000s and 11.9% during the 2010s.

Figure 1: Corporate Profits as Percentage of GDP[24]
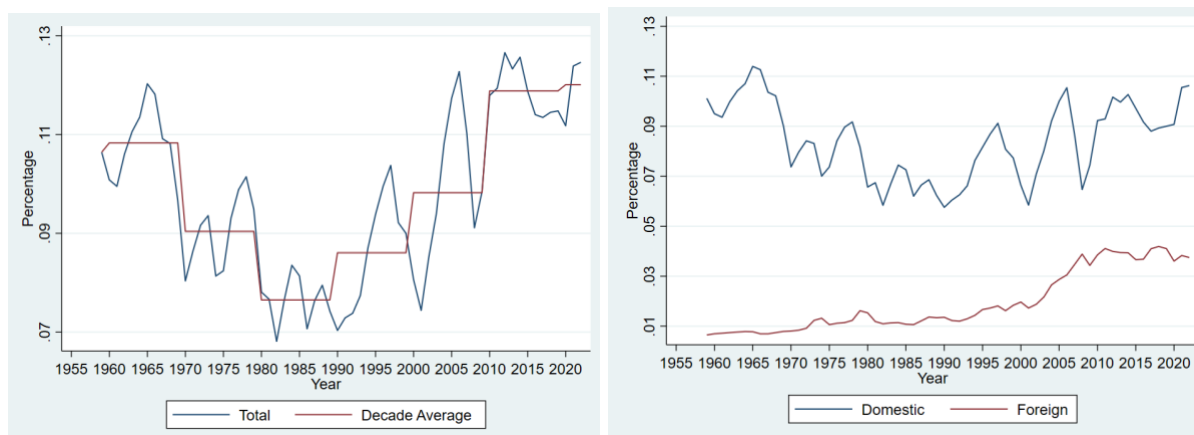
A significant portion of the rise in corporate profits as a share of GDP is attributable to the *foreign* operations of U.S. firms, as shown in the right-hand panel of Figure 1 (Christopher, 2011). Under the hypothesis that U.S. antitrust policy was too lax over the past 40 years, one would expect to see a significant increase in *domestic* profits relative to GDP. But the time series of domestic profits over that time period is significantly flatter than the time series of total profits. Moreover, the significant increase in the income earned on foreign operations by U.S. firms as a share of GDP is likely driven by factors such as lower trade barriers, lower transportation costs, greater value abroad of the intellectual property owned by U.S. firms, and

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[24] Source: FRED Economic Data, St. Louis Federal Reserve. GDP, Corporate Profits, Domestic Profits, Profits from Foreign Operations, Payments to the Rest of the World. Profit measures are before tax.

increased trade in services, not by domestic antitrust policy.[25] This finding motivates one direction for future research: to separate domestic revenues and costs from those of foreign operations in production based markup estimates.

C. Interpretation & Policy Implications

Let us now put aside the substantial measurement issues noted above and suppose that the average price/cost markup has indeed risen significantly in recent decades in many U.S. industries. What would be the implications for competition policy?

One interpretation of the rise in price/cost markups is that firms throughout the economy are competing less vigorously, e.g., due to horizontal mergers that have led to more concentrated markets and fostered conditions for softer price competition. Those calling for a major overhaul of antitrust emphasize this interpretation. However, it has been well known for decades that, just like higher concentration, higher markups can result from technological developments that benefit consumers. The implications for competition policy very much depend on the mechanism(s) that caused average price/cost markups to rise. To see why, consider an industry in which the average price/cost markup rose because the firms with lower costs and higher markups grew over time as trade barriers fell or as technology allowed firms to expand geographically. That could well reflect competition in action, with large and efficient "superstar" firms passing some but not all of their lower costs on to consumers in the form of lower prices.[26] The decomposition analyses in DLEU and Autor et. al. (2020) points towards this type of reallocation of revenue within sectors toward high-markup firms. That reallocation was the primary driver of the estimated increases in average markups over time. Ganapati (2021) shows that rising profitability measures correlate with rising productivity across sectors over time, giving further support to the competition-in-action story. Furthermore, studies using EU data also point to rising markups in the EU, which suggests a common cause. De Loecker and Eeckhout (2018) and International Monetary Fund (2019) use the same DLEU methodology to estimate rising markups in the EU of roughly the same magnitude as the DLEU estimates in the U.S.

One mechanism whereby markups can go up while consumers benefit is when a firm invests to lower its marginal cost or raise the quality of its products. Lower costs with less than full passthrough will generate higher markups, yet lower prices for consumers, higher output, and higher consumer welfare. Likewise, a firm that invents a new product can generate higher

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[25] We note two caveats to this analysis. First, if lax U.S. antitrust policy led to mergers between multinational enterprises that were also not challenged in other jurisdictions, then the increase in foreign profits could at least in part reflect U.S. antitrust policy, especially given that U.S. antitrust policy over this time period was highly influential around the world. Second, U.S. multinationals have increasingly been using complex corporate structures that have resulted in significant profits in low-tax jurisdictions such as Ireland. Some of these schemes are alleged to shift profits on *domestic* activities to low-tax foreign jurisdictions. Tørsløv, et al. (2023) estimates that such profit shifting understated U.S. domestic profits by 10% in 2015. Using this estimate, about 0.8 percentage points of corporate profits relative to GDP were actually earned on domestic rather than foreign operations. More quantitative research on the extent to which such profit shifting has risen over time would thus be useful for antitrust researchers in addition to its obvious relevance to the study of taxation.

[26] However, the reallocation of revenue towards the firms with the highest price/cost markups also could result from a very different mechanism in which those firms lobby for import protection or engage in exclusionary conduct to protect their incumbency rents. One must look more closely at the industry to tell which mechanism is operative.

markups while increasing consumer welfare. Indeed, patents and copyrights are intended to encourage such investments by giving firms some protection from rapid imitation.

Several industry-specific studies surveyed in Miller (2024) clearly show that technological progress stands out quantitatively as the driving factor behind measured changes in markups. We are not saying that pro-consumer mechanisms were the only ones in play. We are just saying that some important aspects of the evidence at scale on price/cost margins point to those mechanisms playing a key role. As discussed below, separate evidence shows that a very different mechanism was operating in some industries: some mergers led to higher prices and thus higher price/cost markups and presumably some industries have been plagued by undetected price-fixing conspiracies. In yet other industries, the key drivers of price/cost margins over time have been technological progress or globalization. In short, even if one restricts attention to industries in which price/cost markups have risen, there is no reason to believe that the same mechanism caused this across all or even most industries.

Indeed, that would be quite unlikely. This is one of many reasons why industrial organization economists moved decades ago towards detailed industry studies that explicitly recognize the features of the industry being studied and that specify the underlying mechanisms at play in any given industry. See Bresnahan (1989) on the need for industry studies to understand the mechanisms causing change and Schmalensee (1989) for the inherent limits on cross-industry studies. In this long-dominant approach, progress comes from enriching models to allow for more realistic consumer and firm behavior, more heterogeneity, and by relaxing assumptions such as parametric functional form restrictions.

Our central message based on the evidence of how price/cost markups have evolved over time in the U.S. economy is thus straightforward: one must understand the underlying mechanism at play in a given industry in order to reach any conclusions about whether there has been a market failure and if so, how antitrust enforcement should be conducted in that industry. Making major changes to competition policy based the unwarranted assumption that rising price/cost markups indicate that competition is in decline is unjustified and could well be counterproductive.

4. Merger Retrospectives

We now turn to a more direct test of the efficacy of a central element of antitrust policy: merger retrospectives. We assess the empirical evidence about the competitive effects of mergers in the United States and then discuss what this evidence teaches us about merger enforcement. We confine our attention to merger retrospectives involving horizontal mergers.[27]

The Clayton Act prohibits mergers and acquisitions where "the effect of such acquisition may be substantially to lessen competition, or to tend to create a monopoly." If merger policy has been too lax in recent decades, one would expect to see numerous consummated mergers in a wide range of industries that substantially lessened competition. Based on this logic, a literature has developed to examine the effects of consummated mergers.[28] In drawing lessons from this

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[27] A smaller literature studies the effects of vertical mergers. Beck and Scott Morton (2021) survey this literature, reaching this conclusion: "Taken as a whole, the empirical evidence as to the change in welfare that is due to vertical mergers is decidedly mixed, and should certainly not be used as a basis for a presumption that most vertical mergers are procompetitive or harmless."

[28] The Bureau of Economics at the FTC has assembled a list of merger retrospectives studies.

literature, some modesty is appropriate because only a tiny fraction of all consummated mergers have been studied and because we do not observe the mergers *deterred* due to antitrust risk.

What can one hope to learn about merger enforcement policy from merger retrospectives? With a large sample of mergers, observing that a substantial majority harmed rather than promoted competition would support the conclusion that overall merger enforcement policy has been too lax. Alternatively, if roughly half of studied mergers harmed competition and the other half promoted competition, no particular change in merger enforcement policy would be indicated unless one could distinguish them ex ante. Studying mergers that were close calls – those investigated but not challenged and those challenged unsuccessfully – could be especially informative. Examining mergers that were "fixed" by requiring divestitures could be informative about the efficacy of those divestitures. More ambitiously, we might learn about the accuracy of the *methods* used to evaluate mergers and about the specific industries or market conditions under which mergers are more or less likely to harm competition.

The primary challenges to conducting merger retrospectives are practical, not conceptual. First, one needs to observe some outcome measure that will be used to evaluate the merger. In practice, by far the most common metric is price: a merger that causes customers to pay higher prices is seen as lessening competition. Lessened competition also can manifest in lower quality or slower innovation, but these effects tend to be more difficult to identify and measure. Second, one needs to compare the prices customers actually paid after the merger with the counterfactual prices they *would* have paid had the merger not taken place. Most studies use a difference-in-difference approach to construct these counterfactual prices. This method requires finding comparator prices that move closely with prices in the market being studied but are unaffected by the merger itself. This method is most likely to work well in markets where the products do not change much over time. Identifying the price effects of mergers is more difficult in industries where products are improving over time, a common phenomenon. Third, the best prospect for measuring the effect of a merger using these methods is in the first year or two after it has taken place, but the merged company may delay price increases to avoid bad publicity or antitrust scrutiny, plus merger efficiencies may take longer to implement. Fourth, there are sample selection issues, as one can only study mergers that actually occurred, not those that were deterred or blocked as a result of antitrust issues, as well as possible publication bias.

Due to these challenges, the merger retrospectives studies found in the peer-reviewed literature tend to be in industries such as hospitals, banks, petroleum products, and airlines, where prices are observable to researchers and the products are relatively stable over time. Due to these practical considerations, our ability to assess merger enforcement in many important sectors is quite limited. Notably, almost no merger retrospectives involve intermediate goods. Moreover, very few studies quantify the effects of mergers in the most innovative sectors of the economy, including the increasingly important information technology sector.

A. *The Price Effects of Mergers*

Kwoka (2015) provides a meta-analysis of a collection of merger retrospective studies. He concludes that "the evidence indicates that for these mergers in the enforcement zone, agency decisions regarding challenges appear too tolerant." (p. 159). He also concludes "that many challenged mergers are subject to remedies that fail to prevent postmerger price increases." (p.

159) The leaders of both antitrust enforcement agencies have cited Kwoka's book when calling for a major overhaul of merger enforcement.[29]

Kwoka's work is valuable and important. However, for the reasons given below, we see the overall body of evidence from merger retrospectives as thin and decidedly mixed.[30] In particular, while identifying some harmful mergers, this body of evidence does not show or imply that mergers in recent decades have caused widespread and significant harms.

The heart of Kwoka's book is Chapter 6, "Mergers and Product Prices," where he discusses "the retrospective literature with respect to price and other effects of mergers."[31] His Table 6.2 reports results for 42 mergers.[32] Of these, 8 are in petroleum, 6 in airlines, 10 in scientific journals, 4 in hospitals, and 14 in other industries. The most recent merger reported by Kwoka is from 2006, so these studies are not directly informative regarding merger enforcement after that date.

To give a flavor of the 42 mergers listed in Kwoka's Table 6.2, consider the seven that took place during this century.[33] Two of these were hospital mergers. The Evanston/Highland Park hospital merger (2000) was found to have led to a 20% price increase, and the Provena/Victory hospital merger (2000) was found to have led to a 4% price decrease. Three were in the petroleum industry. The Exxon/Mobil merger (2000) was challenged by the FTC, which required numerous divestitures. This merger was found to have caused a 4% increase in the wholesale price of gasoline in the nine months following the merger. Sunoco's acquisition of El Paso's Eagle Point refinery (2004) and Valero's acquisition of Premcor (2005) were found have had no significant effect on prices. Then we have Johnson & Johnson's acquisition of Pfizer's consumer health division (2006). The FTC required J&J to divest a number of products. These divestitures appear to have prevented any lessening of competition: the merger was found to have lowered prices by 1%. Lastly, Whirlpool's acquisition of Maytag (2006) was found to have raised prices

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[29] Khan (2022) cites Kwoka in support of this statement: "While the current merger boom has delivered massive fees for investment banks, evidence suggests that many Americans historically have lost out, with diminished opportunity, higher prices, lower wages, and lagging innovation." Kanter (2023b) cites Kwoka's book and other sources in support of this statement: "Since 2010, we have heard growing concerns about the level of competition in key sectors of the American economy. Waves of academic studies document how the public loses out when mergers lessen competition in industries across our economy."

[30] See Vita and Osinski (2018) and for a critical review of Kwoka (2015), and Kwoka (2019) for his response.

[31] In Chapter 9, Kwoka reports studies of *groups* of mergers. Eleven studies involve hospitals, four banking, two pharmaceuticals, one airlines, and one electric utilities. See his Table 9.1. As Kwoka notes, "most of these studies examine groups of mergers that occurred in the 1990s." (p. 146) None involve any mergers since 2004. He states that "these grouped-merger studies cannot be used to analyze questions of agency actions or remedies since individual mergers are not identified and policies cannot be matched to them." (p. 143) Kwoka's Table 9.3 shows that 17 of these 19 studies examine price. The average price effect ranges from -10.4% to +17.6%. Taking a simple average across the 17 studies gives an average price effect of +5.42% (p. 148). However, weighting each paper by the number of mergers studied gives an average price effect of -2.56% (footnote 5 in Chapter 9).

[32] Appendix I: Summaries of Individually Studied Mergers, by Chengyan Gu, provides a page or two of text on each of these mergers. Further details are provided in Kwoka and Gu (2015). Appendix A1 to that paper provides a table showing the HHIs, the price effect estimated, the industry, and whether the transaction was challenged.

[33] The estimated price effects of these mergers are taken from Appendix Table A1 to Kwoka and Gu (2015).

for Whirlpool clothes dryers by 17% and for Maytag dishwashers by 7%, as shown in Table 3 in Ashenfelter et al. (2013).[34]

Summarizing, Kwoka reports seven mergers in four industries since 2000, three of which led to price increases. These seven mergers include two significant failures of merger enforcement: the merger between Evanston Hospital and Highland Park Hospital and Whirlpool's acquisition of Maytag. What can we learn from these failures?

The FTC did challenge the Evanston/Highland Park hospital merger, but only after it was consummated. The constraint on hospital merger enforcement going back to the 1990s has been judicial skepticism about the dangers caused by such mergers, not the ability of the FTC to identify harmful mergers. The FTC had previously lost a number of hospital merger challenges and made the strategic decision to challenge the Evanston/Highland Park merger based on strong evidence of post-merger price increases. That successful challenge was central to the FTC's effort to reinvigorate hospital merger enforcement in the early 2000s. The challenge facing the FTC today is very similar: to convince the courts to be more skeptical of hospital mergers.[35] As discussed below, the evidence for stricter enforcement of hospital mergers is overwhelming, so this is an area where economic research can have a real impact on antitrust enforcement.

The DOJ's failure to challenge Whirlpool's acquisition of Maytag was widely seen at the time as a blunder that reflected an overly lax approach to mergers by the DOJ during the mid-2000s.[36] The leadership of Antitrust Division failed to apply the Division's own merger guidelines to a highly concentrating merger in markets for several household appliances, notably washing machines and dryers. There was no underlying flaw in the methods used by the DOJ staff lawyers and economists to evaluate this merger. The specific mistake was the leadership of the Antitrust Division being too credulous of claims by the merging parties that entry and expansion by importers would protect consumers.[37] When the DOJ and the FTC revised the Horizontal Merger Guidelines in 2010, they adopted a more skeptical view of entry as a merger defense. That skepticism was retained in the 2023 Merger Guidelines. Hopefully, the lesson was learned.

We do not view these two failures as indicating that a major overhaul of how the DOJ and the FTC analyze horizontal mergers is needed. Nor do they imply that such failures are common.

What about more recent merger retrospectives?

Asker and Nocke (2021) assemble all merger retrospectives published in 14 selected economics journals between 2000 and 2020. This yielded eight papers that studied individual transactions in

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[34] Montag (2024) further analyzes the Whirlpool acquisition of Maytag taking into account post-merger expansion by foreign brands such as Samsung and LG and post-merger product repositioning. He too finds that consumers were harmed by the merger.

[35] The FTC lost its most recent hospital merger case in the District Court in North Carolina, but the merger was then abandoned after the Fourth Circuit issued an order preventing the merger from proceeding during the FTC's appeal of that loss. See Federal Trade Commission vs. Community Health Systems Inc. and Novant Health Inc.

[36] Shapiro served as an economic expert for the DOJ when it reviewed this merger. He concluded that the merger would substantially lessen competition. Baker and Shapiro (2008, p. 50) write: "We are deeply concerned that the Whirlpool case is indicative of an overly lax approach to merger enforcement at the current Justice Department."

[37] Adding insult to injury, after Whirlpool convinced the DOJ not to challenge its acquisition of Maytag based on the claim that imports would serve as an effective competitive discipline, Whirlpool successfully went to the International Trade Commission to have tariffs imposed on those same imports.

the United States. Three of these were not included in Kwoka's book: one in the beer market and two in the airline industry. Miller and Weinberg (2017) find "abrupt increases in retail beer prices just after the 2005 consummation of the Miller-Coors joint venture." Luo (2014) did not find significant price increases following the 2009 merger between Delta and Northwest. Das (2019) found that the 2013 merger between American Airlines and US Airways caused prices to go down, especially on larger city-pair markets.[38]

Asker and Nocke state: "The wide range of price outcomes reported following a merger is what we find most striking about these studies when examined collectively." (p. 257) They conclude with this observation: "Lastly, the range of observed outcomes emphasizes the value of evaluating specific mergers with reference to the specific industry context in which it occurs. This mirrors standard practice in empirical industrial organization more broadly."[39] (p. 257)

There is one major industry that has been extensively studied in which mergers are commonly found to lead to significantly higher prices: hospitals. Gaynor (2018) puts it this way: "There are many studies of hospital mergers. These studies look at many different mergers in different places in different time periods, and find substantial increases in price resulting from mergers in concentrated markets…. Price increases on the order of 20 to 30 percent are common, and can range to over 50 percent." (p. 8) Brand, et. al. (2023) examines 558 hospital mergers from 2009 to 2016, finding an average price increase of roughly 5%. Dafny (2009) covers an earlier period. Brot-Goldberg, et al. (2024) find that many hospital mergers reported to the FTC were predictably anti-competitive, using the FTC's standard screening methods, yet not challenged, and that these mergers led to significant price increases. These studies strongly support the need for stricter merger enforcement in the hospital industry.

Bhattacharya, et.al. (2023) examine a data set with 126 mergers involving consumer packaged goods between 2006 and 2019. Their findings are intriguing and informative but we do not believe they give clear guidance for merger enforcement. In their baseline specification, these mergers led to an average price increase of 1.5% "with significant heterogeneity in outcomes across mergers" (a standard deviation of 6.3%). They obtain a very similar estimate in an alternative specification that uses cost shifters and demographic controls. However, when they use geographic markets in which the merged firms are small as controls, they find that the mergers led to an average price *decrease* of 0.4%. Moreover, when they use data from their consumer panel (which includes data from some very large retailers that are not in the scanner data set used for their baseline specification) they find an average price decrease of 0.6%, also with significant heterogeneity. Their mainline findings of near-zero average price effects and large heterogeneity in price effects is essentially the same takeaway that Asker and Nocke reach based on their assessment of the merger retrospective literature.

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[38] Das also measured several non-price variables, finding no effect on flight frequency or the number of seats, an increase in arrival and departure delays, and a reduction in the number of cancelled flights.

[39] Asker and Nocke also list 14 studies of multiple transactions involving a range of industries. Mergers in the health care sector, especially hospital mergers, are found to lead to price increases, but a wide range of price effects are found in other industries.

B. Non-Price Effects of Mergers

A much smaller literature examines the non-price effects of mergers. Mergers can harm customers by lowering product quality, reducing product variety, or retarding innovation. Detecting these effects can be very challenging for researchers, but some results are available.

A number of studies find that consolidation in the hospital industry leads to lower quality care, especially when prices are administered, as they are for Medicare patients. Gaynor, et al. (2015) nicely surveys this literature.

Cunningham, et al. (2021) studies "killer acquisitions," which they define as an incumbent firm acquiring an innovative target "solely to discontinue the target's innovation projects and preempt future competition." (p. 649) By distinguishing acquisitions where the acquirer produces an existing drug that is substitutable with the acquisition target's drug, they estimate that 5.3% to 7.4% of the acquisitions in their sample of pharmaceutical deals are such killer acquisitions, which "disproportionately occur just below thresholds for antitrust scrutiny." (p. 649) This study serves as a strong warning against mergers between drugs that compete directly with each other.

Atalay, et. al. (2023) study how 66 mergers involving various consumer packaged goods affected product variety. They find mergers tend to reduce the diversity of products offered by the merging firms. They interpret this as being consistent with cost synergies among similar types of products or managerial core competencies applicable to particular types of products.

In a very different setting, Farrontao, et. al. (2023) examines the effects of Rover's 2017 acquisition of DogVacay, its largest rival in pet-sitting services. Exploiting geographic variation in the pre-merger sizes of the two platforms, they find that the merger increased usage by the existing Rover buyers. They attribute this to improved product quality based on expanded network effects (more suppliers) on the Rover platform as the DogVacay platform was discontinued. However, many of the legacy DogVacay buyers did not switch to the Rover platform, and those who did switch used the Rover service less than did comparable existing Rover buyers. The authors hypothesize that these buyers preferred the (discontinued) DogVacay platform or began transacting with the same providers directly.

C. Merger Synergies

Merger enforcement policy involves a fundamental tradeoff between enhanced market power and efficiencies, so understanding the prevalence and magnitude of merger efficiencies is highly relevant. Indeed, several of the leading methods used to evaluate proposed mergers involve determining the cost reduction necessary so that customers will not be harmed by the merger.[40]

Merger synergies can arise in many ways, and they often motivate mergers and acquisitions. Fundamentally, merger efficiencies result from placing complementary assets under common ownership. For example, synergies can arise when a highly efficient firm takes control of a facility that is poorly managed. Given the substantial variation in efficiency across firms in the same industry,[41] it is reasonable to believe that mergers and acquisitions – one way in which the "market for corporate control" operates – can unlock significant efficiencies of this type.

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[40] For early contributions, see Farrell and Shapiro (1990) and Werden (1996).

[41] See, for example, Syverson (2011), Van Reenen (2018) and Autor, et. a. (2020).

In practice, it is extremely difficult for the antitrust agencies or the courts to determine whether a merger is likely to lead to significant efficiencies. First, the most detailed information about merger efficiencies is in the hands of the merging parties, who have an incentive to overstate cost savings to gain approval for their deal. Second, the acquiring firm may be overly optimistic about achieving efficiencies. Third, efficiencies that could be achieved without a merger cannot be used to defend a merger, so much of the analysis centers on whether any claimed efficiencies are "merger-specific."[42] The antitrust enforcement agencies and the courts are highly skeptical of efficiency claims made by merging parties. For good reasons, the most convincing efficiency claims are based on evidence showing that similar efficiencies have been achieved in the past.

The merger retrospectives literature discussed above allows us to make inferences about merger efficiencies: when we observe a horizontal merger leading to lower prices or other benefits for customers, we can reasonably infer that the merger generated efficiencies that were sufficient to offset any upward pricing pressure from the elimination of competition between the merging firms. By the same token, if a merger leads to higher prices, we can infer that any efficiencies were insufficient to protect customers.

A modest literature directly examines the efficiencies resulting from consummated mergers.[43] This is inherently difficult because researchers rarely have access to the detailed data necessary to measure such efficiencies. Evidence that a merger led to higher revenue or profits is not informative, because higher revenue or profits can result from either higher prices or greater output. Rose and Sallet (2020) review the literature on merger synergies, noting that "the results reveal heterogeneity in outcomes." (p. 1966)

For illustrative purposes, we describe three instructive studies of merger efficiencies.[44]

Ashenfelter, et. al. (2015) study the 2008 joint venture between Miller and Coors. Miller and Coors claimed that merging their U.S. operations would allow them to substantially reduce shipping costs. That claim convinced the DOJ not to challenge the joint venture. The Antitrust Division stated: "In one of the key parts of the investigation, the Division verified that the joint venture is likely to produce substantial and credible savings that will significantly reduce the companies' costs of producing and distributing beer."[45] Economists at the Antitrust Division agreed: "Much of the efficiencies involved freight cost savings that were based on the ability of the merged firm to redistribute production of the parties' two brand portfolios across the venture's multiple plants, which were geographically dispersed."[46]

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[42] The 2023 Merger Guidelines state: "Competition usually spurs firms to achieve efficiencies internally, and firms also often work together using contracts short of a merger to combine complementary assets without the full anticompetitive consequences of a merger."

[43] Demirer and Karaduman (2024) lists a number of studies of merger efficiencies in a variety of industries including banking, healthcare, ready-mix concrete, and meat products.

[44] Kwoka (2015) comments on merger efficiencies, writing: "The only seemingly systematic benefit [from mergers] is that costs appear generally to decline." (p. 149). His Table 9.3 shows costs going down, between 1.9% and 14.7%, in all four of the multi-transaction studies that track costs.

[45] Statement of the Department of Justice's Antitrust Division on Its Decision to Close Its Investigation of the Joint Venture Between Sabmiller Plc and Molson Coors Brewing Company, June 5, 2008.

[46] Heyer, et al. (2009), p. 351-2. Shapiro is listed as a co-author on that paper, but he is not a co-author of that part of the paper. The Miller-Coors decision was made in June 2008, and he joined the Antitrust Division in March 2009.

Were those efficiencies actually achieved? Exploiting geographic variation, Ashenfelter, et al. (2015) find that "efficiencies created by the merger offset the incentive to increase prices in the average regional market in the long run." (p. 330) However, recall that Miller and Weinberg (2017) found that this joint venture led to large and abrupt price increases.

Craig, et al. (2021) examine whether hospital mergers lead to lower costs for the supplies purchased by hospitals, such as coronary stents or surgical staplers. Working with a data base covering all supply purchases made by over 1000 hospitals during the 2009-2015 period, they find limited evidence of such savings: acquired hospitals achieved savings of 1.9% on average; acquiring hospitals realized no significant savings. Their data is sufficiently detailed that they are able to explore the mechanisms by which these cost savings were achieved. The largest savings came from renegotiating prices with existing suppliers rather than brand switching.

Dimerer and Karaduman (2024) convincingly show that acquisitions of power plants in the United States often lead to improvements in operational efficiency. They measure both fuel efficiency and output at roughly 2000 plants that were acquired between 2000 and 2023. They "find that acquired plants experience an average of 5% efficiency increase five to eight months after acquisition" in cases where ownership changed at the subsidiary (operational) level.[47] They also find "that acquired plants achieve higher efficiency through low-cost operational improvements rather than high-cost capital investments" Moreover, these acquisitions typically increased output, as measured by total electricity generated, capacity utilization, and operating hours. (Figure OA-10, "Impact of Merger on Generator Performance")

We do not mean to suggest that antitrust enforcers should accept efficiency claims without close scrutiny. But nor do we think that merger enforcement policy should be based on an assumption that merger synergies are rare. Yet again, case-by-case analysis is needed for accurate enforcement.

D. Deals Below the Reporting Threshold

Proposed mergers must be reported to the antitrust agencies if they meet certain threshold size requirements. Currently deals valued at more than $119.5 million must be reported under the Hart-Scott-Rodino ("HSR") Act. Exempting smaller deals from the reporting requirement saves costs for merging parties and resources at the antitrust agencies but increases the risk that anti-competitive deals below the threshold will avoid detection.

Wollman (2019) shows that this risk is very real, especially for deals involving local markets, in which mergers between major competitors can easily fall below the threshold. He studies the effect of a change in the law in 2000 that exempted 70% of the transactions that had previously been reportable, despite the fact that 32% of the mergers investigated between 1994 and 2000 involved deals valued at less than $50 million, the new reporting threshold. Wollman (2019) shows that merging firms strategically adjusted to the new thresholds by engaging in more "newly-exempt" horizontal mergers, i.e., deals below the new threshold.

Cunningham, et al. (2021) further document that post-merger pharmaceutical project discontinuations are relatively more likely for deals just under the notification thresholds. Feng,

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[47] No efficiencies were found in cases where ownership only changed at the parent-company level.

et al. (2023) build on that work, showing that pharmaceutical acquisitions falling below the HSR thresholds led to large price increases, which was not true of reportable deals.

Fortunately, even deals that are not reportable can be challenged if they come to the attention of antitrust enforcers. For example, in 2013 the DOJ successfully challenged the consummated merger between BazaarVoice and PowerReviews, which offered competing online product ratings and reviews platforms.[48] In 2017, the FTC achieved a $100M settlement in a case regarding Synacthen, which was the leading example of a killer acquisition in Cunningham, et al. (2021).[49] In September 2023, the FTC challenged a series of consummated acquisitions involving anesthesia services in Houston and Dallas.[50] State Attorneys General also can challenge consummated mergers that harm competition in their states.

E. Big Tech Acquisitions

Amazon, Apple, Facebook, Google, and Microsoft – often lumped together as the "GAFAM" companies – have attracted a great deal of antitrust attention in recent years as they have grown dramatically in size and market value. Numerous observers have asserted that the antitrust agencies have been remiss in challenging almost none of their many acquisitions over the past 20 years. To some degree, the agencies themselves appear to agree with that criticism: in 2020 the FTC sued Facebook in part over its acquisitions of Instagram in 2012 and WhatsApp in 2014, and in 2023 the DOJ sued Google in part over its acquisition of DoubleClick in 2008.

The GAFAM companies certainly have engaged in many acquisitions since they were founded. CBInsights (2021) reports that these five companies collectively have made more than 800 acquisitions over the past 30 years, including 32 that were each for more than $1 billion. According to a detailed report by the Washington Post, as of April 2021 Amazon had by then made 71 acquisitions starting in 1998, Apple had made 96 acquisitions starting in 1988, Facebook had made 77 acquisitions going back to 2005, and Google had made 187 acquisitions going back to 2001. Between 2010 and 2020, Microsoft's largest acquisitions were LinkedIn ($26.2B), Skype ($8.5B), GitHub ($7.5B), ZeniMax ($7.5B), and Nokia ($7.2B), and in 2023 Microsoft acquired Activision for a whopping $75.4B, a deal that was challenged by the FTC.[51]

The central antitrust challenge here is to identify which of these many acquisitions substantially lessened competition so as to inform future merger enforcement in the tech sector. The mere fact that these huge companies grew in part by making many acquisitions does not imply that some or many of those acquisitions harmed competition. Indeed, many of these acquisitions enabled the

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[48] Shapiro testified on behalf of the DOJ in this case.

[49] https://www.ftc.gov/news-events/news/press-releases/2017/01/mallinckrodt-will-pay-100-million-settle-ftc-state-charges-it-illegally-maintained-its-monopoly.

[50] See FTC vs. U.S. Anesthesia Services.

[51] In addition, the Federal Trade Commission (2021) obtained information about 616 acquisitions by the GAFAM firms at or above $1 million that were not reported under the HSR Act. Their report provides information about these acquisitions, such as their distribution over time (Figure 4), by transaction size (Figure 5), by the number of full-time non-sales employees (about half had between 1 and 10), by target firm age (Figure 19), and by sector (Figures 24-31). This report reveals substantial heterogeneity in these transactions but does not attempt to evaluate their competitive effects. Announcing the results of this study, the Chair of the FTC stated that it indicates that the FTC needs to expand its reporting requirements and examine more transactions. See Remarks of Chair Lina M. Khan Regarding Non-HSR Reported Acquisitions by Select Technology Platforms, September 15, 2021.

GAFAM firms to expand into new areas more rapidly or more efficiently than they likely could or would have done solely through internal growth.[52] We focus our attention here on the relatively small share of these transactions that involved acquisitions of actual or potential competitors to the acquiring GAFAM firm's core business.

In principle, merger retrospectives can help us identify the GAFAM horizontal acquisitions that harmed competition. However, the tech sector does not provide fertile ground for conducting merger retrospectives. The fundamental difficulty arises when one seeks to assess what would have happened had the acquisition *not* taken place, a necessary step to compare the real-world outcome with that counterfactual outcome. The difference-in-difference methodology commonly used for merger retrospectives requires some comparator to make this assessment, but that methodology does not work at all well for unique products that are changing over time.

To illustrate the severe difficulties of assessing the competitive effects of consummated mergers in the tech sector, consider Facebook's 2012 acquisition of Instagram. This acquisition is the poster child for those arguing that antitrust enforcers were asleep at the switch in failing to challenge many harmful GAFAM acquisitions. The FTC did not challenge this acquisition in 2012, but in 2020 the FTC filed a monopolization case against Facebook arguing that its acquisition of Instagram protected Facebook's monopoly position in the market for the provision of personal social networking services in the United States.[53] That challenge has obvious appeal: by 2020 Facebook and Instagram were two of the leading social networks and allowing them to merge at that time, had they been separately owned, would have been out of the question.

The FTC asserts that competition in the provision of personal social networking services would have been stronger starting in 2012 had Facebook not been allowed to acquire Instagram. In support of that position, the FTC notes that Instagram was growing rapidly prior to its acquisition by Facebook. The FTC highlights statements made in 2012 by Mark Zuckerberg, the CEO of Facebook, characterizing Instagram as a major threat. According to the FTC, had Facebook not acquired Instagram, Instagram would likely have grown to become a strong rival to Facebook, just as Zuckerberg feared, giving consumers more choices and pressuring Facebook to better serve consumers, e.g., by doing more to protect their privacy. Facebook, for its part, points out that it invested heavily to grow Instagram. In particular, Facebook says that applying its expertise in selling and placing targeted advertisements on Instagram allowed Instagram to grow more rapidly than it would have on its own. Assessing Instagram's growth starting in 2012 had it not been acquired by Facebook is extremely difficult. Applying a difference-in-difference methodology would be challenging, to say the least, due to the difficulty of identifying a suitable comparator for Instagram. Hindsight bias is also a danger.

As we try to reconstruct what the situation looked like back in 2012, we do have some insight into how competition authorities viewed Facebook's acquisition of Instagram at that time. Both the FTC and the U.K. Office of Fair Trading ("OFT") reviewed and cleared the acquisition. Office of Fair Trading (2012) explains the OFT's decision: "The OFT considered two unilateral effects theories of harm: actual competition in the supply of photo apps and potential competition in the supply of social network services." (¶14) Regarding photo apps, the OFT concluded that "there are several relatively strong competitors to Instagram in the supply of camera and photo

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[52] Jin, et. al. (2022) finds that many GAFAM acquisitions followed an "acquire-adjacent-and-then-expand" strategy.

[53] Federal Trade Commission vs. Facebook, Inc., Substitute Amended Complaint, September 8, 2021.

editing apps, and those competitors appear at present to be a stronger constraint on Instagram than Facebook's new app." (¶21) Regarding social networking services, the OFT focused on advertising, reaching this conclusion: "In summary, the evidence before the OFT does not show that Instagram would be particularly well placed to compete against Facebook in the short run. In addition, there are other firms that appear to be presently able to compete against Facebook for brand advertising." Was this reasonable or did the OFT drop the ball?

The U.K. Competition and Markets Authority (the successor to the OFT) commissioned a study to inform their analysis of mergers in digital markets. Lear (2019) examined several mergers that had been cleared, including Facebook's acquisition of Instagram.[54] That study identifies certain shortcomings of the OFT's analysis in 2012 but also finds that Instagram's subsequent growth "has significantly benefitted from the integration with Facebook." (¶II.83). Lear (2019) ends up agnostic about "whether the acquisition has ultimately harmed consumers." (¶II.84)[55]

Argentesi, et. al. (2021) also emphasizes the difficulty in assessing whether Instagram would have become a significant rival to Facebook in the "social network market" had it not been acquired by Facebook. Like Lear (2019), they conclude that Facebook's capabilities helped Instagram grow after the merger, so the merger generated some efficiencies.[56]

In the past few years, some highly visible acquisitions by the GAFAM firms have been blocked by antitrust authorities. One example involves Facebook and Giphy, the owner of a database of GIF files. Facebook acquired Giphy in 2020 for about $315 million. In 2022, the U.K. OFT determined that the acquisition was unlawful in the U.K. and forced Facebook to sell Giphy. Another example involves Amazon and iRobot, the maker of the Roomba self-driving vacuum cleaner. Amazon agreed to acquire iRobot for about $1.78 billion in 2022, but the deal was called off in early 2024 in the face of likely challenges from the European Commission and the FTC. In time, these blocked deals will present opportunities for researchers to study whether the target firms grew into significant rivals to their former suiters or into complements needed by rivals to compete effectively. Such research opportunities are not confined to GAFAM deals that were blocked. For example, Adobe agreed to acquire Figma for roughly $20 billion in 2022, but that deal was abandoned in late 2023 due to antitrust issues.

F. Lessons for Merger Enforcement

Several lessons emerge from the merger retrospectives literature.

First and foremost, the competitive effects of mergers, as best we can assess them, are highly varied across industries and specific transactions. Variety is the spice of industrial organization.

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[54] The other GAFAM acquisitions studied in detail were Google/Waze and Amazon/The Book Depository.

[55] Lear (2019) reaches a similar conclusion regarding Google's acquisition of Waze "While there may be some gaps in the analysis undertaken by the Authorities, and that has resulted in the clearance of the merger, it is hard to say whether this has led to a detrimental outcome. This depends on the development that Waze would have witnessed in the absence of the merger, i.e. the selected counterfactual." (¶II.142)

[56] They also study Google's 2013 acquisition of Waze more. They criticize the U.K. competition authorities for not exploring how that merger would affect markets in which these services are monetized and for putting too much weight on Apple Maps as a substitute. However, they also find that the merger generated efficiencies. They identify several possible but-for scenarios, stating: "There are few elements that allow to identify the most likely counterfactual." (p. 130)

Second, merger retrospectives are only available for a tiny fraction of all mergers and acquisitions, many of which are in just a few industries, so one should be cautious about reaching broad conclusions, one way or the other, from this body of evidence.

Third, while merger enforcement has been imperfect, the evidence does not support the view that the public has been greatly harmed by decades of far too permissive merger policy policies. One of us (Shapiro) has been calling for stricter enforcement of horizontal mergers for over 20 years, but that is based on what happens when the DOJ and the FTC investigate and challenge mergers, not based on evidence of widespread, systematic harms from consummated mergers.

Fourth, on a practical level, the empirical evidence on the competitive effects of mergers is most useful if it helps us identify *observable characteristics* of proposed mergers that are predictive about whether they are likely to lessen competition and thus harm customers. Kaplow (2024) emphasizes the critical role of evidence that is informative about whether a merger will benefit or harm customers, which is central in his decision-theoretic approach. Nevo and Whinston (2010) make a similar point in their discussion of the "treatment effect" approach to predicting a merger's effects. Viewed this way, the heterogeneity of effects found among merger retrospective studies can be informative to the DOJ and the FTC as they seek to identify the mergers most likely to significantly lessen competition. After all, they only have the ability to look closely at roughly 2-3% of all proposed mergers that are reported to them.[57]

Merger retrospectives are most useful for evaluating proposed mergers in the industries that have been studied or in "similar" industries if the parallels are close enough. We do not consider evidence showing that many mergers raised prices in, say, academic publishing markets and in hospital markets, to be very informative when one is trying to assess a proposed merger in a very different industry. For example, in assessing the currently proposed merger between Kroger and Albertsons (supermarkets), studies of previous supermarket mergers, or perhaps other retail mergers, could be quite informative. Likewise, in assessing the recent merger between Exxon Mobil and Pioneer Natural Resources (natural gas production), studies of similar mergers in the petroleum industry could be useful. But we doubt evidence about the effects of mergers involving academic publishers or hospitals would help with either of these mergers.

Lastly, in the technology sector, the challenge is to predict in advance which acquisition targets are most likely to grow into serious rivals of powerful incumbents or complements those rivals need to compete effectively. Making such predictions is inherently difficult when technology is changing rapidly, and especially so in the presence of network effects. Furthermore, asymmetric information plays a role, as the merging firms are likely to know more about emerging technologies and market dynamics than are the antitrust authorities. Research identifying the characteristics of firms that later grow into serious challengers to powerful incumbents, or to offer critical complements, would be very valuable. Tracking the performance of target firms in deals blocked by competition agencies will be especially instructive.

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[57] Appendix A in the Hart-Scott-Rodino Annual Report for Fiscal Year 2022 shows that over the past decade the share of reported transactions receiving a second request ranged from a high of 3.6% in FY2013 to a low of 1.5% in FY2022.

5. Additional Metrics

Our focus so far has been on studies about concentration, markups, and merger retrospectives. These topics have the most direct connection to antitrust policy and traditional IO research. However, proponents of the competition-in-decline hypothesis also point to other metrics, including the decline of the labor share, reduced "business dynamism," and the rise in common ownership.[58] In this section, we briefly touch on each of these metrics.

The decline of the labor share is a huge literature of its own in macroeconomics, labor economics, and international trade. Barkai (2020) and Autor et al. (2020) both link lower labor share to rising concentration. However, given that there are many competing explanations for the decline of the labor share (Grossman and Oberfield, 2022), that the pattern seems to be global (Karabarbounis and Neiman, 2014), and that many of the same measurement issues that exist with markups and concentration apply to the labor share, we do not think this line of work provides incremental evidence in favor or against the broad decline-in-competition hypothesis.

In recent decades, there has been a well-documented slowdown in business dynamism, where business dynamism is defined as the rate of new business formation. Decker et al. (2014) document this secular trend. Proponents of the decline-in-competition view link this trend to reduced competition, arguing that entry is harder because incumbent firms are now more entrenched. However, a lower rate of new business formation does not distinguish between the decline-in-competition hypothesis and the competition-in-action hypothesis. Entry may be harder because incumbent firms are doing a better job serving customers.

In any event, new business formation has surged in the last couple of years. During the decade from 2010 to 2019, there were an average of 241 thousand new business applications per month with a slight upward trend, but in the past two years (June 2022 to May 2024) the average was nearly twice that, at 442 thousand.[59] This evidence indicates that new business formation in the United States is sensitive to business opportunities, arguably more so than in other countries.

Albrecht and Decker (2024) provide a more direct test of whether new business formation has been impeded by a rise in market power. They examine whether sectors with higher DLEU markup growth experience less new business formation and find instead a positive relationship. That is, sectors with higher DLEU markup growth experience higher rates of entry. Another strand of this literature relates to the role of demographics. Hopenhayn et al. (2022) document that younger people tend to start new businesses and show quantitatively that the slowdown in new business formation prior to the pandemic can be explained by an aging population.

The growth in asset managers' ownership of publicly traded companies has led to an increase in joint stockholding of firms in the same industry. This growth has been well documented by Azar et al. (2018) and Backus et al. (2021a). The basic theoretical logic that would make one worry about common ownership is clearly correct: if two competitors each own a 49% stake in the other, then it would be fair to worry that they will not compete vigorously if at all. Indeed, the

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[58] These are not the only metrics that have been linked as cause or effect of a decline in competition. Other metrics include increasing expenditures on lobbying expenditures (Gutierrez and Philippon, 2023) and the reduction of interstate migration (De Loecker et al., 2020).

[59] U.S. Census Bureau Business Formation Statistics, seasonally adjusted. The surge began in the middle of 2020 as the pandemic disrupted the economy. The surge has not abated even as the pandemic has receded.

antitrust laws as originally written explicitly mentioned minority shareholdings as a cause of concern, not just outright control.

In practice, the ownership stakes of even the largest asset managers tend to be under 10% of a firm, and there are multiple owners whose interests are not necessarily aligned. Mix into this environment corporate governance frictions, the fact that the publicly traded firms are often supplying each other rather than competing against each other, and the career incentives of managers, and it is certainly not obvious that increased common ownership has led to softer competition: this is an empirical question. An intriguing empirical literature has started to investigate. At this point, while common ownership is a potentially important phenomenon that warrants continuing observation by antitrust authorities, the existing evidence on whether common ownership translates into higher prices is decidedly mixed. See Azar et al. (2018) and Backus et al. (2021b). Further work on both mechanisms and outcomes is called for here.

6. Policy Implications and Priority Areas for Research

We now return to the big question for antitrust policy: do the observed changes in the U.S. economy in recent decades represent a failure of competition policy? Or do they indicate competition in action? If the answer varies by industry, how can we tell the difference?

Contrary to what you might read in the popular press, the economic evidence that looks across many industries over a long period of time does not support the view that there has been a widespread decline in competition in the U.S. economy over the past 25 or 40 years. Likewise, this evidence does not provide a basis for major changes in antitrust policy.

We are not saying that antitrust policy has been ideal. Far from it.[60] Nor are we saying that merger enforcement has been strict enough. Rather, we are saying that, to do better, one must roll up one's sleeves and do the hard work of studying individual companies, industries, and mergers. Measuring concentration or price/cost markups at scale is no substitute for such studies.

Viewed as a whole, the evidence *does* point to the need for antitrust enforcers to be alert and vigilant. Indeed, Benkard et al. (2023) measure that concentration levels, while decreasing, are on average quite high. In sectors of the economy where large firms have grown by exploiting economies of scale and scope so their share of economic activity has grown, it is important to ensure that these firms do not engage in exclusionary conduct, that they do not collude either within or across markets, and that they are not able to anticompetitively acquire actual or potential rivals. These policy implications apply to any jurisdiction experiencing the same trends as the United States, including at least Europe.[61]

What does all of this imply for future research regarding competition and market power in the United States? The central question can be posed this way: In which industries are we observing competition in action, and in which industries are we observing a decline in competition that

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[60] Shapiro (2021) explains how antitrust policy lost its way in recent decades and how we can do better.

[61] Canada has also experienced some of these same trends, but not all of them and not to the same degree as the United States. See Canadian Competition Bureau (2024). Measuring concentration in 4-digit NAICS industries, the HHI in the top 10% most concentrated Canadian industries rose from 2818 in 2005 to 3060 in 2018 (Table A1), but the average CR3 declined in those industries (Table A5). Average price/cost markups rose from 2002 to 2018 in 55 of 338 industries (Table E2), going up by 12.5% in the 10% of industries with the highest markup in 2002.

suggests a failure of antitrust policy? To answer that question, we need to understand *how and why* different markets and different sectors have evolved as they have.

A number of recent research contributions have identified settings where antitrust enforcement needs to adjust to reflect economic learning and to account for the strategies firms have adopted. Notably, research findings indicate that more resources should be devoted to identifying and deterring killer acquisitions in pharmaceuticals, to preventing serial acquisitions which individually fall under the HSR thresholds but collectively substantially reduce competition, and to investigating and stopping hospital mergers. These are examples, not an exhaustive list.

We close by identifying a collection of specific research directions that would help us learn whether competition in various industries or markets is suffocating or thriving.

First, with respect to concentration studies, we have emphasized that they cannot be informative regarding market power unless concentration is measured over a set of reasonable substitutes, and even if they are, they cannot, taken alone, distinguish between a decline in competition and competition in action. Nevertheless, to aid in getting some preliminary indications of how the economy is changing, it would be useful to identify any broad trends in markets for intermediate goods and services using more narrow market definitions, as Benkard et al. (2023) do for consumer-facing goods. It would also be useful to construct concentration measures with narrower market definitions going back further in time to match estimates in the literature on price/cost markups. The measurements in Benkard et al. (2023) begin in 1994, while aggregate markup estimates and profits series go back to the 1950s.

Second, more studies of specific industries that span longer time horizons could be quite informative. These studies need not focus on concentration or markups *per se*. For example, we would like to know how the division of industry value-added between consumer surplus and producer surplus has evolved in response to technological shocks and regulatory changes. The evidence-at-scale we reviewed spanned not just many industries but also a long period of time, thirty or more years. Industry-specific studies have tended to focus on shorter time frames, possibly because rich data is harder to collate over long time frames. But it is not impossible. The analysis of the steel industry from 1963 to 2003 by Collard-Wexler and De Loecker (2015) is a good model paper in this regard using production function methods. Likewise, Grieco et al. (2024) analyze the auto industry from 1980 to 2018 using the demand approach. Miller, et al. (2023) shows how the adoption of new technology transformed the cement industry from 1974 to 2019. We encourage researchers to apply the level of detail in industry-specific analysis emphasized by Bresnahan (1989) to longer time horizons so we can better understand how technology, globalization, and regulation, including antitrust, affect the functioning of competition in specific industries. If one can overcome the challenge of accounting for rapidly changing technology, such studies in markets such as search engines, social media platforms, microprocessors, or mobile ecosystems would be especially interesting.

Third, and relatedly, we reviewed three studies that compare markup estimates from the demand approach in specific industry studies to estimates for those same industries from the aggregate production approach. Three studies are hardly enough to draw robust conclusions about the extent of agreement or the relative reliability of the two methods. We would like to see many more such comparisons, which appear feasible given that markup estimates are often available as a byproduct of industry studies, even when the motivating research question is not about the evolution of markups *per se*. Work along these lines would allow us to better assess the accuracy

of price/cost markups measured at scale, but it would not tell us whether any observed increases in markups are associated with a decline in competition.

Fourth, also related to the previous two, researchers could measure changes in *conduct* over time in specific markets. As we discussed, markup estimates from the demand approach often assume a mode of firm conduct such as static Nash equilibrium in prices so they can back out what markups must have been given demand conditions and observed prices. With suitable instruments, methods exist to estimate rather than assume conduct, as shown in Bresnahan (1982) and further formalized in Berry and Haile (2014). Industry studies which estimate rather than assume conduct, and ideally those which can trace out changes in conduct over time, would be very valuable. Understanding what drives conduct has become all the more important as technological change and globalization have led to a smaller set of large firms that are competing across multiple markets using sophisticated data analysis and business analytics such as delegating pricing to artificial intelligence. Will these dynamics foster an environment of softer competition due to tacit coordination and multimarket contact, or will market competition more resemble the results from Bresnahan and Reiss (1991) where prices fall quickly with the first few entrants and level off after the fourth entrant? Will sophisticated pricing algorithms serve to increase consumer and total surplus as in Castillo (2024) or will they harm consumers?

Fifth, given that a significant portion of the rise in corporate profits as a percentage of GDP can be attributed to a rise in profits from the foreign operations of U.S. corporations, and given that Compustat data rarely decomposes revenue and costs into foreign versus domestic operations, a key question is how much of the measured rise of markups in estimates using Compustat data is attributable to revenue from foreign operations. Furthermore, one would like to know how much of the revenue that U.S. multinational firms attribute to foreign operations actually reflects profits earned in foreign markets rather than profit-shifting behavior for tax purposes.

Sixth, while the merger retrospectives literature has grown gradually over the years, in our view there is still ample room for additional studies on merger efficiencies, the non-price effects of mergers, including innovation, and especially on observable predictors of the magnitude of price effects. Focusing retrospectives on mergers that the DOJ and the FTC unsuccessfully challenged, and on mergers that they investigated in detail but did not challenge, will be especially fruitful for debates about whether merger policy has been overly lax. We also need more "non-merger retrospectives," by which we mean studies of the performance of target firms after a merger is blocked by the antitrust authorities or abandoned in the face of antitrust scrutiny.

Finally, we see a number of ways that at-scale evidence can be fruitfully synthesized with industry-specific studies. The at-scale evidence can provide useful suggestive evidence regarding which industries to study in more detail. For example, if one sees margin estimates or concentration measured at-scale changing markedly in a given sector, that may provide good motivation to look more deeply at that sector so as to understand what is causing those changes. In the other direction, as industry-specific studies accumulate, they provide additional outcome variables to analyze using cross-industry meta-analysis. For example, several times in this review we mentioned the finding in Ganapati (2021) that increasing sector concentration is correlated with increasing productivity and output as useful evidence to help interpret whether the measurements being made at scale are, on average, more indicative of competition-in-decline or competition-in-action. Industry-specific studies often produce additional outcomes like consumer surplus or rates of technological progress. The overall relationship between those metrics and either concentration or markups could be studied.

Academic research has greatly influenced antitrust enforcement for the past sixty years. In recent decades, much of this influence manifests in our improved understanding of competitive strategy using game-theoretic methods and through detailed investigations of many individual markets, including those conducted to support or contest antitrust enforcement actions. This state of affairs mirrors the state of academic research in industrial organization, which in recent decades has focused on detailed econometric studies of individual markets. However, as a healthy part of the scientific process, it is important to entertain the possibility that this has been a mistake – that industrial organization economists' focus on individual markets missed the forest for the trees.

Studies of competition conducted at scale are enticing because they offer an aerial view of the entire forest. Many people have interpreted the at-scale studies as showing that there has been a broad decline in competition in the U.S. economy in recent decades. On this view, industrial organization economists largely failed to detect this dramatic trend due to their fussiness and their focus on the specifics of how competition works in individual markets.

We have entertained but ultimately rejected this decline-of-competition interpretation of the evidence at scale. We detailed the severe measurement problems that plague this evidence when used for the purpose of identifying trends in competition in the U.S economy. Moreover, even if one puts aside these measurement problems, the trends in concentration and markups identified using evidence at scale do not distinguish between the decline-in-competition hypothesis and the competition-in-action hypothesis because they do not tell us what *caused* those trends.

Looking at the total body of evidence – the union of at-scale and industry-specific studies – the main patterns we observe are several signs of competition-in-action, dramatic effects of technological change, and mixed results regarding the effects of mergers. There is much more work to be done in both the at-scale paradigm and with industry-specific studies. Our vision – aspirational and perhaps unrealistic, we admit – is that enough industry studies will eventually be produced on a regular basis to form the backbone of evidence-at-scale meta-analyses.

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