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## Invited Article

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# Profits and markups during the post-COVID-19 inflation shock in the U.S. economy: a firm-level lens

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In this paper, I use firm-level data from Compustat to document the evolution of markups among listed U.S. non-financial firms during the height of the COVID-19 pandemic (2020–2022). I show that, continuing its long-term rise, the aggregate (sales-weighted) markup rises markedly in 2020 and moderately in 2021, and returns to pre-pandemic levels in 2022. I then disaggregate this aggregate trend to, first, show that its 2020 growth reflects growing sales concentration. In contrast, the average within-firm markup is steadier than the aggregate. Second, I show that the markup distribution widens during the pandemic, due largely to increases at its 90th percentile. At the same time, however, the cross-sectional distribution obfuscates that firms with low pre-pandemic markups command notable markup growth in both 2021 and 2022. Third, I document key roles for manufacturing, retail, and information services in these dynamics. Together, these patterns are consistent with accounts of profit inflation, wherein U.S. firms' market power allowed them to maintain – and, for some firms, increase – their margins over direct costs in the face of input cost shocks in 2020–2022.

Keywords: markups, market power, profit inflation

JEL codes: D4, E12, L1

### 1 INTRODUCTION

In this paper, I document the evolution of markups during the COVID-19 inflation shock in the United States using firm-level data. This analysis speaks to debates on the nature of the pandemic inflation and, specifically, to widening attention in academic and policy circles to the roles of profits and firms' price-setting capacities in driving this inflation (e.g., Bivens 2022; Brainard 2022; Nikiforos et al. 2023; Stiglitz/Regmi 2023; Weber/Wasner 2023; Pancoti/Owens 2024).<sup>1</sup> These arguments variously term the COVID-19 inflation a sellers' inflation (Weber/Wasner 2023), a cost-push-profit-led inflation (Nikiforos et al. 2023), and a profit inflation (Storm 2023). In each case, the central claim is that cost shocks during the pandemic (due, for example, to shipping bottlenecks, commodity price shocks, and energy price spikes) were propagated by firms with market power that raised prices to protect their profit margins. Thus, this explanation of inflationary dynamics has a markedly different focus from those emphasizing a conventional wage– price spiral. The distributional implications also differ: by protecting profits when faced

1. See also Lagarde (2023) and Hansen et al. (2023) in the context of the euro area.

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with input cost shocks, firms pass the burden of these shocks to real wages (Nikiforos et al. 2023).

Why could firms protect their profits during the COVID-19 inflation? Weber/Wasner (2023), for example, emphasize that price hikes during a sellers' inflation rest on implicit agreements among competitors to raise prices, which can be coordinated by sector-wide cost shocks or bottlenecks. Thus, pandemic disruptions may have granted firms temporary market power that allowed them to raise prices without losing market share. At the same time, widespread public attention to supply-chain disruptions and cost shocks can 'create legitimacy for price hikes and create acceptance on the part of consumers to pay higher prices' (Weber/ Wasner 2023: 186). In fact, earnings calls show companies extolling their ability to raise prices during the pandemic without losing demand – i.e., to 'blame inflation' for price increases (Mabud 2022: 4).

COVID-19 also arrived on the coattails of a long-term rise in corporate market power, exemplified by growth in markups (De Loecker et al. 2020), profit margins (Davis/de Souza 2023), and sales concentration (Grullon et al. 2019; Davis/Orhangazi 2021). These shifts are dramatic: for instance, De Loecker et al. (2020) document a 70 per cent rise in the aggregate markup after 1980. This long-term shift in distributional power relations in the U.S. may have also set the stage for firms' price-setting response to pandemic disruptions. For instance, high market concentration can facilitate firms' ability to coordinate price increases, particularly when supply disruptions make it difficult to invest in new capacity (Korinek/Stiglitz 2022). In turn, a growing body of evidence establishes record profit margins and a substantive role for profits during the COVID-19 inflation at the aggregate level (e.g. Bivens 2022; Hansen et al. 2023; Matamoros 2023; Stiglitz/Regmi 2023) and, increasingly, at the firm-level as well (Konczal/Lusiani 2022; Conlon et al. 2023; Nikiforos et al. 2023).

In this paper, I extend this body of empirical evidence using firm-level data to describe the markups – defined as average sales per unit of the cost of goods sold – of U.S. listed non-financial firms between 1950 and 2022, with a focus on 2020–2022. Firm markups speak directly to the possibility of profit inflation in the COVID-19 period: even *constant* markups in the face of the COVID-19-era input cost spikes and supply disruptions mean that firms pass these cost increases to consumers in the form of higher prices and lower real wages (see Nikiforos et al. 2023). I show that the aggregate (sales-weighted) markup jumps substantively with the onset of pandemic disruptions in 2020 and rises moderately in 2021, before returning to approximately pre-pandemic levels in 2022 (see also Konczal/ Lusiani 2022; Conlon et al. 2023; Nikiforos et al. 2023).<sup>2</sup> In the post-2019 context of dramatic input cost shocks, this pattern speaks to profit inflation à la Nikiforos et al. (2023). Specifically, these trends indicate a remarkable ability of the aggregate group of U.S. corporations to exercise the high levels of market power that they amassed over the post-1980 period to insulate themselves from these shocks.

I then take a distributional and sectoral lens to unpack three patterns underlying this aggregate trend. First, I establish the central importance of reallocation effects (i.e., changes in firms' sales weight within the weighted average) for changes in the aggregate markup. In particular, I show that, rather than within-firm markup growth, the large 2020 jump in the aggregate markup reflects a reallocation of sales towards relatively high-markup firms. In other words, high-markup firms may have exercised market

<sup>2.</sup> As I discuss below, I analyze a different sample of firms than, for example, Konczal/Lusiani (2022) and Conlon et al. (2023). These differences affect the annual specifics, but not the qualitative story of profit inflation.

power during the pandemic at least in part by increasing their hold on already-concentrated markets – even without necessarily raising these already-high markups further. This pattern suggests not just a sellers' inflation, but a 'winners' inflation' as well. I also show that, in contrast, if the aggregate markup were only driven by within-firm changes, it would have declined moderately between 2019 and 2022.

Second, I show that markups rise quickly at the top of their distribution in 2020 and 2021 and that, despite a decline in 2022, top markups are notably higher in 2022 than before the pandemic. While top-percentile markup growth is in keeping with long-term trends, the pandemic years are unusual in suggesting that low-markup firms also exerted new price-setting power during the pandemic (see also Konczal/Lusiani 2022; Nikiforos et al. 2023). To describe the behavior of low-markup firms, I move from the annual (cross-sectional) distribution, in which firms can move between percentiles and which is also affected by entry and exit, to make use of the data's panel structure and follow firms ranked by their pre-pandemic markups through the pandemic. I show that firms with low pre-pandemic markups rises almost 10 per cent by 2021 relative to 2019. Thus, while their markups remain (substantially) lower in levels than those of high-markup firms, firms with low pre-pandemic markups were able to take advantage of the emergence of inflation to raise prices relative to their costs of goods sold.

Third, I consider the sectoral nature of markup growth. The COVID-19 inflation is characterized by clear sectoral differences, as energy prices, bottlenecks and backlogs, sector-specific demand shifts, and supply shortages affected firms in different sectors differently. In a profit inflation, markups should, therefore, also evolve differently by sector (Stiglitz/Regmi 2023; Weber/Wasner 2023). I show that three sectors - manufacturing, information services, and retail – play central roles in the large 2020 jump in the aggregate markup, via higher average markups (for manufacturing and information services) and via growth in market share (for information services and retail). At the same time, average markups in other sectors tend to be steady. In fact, only two sectors (mining in 2020 and manufacturing, in which within-sector markup growth reverses in 2021 and 2022) record notable sectoral markup *declines* in any pandemic year and, even then, the cumulative changes in markups in both mining and manufacturing between 2019 and 2022 are close to zero. Finally, I show that the 2022 decline in the aggregate markup reflects shifts in sectoral market share rather than declining sectoral markups. Thus, the sectoral evidence also speaks to profit inflation wherein, across sectors, markups tend to be steady or rising during the COVID-19 period.

Together, this evidence speaks to firms' price-setting behavior during the COVID-19 years: within-firm and within-sector markups are either steady or – for firms at the top of the cross-sectional markup distribution, those with low pre-pandemic markups, and, in 2020, those in manufacturing and information services – rising. These results also highlight that market share plays a central role in shaping the aggregate pandemic-period markup. The 2020 jump in the aggregate markup, in particular, reflects reallocation effects, suggesting a 'winners' inflation' wherein high-markup firms' expanded their market share with the onset of the COVID-19 inflation. Building on Weber/Wasner (2023), Weber et al. (2024), Stiglitz/Regmi (2023) and Korinek/Stiglitz (2022), this pattern, therefore, suggests an additional channel through which long-term growth in sales concentration in the U.S. may have set the stage for an inflationary response to COVID-19-rea shocks. Finally, these results suggest that, after market share effects had transmitted inflationary impulses through the economy, other firms – including those with low pre-pandemic price-setting power – could also raise their markups over costs.

Finally, a note on scope: while this paper is motivated by the COVID-19 inflation, firm-level markups do not speak directly to inflationary dynamics. My aim, more narrowly, is to describe markups across listed non-financial firms and, in doing so, to provide firm-level evidence that speaks to firms' price-setting power during the COVID-19 inflation.

The paper is structured as follows: in Section 2, I introduce the definition of the markup and the data that I use in the paper, and in Section 3 I document the aggregate markup across U.S. listed non-financial firms between 1950 and 2022. Sections 4 and 5 disaggregate this aggregate trend. In Section 4, I identify the relative contributions of market share, top firms, and bottom firms. In Section 5, I document sectoral contributions to aggregate markup growth. Section 6 briefly concludes.

#### 2 DEFINING THE MARKUP WITH FIRM-LEVEL DATA

#### 2.1 The markup

In Keynesian theory, firms set prices at an average markup over the unit cost of production. Thus, the markup is the ratio of a firm's revenues to its direct costs of production (Lee 1999; Lavoie 2014). This ratio is a key distributional variable in Keynesian frameworks: when firms command higher markups by selling at higher prices relative to their costs of production, they pay lower real wages. In turn, firms' degree of price-setting power is determined by institutions, norms, and structural characteristics of the economy. A declining prevalence of institutions like unions that support labor's bargaining power, for example, allows firms to extract higher prices relative to wage costs and, thus, higher sales relative to their average direct costs of production. At the macroeconomic scale, a higher markup implies a higher profit share and, conversely, a lower labor share of income.<sup>3</sup>

In this paper, I emphasize this Keynesian concept of the markup and apply it to Compustat data between 1950 and 2022.<sup>4</sup> To do so, I measure the markup as the simple ratio of sales (Compustat variable *sale*) to the cost of goods sold (*cogs*). This measure of the markup is also used in Nikiforos et al. (2023). The sales variable in Compustat measures total sales net of items such as returned goods and, therefore, reflects gross revenue from normal business operations. The cost of goods sold measures direct costs of production such as direct labor; salary expense; supplies; heat, light, and power; improvements to leased property; insurance and safety; lease expenses; licenses; maintenance and repairs; operating expenses; taxes other than income taxes; transportation; and warehousing expense. Thus, the sales-to-cost-of-good-sold ratio measures an *average* markup over costs.

There is, of course, substantive variation in the existing literature on the definition and measurement of markups. Most famously, De Loecker et al. (2020) use a production approach that builds on Hall (1988) and De Loecker/Warzynski (2012) to estimate markups based on firms' cost minimization decisions. The key difference between this approach and the definition of the markup that I use in this paper lies in that the

<sup>3.</sup> See Nikiforos et al. (2023) for a detailed discussion of the relationship between the Keynesian price-setting equation and the profit share applied to the pandemic-period inflation.

<sup>4.</sup> Compustat describes the universe of firms that are publicly listed in the U.S. It is a key data source for firm-level analyses of the U.S. economy, as it includes detailed income and balance sheet data for a macroeconomically relevant sample of relatively large firms (see, for example, Davis et al. 2006, for a discussion of its macroeconomic relevance).

production approach estimates markups over marginal, rather than average, costs. Thus, De Loecker et al. (2020) scale the ratio of total revenue to the average cost of production (i.e., the ratio of sales to the cost of goods sold) by a time- and sector-specific term that describes the output elasticity of demand.<sup>5</sup>

The De Loecker et al. (2020) approach forms the basis for a large empirical literature on firm markups and market power, including recent work extending (versions of) their measure of markups into the pandemic period. Konczal/Lusiani (2022), for example, scale the ratio of sales to the cost of goods sold by 0.85, which is the average output elasticity over time and sector estimated by De Loecker et al. (2020).<sup>6</sup> Of course, while the level of the markup differs when scaling the sales-to-cost-of-goods sold ratio by this constant term, the trend and growth rate are unchanged relative to my (unscaled) definition. In fact, De Loecker et al. (2020) also show that, despite the theoretical differences distinguishing their baseline markup from a simple sales-to-cost-of-goods-sold ratio, the long-term trend is quite similar when using time- and sector-invariant output elasticities.<sup>7</sup> Thus, the empirical patterns in the simple sales-to-cost-of-goods-sold ratio that I use in this paper also relate closely to this previous body of work.

The measurement of markups is also affected by the definition of costs and, in particular, the share of overhead in total costs, which has grown after 1980 (Traina 2018). In the Appendix, I, therefore, show aggregate trends for two alternative measures of market power that also account for overhead. First, I show the ratio of sales to *total* costs, where total costs are the sum of the cost of goods sold (*cogs*) and selling, general and administrative expense (*xsga*). Selling, general, and administrative expense includes overhead items such as accounting and advertising expense, legal expense, and directors' fees and remuneration. Second, I show the profit margin, defined as total after-tax profits relative to sales (following Davis/de Souza 2023).<sup>8</sup> While there are year-to-year differences, both measures reinforce the general pandemic-period trend captured by simple sales-to-cost-of-goods-sold ratio – and, in particular, its 2021 peak – that I document in Section 3, below.

#### 2.2 The sample of U.S. listed non-financial firms

I define the markup for the group of U.S. listed non-financial firms in Compustat between 1950 and 2022. To clean the Compustat data, I exclude observations with

5. More specifically, De Loecker et al. (2020) measure the markup using the following equation:

$$\mu_{i,t} = \theta_{i,t}^{\nu} \frac{P_{i,t}Q_{i,t}}{P_{i,t}^{\nu}V_{i,t}}$$
(1)

where  $P_{it}Q_{it}$  is total revenue (i.e., the Compustat variable sales),  $P_{it}^V V_{it}$  is the average cost of production times production (i.e., the cost of goods sold in Compustat), and  $\theta_{it}^{\nu}$  is the output elasticity of demand with respect to the variable input, which they estimate based on an industry- and year-specific Cobb–Douglas production function.

6. Similarly, Conlon et al. (2023) hold the estimated output elasticities from De Loecker et al. (2020) fixed at their 2016 values.

7. Given this similarity, they conclude that the long-term rise in markups does not reflect technological change.

They also show that their estimated output elasticities vary little over time.

8. Total profits include gross sales and non-operating income flows (such as interest and dividend income) less the cost of goods sold, interest expense, and general and administrative expense (the sum of Compustat item *oibdp* and *nopi* less *xint* and *txt*).

negative values for total assets, sales, or the cost of goods sold.<sup>9</sup> I also exclude finance and real estate (FIRE), thereby dropping mutual/investment funds, firms with employees devoted to the management of funds, and other financial firms from my analysis (firms with NAICS codes beginning in 52 and 53). While excluding FIRE deviates from recent empirical work on markups (e.g., De Loecker et al. 2020; Konczal/Lusiani 2022; Conlon et al. 2023), this restriction is important for making comparisons over time: not only do financial companies' income and cost structures differ substantively from those of non-financial firms, but their share in listed firms also grows after 1980 (from 16.6 per cent of the unrestricted Compustat data in the 1980s to 35.3 per cent since 2010).<sup>10</sup>

Last, I use foreign incorporation codes (Compustat variable *fic*) to limit the sample to U.S. firms. In doing so, I exclude foreign private issuers, which are foreign firms that list on U.S. stock exchanges — for example, to access liquid secondary equity markets or positive reputational effects that may stem from oversight by the U.S. Securities and Exchange Commission (Karolyi 1998).<sup>11</sup> Because foreign private issuers need not do business or sell their products in the U.S, they are not relevant for questions about U.S. markups or pricing behavior.<sup>12</sup> Furthermore, because their accounting procedures follow the rules of their native countries, their reported data need not be directly comparable to that of U.S. listed firms (Francis 2010). After these sample restrictions, I trim the markup at the 1st and 99th percentiles to account for outliers, where these percentiles are calculated annually (as in De Loecker et al. 2020). This sample describes listed U.S. non-financial firms, and includes 244,866 observations and 18,442 firms between 1950 and 2022.

Finally, an important note on data frequency and timing: this paper uses annual fiscalyear data. Fiscal-year-end dates reach as far as May of the following calendar year. Thus, the 2020 fiscal year includes sales and costs for some firms from the 2021 calendar year; the 2021 fiscal year includes sales and costs for some firms from the 2022 calendar year, etc. A strict year-for-year correspondence between these annual series and inflation is, therefore, not possible. Instead, this paper aims to establish general evidence of the extent to which firms maintain or even increase their markups over the full pandemic period.

#### 3 THE AGGREGATE MARKUP

Figure 1 begins by showing the aggregate (i.e., sales-weighted average) markup across U.S. listed non-financial firms from 1950 through 2022. This figure documents a striking secular increase in the aggregate markup beginning in 1980. This long-term trend is now well-known from De Loecker et al. (2020), whose analysis ends in 2016. Specifically, Figure 1 shows that the weighted-average markup rises from a pre-1980 average of 1.458 (i.e., a 45.8 per cent markup over the cost of goods sold) to a post-2000 average of 1.726 (i.e., a 72.6 per cent over the cost of goods sold). The markup peaks at 89.1 per cent

9. I also exclude observations that do not report a NAICS code; those with a NAICS code that designates them as being in an unclassifiable industry; and those in public administration (four observations). Observations without NAICS codes are concentrated in the early years of the sample, falling to zero or one observation per year by the mid-1980s.

10. Nonetheless, the main qualitative patterns in this paper are robust to the inclusion of FIRE, yielding a sample closer to those in De Loecker et al. (2020) and Konczal/Lusiani (2022).

11. This sample restriction also deviates from the recent empirical literature on markups.

12. Instead, these firms' growing presence in Compustat is indicative of post-1980 growth in international financial (equity) flows. In fact, the share of Compustat firms that are foreign private issuers rises markedly as international equity flows grow after 1980, from an average of 8.8 per cent of Compustat observations during the 1980s to almost one-third (31.8 per cent) after 2010.



*Notes:* This figure shows the sales-weighted average markup across U.S. listed non-financial firms between 1950 and 2022. The markup is the ratio of sales to the cost of goods sold. See Section 2 for details on the data and sample.

#### Figure 1 The aggregate markup

in 2021.<sup>13</sup> Thus, the aggregate markup rises more than 40 percentage points from before 1980 to 2021, capturing a long-term rise in average market power and, specifically, in the extent to which U.S. listed non-financial firms amass revenues in excess of their average direct costs.<sup>14</sup>

Figure 1 also extends this trend through 2022, thereby describing the height of the COVID-19 pandemic in the United States (see also Konczal/Lusiani 2022; Conlon et al. 2023; Nikiforos et al. 2023). Doing so shows, first, that the sales-weighted markup across U.S. listed firms rises sharply in 2020 and remains high in 2021. In fact, the 2020 increase in the markup is one of the largest annual increases of the post-1980 period, rising more than five percentage points, from 83.5 per cent in 2019 to 88.9 per cent in 2020. Consistent with profit inflation, this increase suggests that the aggregate of U.S. listed firms could exercise a decades-long rise in market power in 2020 and 2021 to not only emerge unscathed from large-scale cost-side disruptions but to also command a *higher* sales-weighted markup.

Second, Figure 1 shows that the aggregate markup returns to approximately prepandemic (namely, 2019) levels in 2022. Put differently, the cumulative change in the aggregate markup over the pandemic years is close to zero. As Nikiforos et al. (2023) emphasize, a constant markup showcases the non-financial corporate sector's ability, as a group, to insulate itself from cost shocks by passing these shocks to real wages. The

13. If, like Konczal/Lusiani (2022), I scale the sales-to-cost-of-goods sold ratio by 0.85, then the magnitudes in Figure 1 imply that the aggregate markup rises from an average of 23.9 per cent prior to 1980 to reach 50.0 per cent in 2016 and 60.7 per cent in 2021. While there are sample differences wherein I exclude financial and foreign firms, these values are on par with those in the previous literature.

14. Figure A1 in the Appendix plots the sales-weighted markup defined relative to the sum of the cost of goods sold and selling, general, and administrative expense, and Figure A2 plots the sales-weighted profit margin. Despite year-to-year differences, the qualitative pattern is the same. In particular, each series peaks in 2021.

2022 drop also speaks to the propagation patterns of a sellers' inflation: Weber/Wasner (2023) emphasize that the supply disruptions of the pandemic grant only temporary market power, which fades after initial shocks pass through downstream sectors. While, as noted in Section 2.2, the timing of these changes cannot be mapped directly into inflationary trends, Figure 1 is consistent with this interpretation, wherein a temporary boost to market power recedes as supply pressures ebb.

#### 4 UNPACKING THE DISTRIBUTION: TOP AND BOTTOM FIRMS

In addition to establishing aggregated trends, firm-level data can describe the distribution of markups across firms and thereby suggest different reasons for these aggregate patterns. For example, does the aggregate markup rise in 2020 and 2021 because a set of already-powerful firms achieve further gains? If so, do these gains reflect higher markups or higher market share? Or, alternatively, do the pandemic disruptions allow new firms to raise prices under the guise of already high inflation?

In this section, I describe three patterns underlying the aggregate markup in 2020–2022. First, I use a decomposition from De Loecker et al. (2020) to show that aggregate markup growth in 2020 reflects rising sales concentration among high-markup firms, whereas the average within-firm markup is steadier than the weighted-average trend. Second, I show that, while top percentiles of the (cross-sectional) markup distribution experience the first (and largest) markup gains in 2020, markups also rise at the *bottom* of the distribution in both 2021 and 2022. Third, I utilize the panel structure of the data to show that, in fact, firms with *low pre*-pandemic markups had disproportionately large markup gains in both 2021 and 2022. Thus, firms at the top of the distribution lead markup growth and amass gains during the pandemic, after which low-markup firms take advantage of the disruptions and raise markups to a degree that breaks with their historical capacity to do so.

#### 4.1 Rising concentration versus within-firm markup growth

I begin by documenting the relative weights of reallocation effects and within-firm changes in the markup for the aggregate patterns shown in Figure 1. To do so, I use the firm decomposition from De Loecker et al. (2020) to disaggregate the annal change in the sales-weighted markup into three terms. These terms show, first, that the salesweighted markup can rise if firms raise their markups (i.e., due to within-firm changes). Second, it can rise if the market share (i.e., sales weight) of high-markup firms increases. Third, it can rise due to changes in the composition of firms if firms enter with relatively high markups and/or exit with relatively low ones.

I show this decomposition in equation (2):

$$\Delta \mu_{t} = \underbrace{\sum_{i} m_{i,t-1} \Delta \mu_{i,t}}_{\text{Within-firm component}} + \underbrace{\sum_{i} \tilde{\mu}_{i,t-1} \Delta m_{i,t}}_{\text{Market share component}} + \underbrace{\sum_{i} \Delta \mu_{i,t} \Delta m_{i,t}}_{\text{Cross term}} + \underbrace{\sum_{i \in \text{Entering}} \tilde{\mu}_{i,t} m_{i,t} - \sum_{i \in \text{Exiting}} \tilde{\mu}_{i,t-1} m_{i,t-1}}_{\text{Net entry}}$$
(2)

where  $\Delta \mu_t$  is the annual change in the markup; *m* is a firm's market share of total sales;  $\mu$  is the firm-level markup;  $\tilde{\mu}_{i,t} = \mu_{i,t} - \mu_{t-1}$ ; and  $\tilde{\mu}_{i,t-1} = \mu_{i,t-1} - \mu_{t-1}$ . Thus, the first term in equation (2) shows the contribution of within-firm changes to changes in the sales-weighted

average markup, holding each firm's market share constant at its initial level; the second term shows the contribution of changes in market share, weighted by firms' demeaned lagged markups; the third term describes the joint effect of changes in the markup and in market share; and the final terms capture entry and exit.<sup>15</sup>

I show this decomposition in Figure 2, which plots the aggregate markup and four counterfactual trends describing the aggregate markup's evolution if only within-firm changes, changes in market share, or net entry were to have affected its post-1980 path. I exclude the cross term, which is small. As in De Loecker et al. (2020), this decomposition shows that, particularly since the mid-2000s, markup growth is dominated by growing sales concentration among high-markup firms.<sup>16</sup> Changes in market share account for approximately half the increase in the aggregate markup between 1980 and 2000, and for 85 per cent between 2000 and 2019. This pattern is consistent with the timing of rising corporate concentration in the U.S. economy (Grullon et al. 2019), and suggests that high-markup U.S. firms exercise this market power to grow their market share. In turn, while within-firm changes account for approximately the other half of markup growth through 2000, within-firm markups are steady after the mid-2000s. In all years, the role of net entry is small; thus, entry and exit do not exert substantive annual pressure on the weighted mean.<sup>17</sup>

The importance of this market share effect persists with the onset of the pandemic. In 2020, changes in market share contribute 5.7 percentage points to the change in the



*Notes:* This figure shows a decomposition of the sales-weighted average markup across U.S. listed non-financial corporations after 1980 into the within-firm, market share, and net entry terms shown in equation (2). The markup is the ratio of sales to the cost of goods sold. See Section 2 for details on the data and sample.

Figure 2 Firm-level decomposition of changes in the markup

15. See De Loecker et al. (2020) for more discussion.

16. Note that De Loecker et al. (2020) combine the cross term with the market share component in their presentation of this graph.

17. However, entry and exit can be important away from the mean, both at certain percentiles and for explaining changes in distributional statistics (e.g., Davis/de Souza 2022; Davis et al. 2023). Entry and exit may also exert cumulative pressure on the weighted mean over longer (non-annual) periods of time.

aggregate markup, thereby (more than) dominating its 5.4 percentage point increase. This 5.7 percentage point contribution is very large by historical standards. For example, the average annual market share effect after 1980 is only 0.8 percentage points. In contrast, the within-firm effect is negative in 2020, equal to -3.5 percentage points. Thus, the aggregate markup would have increased moderately *more* in 2020 if it only reflected the reallocation of sales towards high-markup firms, and would have *fallen* if only reflective of within-firm changes.<sup>18</sup> Aggregate markup growth in 2020, therefore, reflects rising sales concentration among high-markup firms, wherein high-markup firms further increase their hold on concentrated markets – and in an extraordinary way relative to historical patterns. Thus, the COVID-19 inflation in 2020 was kicked off by a year with rising concentration, suggesting not only a sellers' inflation characterized by firms' ability to sustain profits, but in fact a 'winners' inflation', wherein top-markup firms amassed competitive gains specifically via expanded market share.

In 2021 and 2022, the market share effect reverses, such that changes in market share reduce the aggregate markup. Specifically, the market share component is slightly negative in 2021 (equal to -0.7 percentage points) and notably negative in 2022 (equal to -3.1 percentage points, which is its largest negative value over the post-1980 period). In turn, the within-firm effect is approximately zero in 2021, such that, on average, firms maintain their markups despite accelerating inflation in this year. In 2022, this within-firm effect is moderately negative, but accounts only for a quarter of the aggregate markup is again dominated by changes in market share. Thus, within-firm markups are also steadier than the weighted-average markup in 2022, and are effectively constant between 2020 through 2022.

This firm-level decomposition highlights two key features of the aggregate pandemicera markup. First, changes in the relative market share of high- and low-markup firms play a central role in the weighted-average markup during the pandemic. In particular, a strong positive market share effect in 2020, which builds on a long-term rise in corporate concentration, shows that high-markup firms expanded their market share during the pandemic. Second, average within-firm markups are steadier than the weighted average – both when the aggregate markup rises in 2020, and again when it falls in 2022. As emphasized by Nikiforos et al. (2023), steadiness shows that firms were on average able to insulate themselves from pandemic-period input cost spikes – particularly in 2021 and 2022 – and, thus, offers evidence of profit inflation.

#### 4.2 Percentiles of the sales-weighted markup distribution

Next, Figure 3 turns to percentiles of the aggregate markup distribution that is shown in Figure 1, plotting the 90th, 75th, 50th, 25th, and 10th percentiles of sales-weighted markup distribution between 1950 and 2022, as well as the weighted-average trend from Figure 1 for comparison. The overwhelming pattern in Figure 3 is a pulling away at the top of the distribution: in fact, post-1980 growth in the markup is entirely concentrated in the top half of the distribution, with the bulk of growth at the very top (De Loecker et al. 2020). For example, while the 90th percentile grows more than 70 per cent between 1980 and 2022, the median markup is effectively steady at a post-1980 average of 36 per cent. De Loecker et al. (2020), furthermore, emphasize

<sup>18.</sup> Net entry also makes a positive 1.4 percentage point contribution.



*Notes:* This figure shows selected percentiles of the sales-weighted markup distribution, as well as the weighted average from Figure 1, between 1950 and 2022. The markup is the ratio of sales to the cost of goods sold. See Section 2.2 for details on the data and sample.

#### Figure 3 Percentiles

that high-markup firms tend to be large, such that markups have not risen for the majority of firms. Thus, markup growth over the long haul has been concentrated among 'winners'.

Firms at the top of the distribution continue to differentially raise their markups during the pandemic years (see also Konczal/Lusiani 2022). For example, at the 90th percentile, markups jump substantively in both 2020 and 2021 and, even with a 2022 decline, remain notably higher in 2022 than prior to the pandemic (equal to 2.90 in 2022, implying a 190 per cent markup over the cost of goods sold, versus 2.74 in 2019). Thus, to the extent that the pandemic supply disruptions were fading in 2022, Figure 3 also suggests that the top of the distribution had a unique ability to *retain* higher markups after the storm had passed. At the same time, however, Figure 3 also shows that, despite falling in 2020, markups at the very *bottom* of the distribution (e.g., the 10th percentile) rise in both 2021 and 2022.<sup>19</sup> This behavior suggests that price-setting power at the bottom of the markup distribution temporarily declined in 2020, before recovering to its initial levels in 2021 and 2022. At the same time, however, as I show below, even the 2020 decline at the 10th percentile in fact disappears when following the specific firms that had low pre-pandemic markups through the pandemic years. I turn to this question of bottom firms more directly in Section 4.3.

#### 4.3 Prior markups and low-markup firms

While Figure 3 shows that markups at the bottom of the markup distribution dip in 2020 and rise in 2021 and 2022, these percentiles are annual cross-sections (such that firms can move between percentiles over time). The fact that firms can move between percentiles over time is likely to be especially important at bottom percentiles of the distribution, which are

<sup>19.</sup> This 10th percentile grows 3.2 per cent in 2021 and 2.5 per cent in 2022. The 2022 increase is the largest change at this percentile over the post-1980 period and the 2021 increase is the third largest change.

most affected by the entry of new firms or the exit of unprofitable ones.<sup>20</sup> Thus, crosssectional percentiles are only suggestive of whether firms with low *pre*-pandemic markups gained price-setting power during the pandemic. In this section, I utilize Compustat's panel structure to explore if firms with low or high pre-pandemic markups differentially changed these markups during the pandemic. To do so, I rank firms by their pre-pandemic markup, and use this ranking to track groups of firms with low and high pre-pandemic markups into 2020–2022. This exercise shows that, despite the persistence of large level differences between low- and high-markup firms, the former saw substantially greater average markup growth in 2021 and 2022.

Figure 4 plots average markups among firms in the top 10 per cent, middle 50 per cent, and bottom 10 per cent of the 2019 markup distribution indexed to their 2019 levels.<sup>21</sup> Thus, this figure describes average *changes* in markups relative to pre-pandemic levels (rather than the absolute level of markups for top and bottom firms). Figure 4 shows, first, that the average markups within each of these three groups is steady in 2020. This stability speaks to the pattern in Section 4.1, wherein 2020 growth in the sales-weighted markup reflects real-location effects rather than within-firm markup growth.<sup>22</sup> Second, Figure 4 shows that not only do bottom firms' average markups rise in 2021 and 2022, but also that they rise more



*Notes:* This figure shows the change in the average markup among firms in the top 10 per cent, middle 50 per cent, and bottom 10 per cent of the 2019 markup distribution during 2020–2022. All values are indexed to their 2019 levels. See Section 2.2 for details on the data and sample.

Figure 4 Change in markups for top, mid, and bottom firms, classified by 2019 markups

20. For example, entering firms tend to have low (or, in fact, negative) profitability and are more likely to be financially fragile (Fama/French 2004; Davis et al. 2019; Davis/de Souza 2022).

21. Note also that these are simple (unweighted) averages, such that – unlike in the previous figures – a firms' sales weight does not affect the documented patterns.

22. These patterns hold for other ways of classifying strata (e.g., using quintiles rather than deciles) and for other definitions of pre-pandemic markups (e.g., using 2018 markups or the average of 2018 and 2019 markups). Note that, because firms need to be in the 2019 data to be classified by their 2019 markup, Figure 4 is based on a different group of firms than Figures 1–3. However, these sample differences do not drive the main pattern here; for example, the aggregate and percentile trends are similar when restricting to this same group of firms.

than those of top firms' and that the magnitude of this increase is big – reaching almost 10 per cent in 2021 relative to 2019. This change is particularly noteworthy given that, on average, markups at the bottom decile do not grow over the rest of the post-1980 period. Thus, unlike at the 10th percentile of the annual distribution, firms with low pre-pandemic markups have higher markups in *absolute* terms in 2022 than in 2019.<sup>23</sup> In contrast, average markups in the top 10 per cent of the pre-pandemic distribution decline moderately in both 2021 and 2022.<sup>24</sup> Together with the evidence of rising concentration from Figure 2, this behavior of top markup firms further speaks to a possible 'winners' inflation', by showing top firms' gains via market share raise the aggregate markup even with moderately declining (within-firm) markups.

Figure 4, therefore, provides descriptive evidence that firms with low pre-pandemic markups could exercise price-setting power in a new way during the pandemic. This pattern suggests that markup growth propagated into a new and broader set of firms during the pandemic, as, for example, widespread coverage of inflation, supply disruptions, and high input costs gave otherwise low-markup firms the 'license' to also raise prices, or perhaps as sector-specific disruptions also coordinated temporary pricing power for low-markup firms (Weber/Wasner 2023). Thus, Figure 4 suggests a new ability for bottom firms to also raise markups during the pandemic, to be explored in further research.

#### 5 THE SECTORAL NATURE OF MARKUP GROWTH

Given the sectoral nature of the COVID-19 inflation, I conclude by unpacking the sectoral basis of changes in markups during the pandemic years. To do so, I focus on total sectoral contributions to the aggregate markup, thereby considering both changes in the average markup *within* each sector and changes in each sector's share of total sales. Accounting for sectoral market share is important: while year-to-year changes in relative sector size are generally small, sectoral shortages and demand shifts are a notable feature of the pandemic period (Konczal/Lusiani 2022; Stiglitz/Regmi 2023). I show three main results. First, manufacturing, retail, and information services make outsize contributions to the aggregate markup during the pandemic years. Second, within-sector markups tend to be either constant or rising and, among sectors that do have annual markup declines, the cumulative change in the markup over the pandemic is approximately constant. Third, offsetting changes in sectoral market share contribute to the aggregate markup decline in 2022.

#### 5.1 A sectoral decomposition

I use a standard shift-share decomposition that again follows De Loecker et al. (2020) to disaggregate changes in the sales-weighted markup into the contributions of *within-sector* 

<sup>23.</sup> For example, while entry and exit are particularly likely to affect bottom percentiles of the (annual) distribution, they do not affect the low-markup firms in Figure 4.

<sup>24.</sup> This descriptive pattern is corroborated by a simple regression of the post-pandemic change in firms' markups on their 2019 markup controlling for firm size (assets) and industry, which shows a negative and statistically significant relationship between pre-pandemic markups and the subsequent change in the markup. Thus, a lower pre-pandemic markup is associated with a larger pandemic-period change in the markup, also conditional on firm size and industry.

markup increases and the contribution of changes in the sales weight of sectors (*between-sector* changes). This decomposition is shown in equation (3):

$$\Delta \mu_{t} = \sum_{\substack{s \\ \text{Within-sector component}}} m_{s,t-k} \Delta \mu_{s,t} + \sum_{\substack{s \\ s \\ \text{Between-sector component}}} \Delta m_{s,t} + \sum_{\substack{s \\ s \\ \text{Cross term}}} \Delta \mu_{s,t} \Delta m_{s,t}$$
(3)

where  $\Delta \mu_t$  is the change in the sales-weighted average markup between t and t - k;  $m_s$  is the market share of total sales accruing to sector s; and  $\mu_s$  is a sector's sales-weighted markup. Below, I show decomposition results based on two values of k: in this section I begin by describing long-term patterns using the case when k = 10, while in Section 5.2, I narrow in on annual changes (such that k = 1) to focus on the pandemic period.

Thus, equation (3) distinguishes three components of changes in the aggregate markup. The within-sector term measures markup changes occurring within sectors, holding each sector's share of total sales fixed. This term is positive when markups tend to increase in a broad-based way across sectors of economic activity. The between-sector term shows that the aggregate markup can also increase due to a reallocation of market share towards relatively high-markup sectors (or away from relatively low-markup sectors). In equation (3), these between-sector reallocation effects are weighted by each sector's initial markup in t - k. This term is positive when, for example, high-markup sectors expand to command a larger share of total sales. Finally, the cross term, which tends to be small in the results below, reflects joint changes in markups and market share.

Over the long term, aggregate markup growth across U.S. firms is dominated by within-sector, rather than between-sector, changes in the markup. Thus, long-term markup growth reflects a broad-based expansion of market power across sectors of the economy, rather than the growth of relatively high-markup sectors or the contraction of relatively low-markup ones. I show this result from De Loecker et al. (2020) in Table 1, in which I disaggregate changes in the weighted-average markup over 10-year periods between 1980 and 2019 into within- and between-sector contributions using sectors defined by two-digit NAICS codes.<sup>25</sup> Column 1 reports the total change in the aggregate markup over each decade, and the remaining columns to decompose this change into its within, between, and cross terms using equation (3).

Table 1 shows that post-1980 markup growth is dominated by *within-sector* changes, which are moderately offset by structural change.<sup>26</sup> As De Loecker et al. (2020) emphasize, this pattern contrasts the firm decomposition above, in which reallocation effects emerge as a primary driver of long-term markup growth.<sup>27</sup> Instead, when disaggregating

26. The exact numbers differ from De Loecker et al. (2020) due to differing periodization and, more importantly, the exclusion of foreign firms and FIRE in this paper. Despite these differences, the key result that the change in the markup is driven by within-sector changes is the same.

27. Figure A3 in the Appendix disaggregates Table 1 by sector to show the within- and betweensector contributions of each two-digit NAICS sector to post-1980 changes in the aggregate markup. These figures reiterate that between-sector changes in market share are outweighed by within-sector changes in the markup over the long term. For example, Figure A3 shows that there are few cases of

<sup>25.</sup> The sectors are manufacturing (NAICS codes 31–33); wholesale (42); retail (44–45); transportation (48–49); information (51); services (54, 56, 61, 62, 71, 72, 81); agriculture (11); mining (21); utilities (22); and construction (23). Thus, services aggregate non-financial and non-information services: professional, scientific and technical services; administrative and support and waste services; educational services; health care and social assistance; arts, entertainment, and recreation; accommodation and food services; and other services except public administration. Together, these services sectors constitute an average of 10.2 per cent of the post-1980 sample. As discussed above, my sample excludes unclassifiable establishments, public administration, FIRE, and observations without a NAICS code.

	$\Delta$ Markup	$\Delta$ Within	$\Delta$ Between	$\Delta$ Cross
1980–1989	0.128	0.117	0.014	-0.004
1990–1999	0.076	0.098	-0.011	-0.011
2000–2009	0.080	0.103	-0.016	-0.007
2010–2019	0.130	0.138	-0.003	-0.005

Table 1 Decadal sectoral decomposition based on two-digit NAICS codes (1980–2019)

*Notes:* This table shows a decomposition of 10-year changes in the sales-weighted average markup across U.S. listed non-financial corporations after 1980 into the between-sector, within-sector, and cross terms shown in equation (3).

the data by sector, the dominant pattern is a broad-based rise in price-setting power independently of sector of economic activity. For instance, between 2010 and 2019, the aggregate markup increases 12.5 percentage points. If the aggregate markup were only driven by within-sector changes over this decade, this increase would have equaled 14.0 percentage points, which is slightly offset by a 1.0 percentage point decline from structural change (and a small negative cross term). Together with the fact that markup growth is concentrated at its upper percentiles, this pattern also speaks to superstar firms that have come to dominate their sector-specific markets (Autor et al. 2020).

#### 5.2 Sectoral markups during the pandemic years

What about sectoral dynamics in the pandemic years? I next use equation (3) to decompose annual changes in the markup between 2019–2020, 2020–2021, and 2021–2022.<sup>28</sup> Figure 5 reports each sector's contributions to annual changes in the weighted average that come from changes in its markup (i.e., within-sector changes) and that come from changes in its market share (i.e., between-sector changes), as well as the total sum of the withinand between-sector terms. I exclude the cross term, which is small, from these figures. Keep in mind that, because they are based on fiscal year, these annual decompositions are not directly comparable to calendar-year inflation dynamics, but they do outline changes in sectoral markups and market share during the pandemic.

Figure 5 shows that the manufacturing, information services, and retail sectors drive the bulk of the 2020 increase in the sales-weighted markup, via both within-sector markup growth (in the case of manufacturing and information services) and via changes in sectoral market share (in the case of retail and information services). First, consider the contribution of within-sector markups, which push up the sales-weighted markup by a total of 4.2 percentage points in 2020. Figure 5 shows that this increase is concentrated in manufacturing and information services, which contribute 4.3 and 3.0 percentage points, respectively. Figure 5 also highlights that, with the exception of a falling markup in mining (which reverses in 2021 and 2022), other sectors' 2020 markups are steady. Thus, within-sector markups reinforce a narrative of profit inflation characterized by steady or rising markups in 2020. Second, shifts in sectoral market share raise the

*declines* in sector-level markups after 1980, with instances limited to close-to-zero declines in retail and transportation in the 1980s; utilities in the 1990s; and wholesale in the 2010s. Figure A3 also shows that within-sector increases in the markup are the most widespread in 2010–2019, reaching seven of these ten sectors.

28. Note that annual changes will, of course, tend to be smaller than those over 10-year periods, as in Table 1.



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*Notes:* This figure shows sectoral contributions to the change in the sales-weighted markup across U.S. listed non-financial firms between 2019–2020, 2020–2021, and 2021–2022. Sectors are defined by two-digit NAICS codes. The light-grey bar shows the within-sector term, the white bar shows the between-sector term, and the black bar is their sum. The cross term in equation (3) is small and excluded for ease of visualization. For details on the sectoral classification and decomposition equation, see Section 5.1. For variable definitions and sample details, see Section 2.2.

#### Figure 5 Sectoral decomposition based on two-digit NAICS codes (2019–2022)

aggregate markup by 0.8 percentage points in 2020, thereby reinforcing within-sector markup growth. As Figure 5 shows, positive between-sector contributions are concentrated in two sectors: information services, which pushes up the aggregate markup by an additional 3.0 percentage points via growth in market share, and retail, which contributes 2.9 percentage points via sectoral growth despite a steady within-sector markup.

Figure 5 also gives three insights into the stability of the aggregate markup in 2021 and its 2022 return to approximately pre-pandemic levels. First, Figure 5 shows that, outside of manufacturing, sectoral markups remain largely steady after 2020.<sup>29</sup> This steadiness during years when inflationary pressures increased in the U.S. further reinforces evidence of profit inflation à la Nikiforos et al. (2023). Second, Figure 5 shows that, consistent with a staggered reopening from the pandemic, a substantive share of the 2021 and 2022

29. Only three sectors have lower markups in 2022 than in 2019: manufacturing, wholesale, and transportation services. The magnitudes of these declines are small.

behavior in the aggregate markup is accounted for by offsetting changes in market share between sectors.

Finally, Figure 5 shows that the manufacturing markup declines substantively in 2021 and 2022. The fact that this decline follows a substantial within-manufacturing spike in 2020 speaks to dynamics wherein pandemic bottlenecks create *temporary* market power (Weber/Wasner 2023). Notably, manufacturing's market share also grows during the pandemic, such that – even as its markup is slightly lower in 2022 than in 2019 – its *cumulative* post-2019 contribution to the weighted-average markup (the sum of its within- and between-sector contributions from 2020 to 2022) is weakly positive (0.54 percentage points). This growth in manufacturing's market share in 2021 and 2022, which follows a long-term post-1980 decline, suggests that manufacturing's temporary ability to raise markups in 2020 may have granted a subsequent market share advantage to the manufacturing sector.

#### 6 CONCLUSIONS AND DISCUSSION

This paper documents markups among U.S. listed non-financial corporations during the height of the COVID-19 pandemic with an eye towards contributing firm-level evidence to debates on the roles of profits and price-setting power in the COVID-19 inflation. The evidence that I show is consistent with profit inflation, wherein firms tend to have constant or even rising markups during the COVID-19 years.

Specifically, I establish four main patterns. First, I show that the aggregate (salesweighted) markup jumps markedly in 2020 and increases moderately in 2021, before declining in 2022 to approximately return to pre-pandemic levels. Thus, when faced with large-scale input price shocks and supply-side disruptions, the aggregate of listed U.S. non-financial firms could shield itself from these shocks by raising prices to maintain a constant (sales-weighted) ratio of sales to the cost of goods sold. Importantly, these pandemic-period changes also occurred in the context of a sustained post-1980 rise in the markup. While this long-term rise in market power has different causes than its COVID-19-era behavior, it laid the groundwork for U.S. firms' ability to exercise price-setting power during the COVID-19 period: with high prior levels of market power, the aggregate of U.S. firms was able to insulate profits from input cost shocks and supply disruptions.

Second, I draw attention to the role of market share and sales concentration in aggregate markup growth, particularly in 2020. I show that, in fact, the majority of the 2020 increase in the sales-weighted markup reflects a growing sales weight on high-markup firms. In other words, the pandemic came with a further concentration of economic activity among dominant firms. In contrast, when assigned a constant market-share weight, within-firm markups are steadier than the weighted average – both when the weighted average increases in 2020 and also when it subsequently falls in 2022. This pattern highlights stable firm markups during the COVID-19 years. It also suggests that pandemic-period 'winners' exercised market power, specifically, via expanded market share.

Third, I show that, following the 2020 increase in the aggregate markup and in inflation, bottom firms raised their markups in 2021 and 2022 – thereby breaking their post-1980 trend of constant markups. While it is too early to determine if this pattern will become entrenched, it suggests that firms *without* substantial prior market power were able to use the period of high inflation to also achieve price-setting gains. Finally, I document sectoral patterns and, in addition to highlighting outsize roles for three specific

sectors – manufacturing, information services, and retail – I show that these sectoral dynamics reflect not only changes in sectoral markups, but also pronounced changes in sectoral market share. The importance of changes in sectoral size speaks to the staggered reopening after the pandemic, and suggests that this type of staggered closure offers temporary market power advantages via market share.

These patterns that I document in this paper also raise questions for future research. First, it remains to be seen which of the trends that emerge in the short-run confusion of the COVID-19 era are persistent and, for example, if firms experienced *temporary* boosts to market power or if firms in sectors with markup gains will retain these gains after the pandemic disruptions fade. Second, while this paper makes use of annual fiscal year data, for example, future work making use of quarterly data, like in Conlon et al. (2023), can also explore more direct links to inflationary dynamics. Similarly, further work is needed on the implications of growth in general and administrative costs for understanding firms' markups and market power.

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#### APPENDIX



*Notes:* This figure shows the sales-weighted average markup across U.S. listed non-financial firms between 1950 and 2022. The markup is the ratio of sales to total costs (which are the sum of the costs of goods sold and selling, general, and administrative costs). The markup is trimmed at the 1st and 99th percentile. This figure is constructed with a sample that is trimmed only on the definition of the markup used in this figure. See Section 2 for details on the data and sample.

Figure A1 The aggregate markup over total costs



*Notes:* This figure shows the sales-weighted average profit margin across U.S. listed non-financial firms between 1950 and 2022. The profit margin is the ratio of total profits to sales, where total profits are the sum of gross sales and non-operating income flows less the cost of goods sold, interest expense, and general and administrative expense. The profit margin is trimmed at the 1st and 99th percentile. This figure is constructed with a sample that is trimmed only on the profit margin used in this figure. See Section 2 for details on the data and sample.

Figure A2 The aggregate profit margin



*Notes:* This figure shows sectoral contributions to the change in the sales-weighted markup across U.S. listed firms over ten year periods between 1980 and 2019 (1980–1989, 1990–1999, 2000–2009, 2010–2019). Sectors are defined by two-digit NAICS codes. The dark grey bar shows the within-sector term and the white bar shows the between-sector term. The cross term in equation (3) is small and is excluded for ease of visualization. For details on the sectoral classification and decomposition equation, see Section 5.1. For variable definitions and sample details, see Section 2.2.

Figure A3 Decadal sectoral decomposition based on two-digit NAICS codes – sectoral details