The Rise of Market Power and the Macroeconomic Implications: Comment *

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Abstract

De Loecker et al. (2020) (DLEU) estimates that average U.S. markups rose from 21% to 61% above marginal cost between 1980 and 2016. We show that this result is sensitive to sample selection and weighting. Restrictions in the DLEU code drop 30% of usable observations. Without the restrictions, sales-weighted markups rise gradually, with a late increase driven almost entirely by Finance and Insurance, where an accounting artifact inflates estimates; excluding that sector, markups rise from roughly 30% to 35%. Weighting by costs rather than sales also reduces the increase and, absent the sample restrictions, largely eliminates it.

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1 Introduction

De Loecker et al. (2020) (henceforth, DLEU) estimates how markups—a possible proxy for market power—evolved in the United States economy between 1955 and 2016. The article's headline result is that the average markup, as measured by the ratio of price to marginal cost, increased from 1.21 in 1980 to 1.61 in 2016 (DLEU Figure I). DLEU further reports that the increase in market power occurs in all sectors and industries, and that the results hold under many alternative specifications. The results have been widely cited in both academic and popular settings, and are a leading piece of evidence supporting the hypothesis that market power has increased over recent decades.[1]

In this comment, we replicate the DLEU analysis and show that it is sensitive to both sample selection and weighting. First, we identify screens implemented in the DLEU code that exclude 30% of the otherwise usable observations from the Compustat data used to generate the main results. DLEU conducts a large number of robustness checks, but does not report results when these screens are removed. We construct a "full sample" without the screens, and examine whether the results still hold.[2] Second, we compare the sales-weighted average markup that DLEU reports with a cost-weighted alternative proposed by Edmond et al. (2023). We also reexamine DLEU's supplementary analyses, including its decomposition of markup growth and its analysis of Census data.

Using the full sample, the average markup follows a markedly different trajectory (see Figure 1). While the average markup in the DLEU sample increases rapidly throughout the 1980s and 1990s, in the full sample it increases only gradually through 2008, followed by a sharp rise in the final years; both samples converge to similar levels in 2016. However, unlike the DLEU sample, the late rise in the full sample is driven almost entirely by a single sector: Finance and Insurance (F&I).[3] When the F&I sector is excluded, average markups increase only modestly, from just below 1.30 in the mid-1980s to approximately 1.35 in 2016. Furthermore, even the F&I contribution reflects an accounting artifact: interest income is counted as revenue, but interest expense is typically excluded from Cost of Goods Sold (COGS). When we add interest expense

[1] See, e.g., Syverson (2019); Philippon (2019); Berry et al. (2019); U.S. Department of the Treasury (2022); Council of Economic Advisers (2022); Shapiro (2021).

[2] Our replication is based on the published supplementary materials, additional code provided by one of the DLEU authors, and an auxiliary dataset identifying the firm-year observations used in DLEU. Precise details are provided in Section 2. The 30% number is the 105,381 observations dropped by the screens, relative to the 348,211 observations in the full sample.

[3] Although the DLEU sample results are robust to excluding F&I, this is because the implemented sample screens exclude 89% (sales-weighted) of the F&I observations. The full sample restores these observations, and the results become sensitive to their inclusion.

to COGS, the full sample average markup ends the sample period close to the level obtained when F&I is excluded entirely.[4]

We also find that the weighting scheme matters. Weighting markups by COGS rather than sales attenuates the increase in markups in the restricted (DLEU) sample, and largely eliminates it in the full sample: the COGS-weighted average markup in the full sample ends the sample period below its levels of the 1960s. The rapid rise in markups reported in DLEU thus rests on the combination of the sample restrictions and the sales weighting. Taken together, these findings indicate that the production approach applied to Compustat does not provide robust support for a rapid, economy-wide rise in markups. Once the sample restrictions are removed and the F&I accounting issue is addressed, the estimates range from a modest increase under sales weighting to little change under COGS weighting.

We also revisit DLEU's supplementary results and find that the decomposition of markup changes is likewise sensitive to sample selection and weighting. Most notably, when we decompose markup changes in the full sample excluding F&I, one of DLEU's central findings reverses sign: sales-weighted within-firm markups decrease over time, which under DLEU's interpretation would indicate a decrease in the pricing power of existing firms. As in DLEU, however, sales are reallocated from low-markup to high-markup firms, and the upper tail of the markup distribution fattens over time. The reallocation more than offsets the within-firm decline, leaving a modest net increase in the average markup. The weighting scheme matters here as well. Under COGS weighting, within-firm markups are flat to slightly increasing, and the reallocation term becomes negative: sales shares shift toward high-markup firms while cost shares shift away from them.

Finally, we reexamine DLEU's comparison of its Census and Compustat estimates and find that the two do not generally align; for manufacturing, the Census estimates track the full sample more closely.

Our comment contributes to the substantial literature on the DLEU data and methodology (e.g. Bond et al., 2021; Foster et al., 2024; Raval, 2022; Edmond et al., 2023; Doraszelski and Jaumandreu, 2024; Shapiro and Yurukoglu, 2026). It differs in spirit from this literature: rather than proposing methodological corrections, we apply the article's methods to the article's stated sample, and find that the headline results are sensitive to this change. As an additional contribution, we provide a complete replica-

[4] As a robustness exercise, motivated by De Loecker et al. (2026), we also recompute the full sample results excluding the four-digit NAICS industry 3254 (Pharmaceutical and Medicine Manufacturing) from all parts of the analysis, and obtain nearly identical results. See Section 3.2.3 for details.

tion package for DLEU's main results.[5] In the appendix, we describe the specification of the production function that DLEU uses to obtain markup estimates.

2 Methods and Data

DLEU recovers markups using the "production approach." Cost minimization and other assumptions imply that the markup equals the output elasticity of the production function with respect to a freely-adjustable variable input, multiplied by the ratio of gross revenue to expenditure on that variable input. If COGS is assumed to be a freely-adjustable variable input, as it is in the baseline DLEU specification, the markup estimate for firm i in period t is given by

$$\mu_{it} \equiv \frac{P_{it}}{MC_{it}} = \theta_{it} \times \frac{\text{Sales}_{it}}{\text{COGS}_{it}} \tag{1}$$

where P_{it} and MC_{it} are price and marginal cost, respectively, and θ_{it} is the output elasticity with respect to COGS from the production function.[6] DLEU calculates the average markup as a sales-weighted mean across firms.

The markup calculation requires knowledge of the output elasticity. For the baseline Compustat analysis, DLEU estimates a production function in which the output elasticity varies across years and 2-digit sectors (see Appendix A). DLEU uses variables for Sales, COGS, Capital, and Investment (which enters a control function) in estimation. Sales and COGS, along with the output elasticities, are then used to obtain markups. Markups are calculated for many firms that have valid Sales and COGS data, but are excluded from estimation for other reasons (e.g., because Investment is missing). To recover markups, a firm-year observation requires information on both Sales and COGS.

Our replication proceeds as follows. We pull the Compustat data and construct the estimation sample using the DLEU replication code. The resulting sample does not exactly match what is reported in the article: the code generates 248,390 firm-year observations, whereas the article reports 247,644 (DLEU Table B.1). As we have confirmed with the authors, the sample used to generate their results is a smaller subset of 242,645 firm-year observations. We have been unable to identify a screen that produces this smaller subset, so we drop observations not included in an auxiliary dataset the au-

[5] Code to replicate both DLEU's original results and our results is publicly available on our websites.

[6] There are some details omitted here with respect to how output and inputs are measured, that we believe are important but outside the scope of this comment. See Bond et al. (2021) and De Ridder et al. (2026) for details.

thors provided. With this "DLEU sample," we can closely replicate DLEU's estimated output elasticities and main markup results; the remaining discrepancies are minor and are plausibly attributable to revisions in the Compustat data since DLEU's extraction. Our replication package includes the list of firm-year observations that constitute the DLEU sample, so that researchers with Compustat access can reconstruct it.[7]

We compare results from the DLEU sample with an alternative that we call the "full sample." The primary change involves screens related to Capital and SG&A that are implemented in the DLEU code but not addressed in the article. In the order they appear in the DLEU code, these include:

(i) 33,422 observations with missing values for Capital are dropped.

(ii) 3,380 observations below the 1st or above the 99th percentile of the ratio of COGS to the sum of COGS and Capital are dropped.

(iii) 63,572 observations with missing values for SG&A are dropped.

(iv) 5,007 observations below the 1st or above the 99th percentile of the ratio of COGS to the sum of COGS, Capital, and SG&A are dropped.

In total, these screens drop 105,381 observations. We do not apply these screens when creating the full sample. We do, however, add a screen that drops 5,560 observations below the 1st or above the 99th percentile of the ratio of SG&A to Sales (we do not drop missing values); this screen is described in the DLEU article but does not appear in the DLEU code. Of the differences, the screen on missing SG&A is the most consequential economically, as we show below. The full sample has 348,211 firm-year observations.

3 Sample Selection

3.1 Main Results

We begin with the baseline DLEU model, estimated using Compustat data. Figure 1 plots three estimates of the average markup over time. The average markup obtained using the DLEU sample increases rapidly throughout the 1980s and 1990s, pauses in the 2000s, then increases rapidly again in the final few years of the sample (solid red

[7] DLEU's replication package takes as given the output elasticities estimated in code not included in the package. However, the authors shared the estimation code with us and, except where explicitly noted, we use it to estimate the output elasticities for each sample we consider. Our replication package makes this code available for the first time.

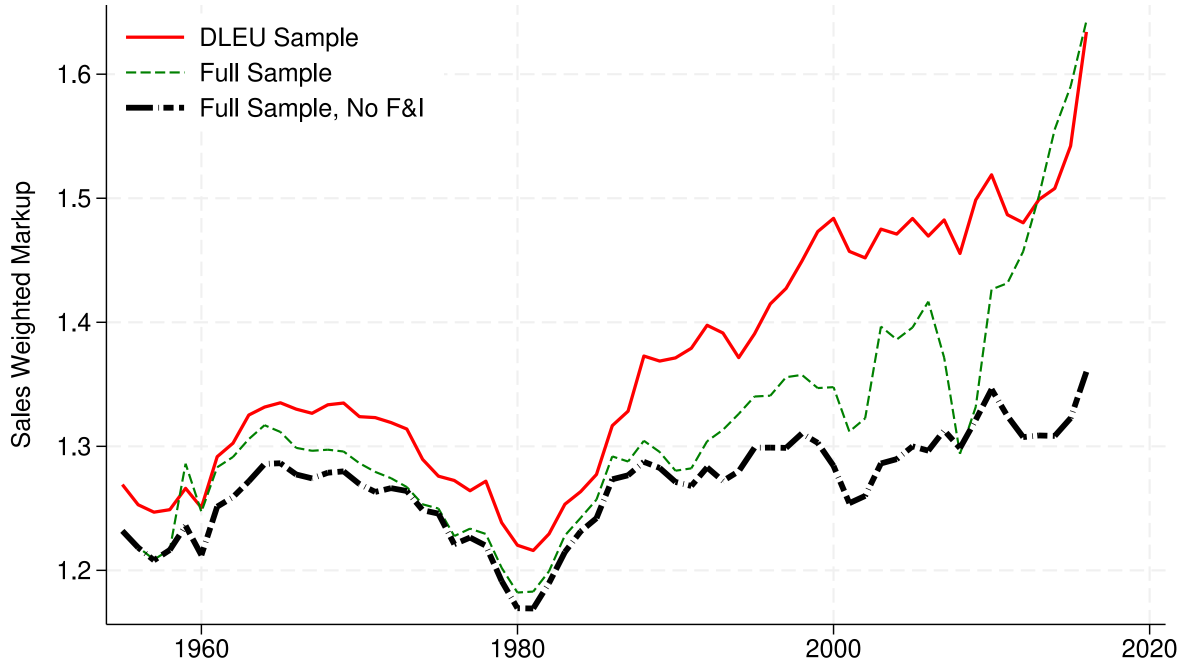

Figure 1: Markups Obtained with the DLEU Sample and the Full Sample

Notes: The figure plots estimates of the sales-weighted average markup (the ratio of price to marginal cost) over time. The solid red line is a near-exact replication of Figure I of DLEU, obtained by applying the DLEU code, including the code to estimate output elasticities, to the DLEU sample. The dashed green line is obtained by applying the same code to the full sample. The dash-dot black line is identical except that it excludes the Finance and Insurance (F&I) sector.

line). In the full sample, the average markup increases more gradually through 2008 (dashed green line). It then rises sharply, ending in 2016 at a level similar to that in the DLEU sample. The increase in markups in the full sample is driven almost entirely by a single sector: F&I. This contrasts with the DLEU sample, in which the results are robust to the exclusion of individual sectors (DLEU Appendix 10). Excluding F&I, the average markup increases only modestly, from just below 1.30 in the mid-1980s to about 1.35 in 2016 (dash-dot black line).

3.2 Understanding the Sensitivity to Sample Selection

3.2.1 The Role of Selection on Missing SG&A

Observations with missing SG&A values account for most of the difference between the DLEU sample and full sample results. Table 1 characterizes these observations. We regress log(Sales) and log(COGS) on an indicator for a missing SG&A value and its in-

Table 1: Regression Analysis of Observations with Missing SG&A Values

	Dependent Variable			
	log(Sales)	log(Sales)	log(COGS)	log(COGS)
SG&A Missing	-0.142	-0.445	0.442	0.211
	(0.050)	(0.029)	(0.048)	(0.030)
SG&A Missing $\times$ Trend	-0.006	-0.007	0.009	0.004
	(0.002)	(0.001)	(0.002)	(0.001)
Firm Fixed Effects	no	yes	no	yes
R^2	0.094	0.907	0.108	0.903

Notes: This table reports the results of OLS regressions of log Sales and log COGS on an indicator for missing SG&A and its interaction with a demeaned time trend. All regressions include year and industry fixed effects. The industry fixed effects are at the 2-digit NAICS level. There are 348,211 firm-year observations. Standard errors are in parentheses.

teraction with a demeaned time trend, controlling for industry and year fixed effects (first and third columns); the second and fourth columns add firm fixed effects. Observations with missing SG&A tend to have lower Sales and higher COGS—and hence lower markups—than other observations. These relationships are statistically significant both across firms and within firms over time, and they strengthen over the sample period. Dropping observations with missing SG&A therefore removes disproportionately low-markup observations, and does so increasingly over time, raising both the level and the trend of the estimated average markup.

Changing the sample can affect the sales-weighted average markup through the estimated output elasticities, the composition of Sales-to-COGS ratios that enter the average, or the sales weights, which are calculated based on the firms in the sample. We isolate the first channel by applying the output elasticities provided with the DLEU replication package to the full sample.[8] We exclude the F&I sector from the full sample due to a distinct accounting issue that we address below.

Figure 2 shows the results. It again plots our replication of Figure I of DLEU (solid red line) and the full sample results excluding F&I (dash-dot black line). It also plots the third series described above, which applies the output elasticities from the DLEU replication package to the full sample (dashed green line). As shown, the third series falls roughly halfway between the other two. Thus, changes in output elasticities account for about half of the difference between the DLEU sample and full sample results, with the composition of Sales-to-COGS ratios and the sales weights accounting for the

[8]These output elasticities are nearly identical to the ones we estimate using the DLEU sample.

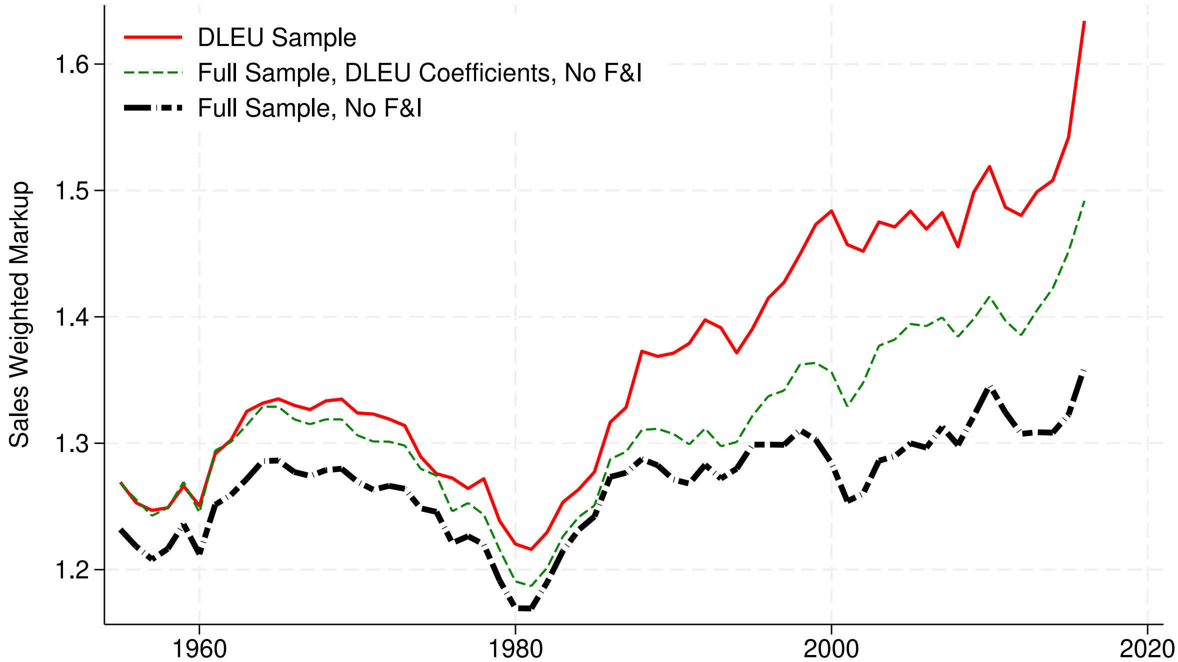

Figure 2: Breakdown of the Difference in Markups with the DLEU and Full Samples

Notes: The figure plots estimates of the sales-weighted average markup (the ratio of price to marginal cost) over time. The solid red line is a near-exact replication of Figure I of DLEU, obtained by applying the DLEU code, including the code to estimate output elasticities, to the DLEU sample. The dash-dot black line is obtained by applying the same code to the full sample, excluding the Finance and Insurance (F&I) sector. The dashed green line is identical except that it uses the output elasticities provided with the DLEU replication package.

remainder.

Given the large impact of the sample screens on the markup estimates, one might reasonably wonder whether there are good reasons to exclude observations with missing SG&A values. We have not been able to identify any. SG&A is not needed to estimate markups and does not otherwise factor into the main results of the article, so there is no practical reason to exclude these observations. There is also no reason to believe that observations with unreported SG&A are of low quality. SG&A is not required to be reported as a separate line item under GAAP: companies must report Operating Expenses, but the precise breakdown is discretionary. A close inspection of SG&A reporting in the Compustat data also reveals no systematic data quality issues for firm-year observations where SG&A is not reported. SG&A reporting is much lower in some sectors than others, but since 1970, the fraction of public firms reporting SG&A has held steady at around 80% (see Table B.1 and Figure B.1). Many large, well-known firms have not consistently reported SG&A, including Aetna, Citigroup, Delta Air Lines, Ford Motor Company, HCA

Healthcare, and United Parcel Service. If we are interested in what happened to average markups across the entire U.S. economy, it would seem important to include all of the data in this calculation.

3.2.2 The Role of the Finance & Insurance Sector

Figure 1 shows that, in the full sample, the inclusion of F&I firms has a large impact on the average markup, particularly after 2010. By contrast, DLEU reports that excluding the F&I sector does not affect its results (DLEU Appendix 10).[9] Below, we document two reasons for the difference.

First, 89% (sales-weighted) of the F&I observations in Compustat are missing either Capital or SG&A. Thus, after the sample screens, the F&I sector is already largely excluded from DLEU's main analysis, which helps explain why the DLEU results are robust to excluding the remainder.[10] This fact also informs how the three lines in Figure 1 compare: the dash-dot black line (the full sample excluding F&I) and the solid red line (the DLEU sample) provide the closer like-for-like comparison, and the difference between them shows, approximately, the effect of the sample screens on the markup estimates for the rest of the economy. The dashed green line then shows the effect of restoring the F&I observations.

Second, Compustat includes interest income in Sales but typically excludes interest expense from COGS. For firms in financial intermediation, this asymmetry inflates the Sales-to-COGS ratio, and because the resulting denominators can be small enough that modest perturbations translate into large proportional changes, the DLEU approach yields markup estimates that are both high and volatile. For example, the estimated markup of the Federal National Mortgage Association (Fannie Mae) rises from 2.67 in 2011 to 21.30 in 2016, an eightfold increase from a level already roughly twice the economy-wide average. With high F&I markup estimates, an increase in financial activity can mechanically raise the sales-weighted average, and indeed the F&I sector accounted for 1% of Compustat sales in 1955 and more than 18% in 2016.

In Appendix Figure B.2, we reproduce the main results with a data correction that adds interest expense to COGS. With this correction, the full sample average markup ends in 2016 at approximately 1.40—close to the 1.35 obtained when F&I is excluded

[9] DLEU's Appendix 10 also excludes the Real Estate sector, but in the full sample, excluding it has little impact on any results.

[10] The difference in sensitivity to F&I between the two samples primarily reflects how much F&I activity the screens remove rather than which F&I observations they remove: markups are broadly similar for F&I observations with and without SG&A.

entirely, and well below the approximately 1.60 obtained from the DLEU sample. Furthermore, the corrected series closely tracks the series excluding F&I throughout the sample period, indicating that the interest asymmetry accounts for most of the F&I contribution to the rise in the average markup. We caution that this correction addresses a single measurement issue for an economically unique industry, and that other measurement issues may remain unaddressed.

3.2.3 Robustness: The Pharmaceutical Sector

The difference between the markups obtained from the DLEU sample and from the full sample does not arise from four-digit NAICS industry 3254 (Pharmaceutical and Medicine Manufacturing), a possibility raised in De Loecker et al. (2026). That industry includes small firms with low Sales relative to COGS and, therefore, low measured markups. The SG&A screen excludes most of these observations from the DLEU sample. In the full sample, these observations enter the results both directly, through the sales-weighted average markup, where they carry little weight, and indirectly, through the output elasticities estimated for all of sector 32.

We provide two robustness checks that show these firms do not drive our results. The first removes all observations in industry 3254 from the data before the production functions are estimated and before markups are calculated and averaged, which shuts down both channels through which the industry could affect results—in the check, it is as if the industry does not exist. In Figure 3, the dashed green line shows the resulting series for the full sample excluding F&I. It is nearly identical to the corresponding series that retains industry 3254 (dash-dot black line), while the DLEU series is unchanged in this exercise. The difference between the two samples is therefore insensitive to including this four-digit industry in the full sample.

The second check keeps the observations in industry 3254 but estimates a separate production function for them, treating the industry as its own two-digit sector rather than as part of sector 32. This closes the indirect channel while leaving the direct one open: the observations continue to enter the average markup, but they no longer influence the output elasticities estimated for the rest of sector 32. It also has the advantage of retaining the large firms that the first check discards. The dashed blue line in Figure 3 shows the resulting series. It is nearly identical to both the series that drops the industry altogether (dashed green line) and the full-sample series that includes it (dash-dot black line). Neither channel, then, accounts for the difference between the DLEU sample and the full sample. The sensitivity to sample selection documented above

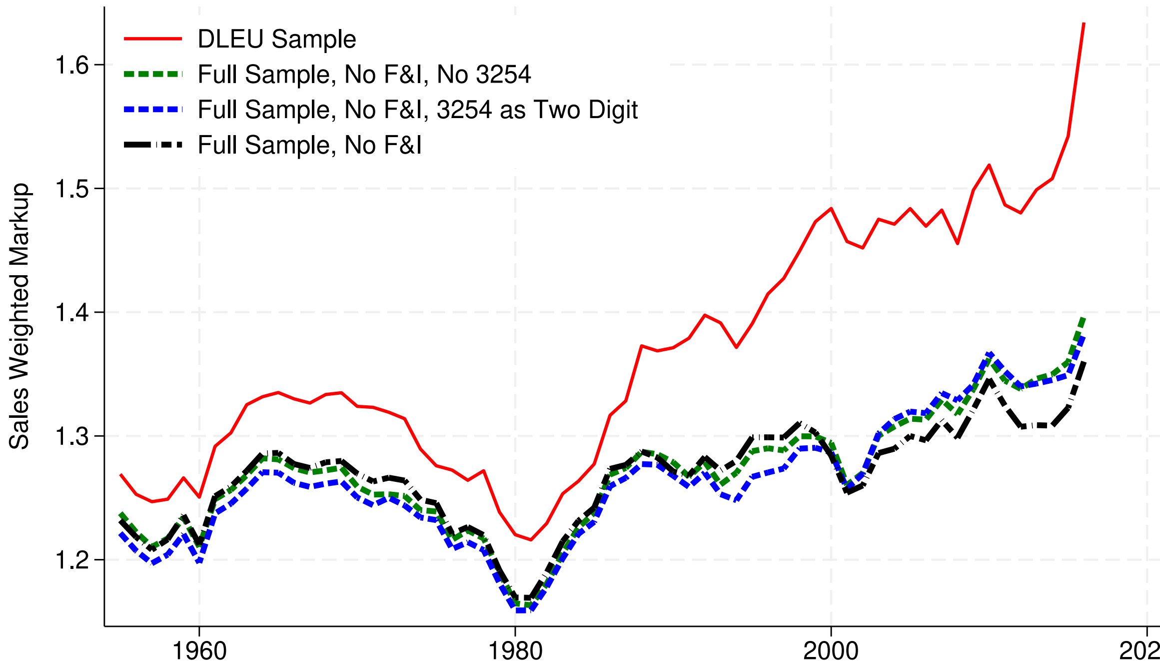

Figure 3: Results for Treatment of NAICS Industry 3254

Notes: The figure plots estimates of the sales-weighted average markup (the ratio of price to marginal cost) over time. The solid red line is a near-exact replication of Figure I of DLEU, obtained by applying the DLEU code, including the code to estimate output elasticities, to the DLEU sample. The dash-dot black line is obtained by applying the same code to the full sample, excluding the F&I sector. The dashed green line additionally excludes NAICS industry 3254 from all parts of the analysis. The dashed blue line retains NAICS industry 3254 but treats it as its own two-digit sector, so that its output elasticities are estimated separately from those of the rest of sector 32.

does not reflect industry 3254.

4 Sensitivity to Weighting

DLEU reports the average markup as a sales-weighted mean across firms. Edmond et al. (2023) argues that weighting by input costs provides a more appropriate measure of the aggregate industry markup. Specifically, under the assumption that the cost elasticity (the elasticity of total variable costs with respect to output) is common to all firms, the aggregate markup (the ratio of aggregate price to aggregate marginal cost) is exactly the cost-weighted average of firm-level markups. The sales-weighted markup then equals the aggregate markup plus a term that reflects the variance in markups across firms. Thus, an increase in markup variance can raise the sales-weighted markup even if the aggregate markup is unchanged.[11]

We explore COGS weighting using both the DLEU sample and the full sample, holding each sample fixed as constructed in Section 3.[12] Figure 4 shows the results. The solid red line repeats our sales-weighted replication of Figure I of DLEU. The dashed purple line applies COGS weights to the DLEU sample. The dash-dot green and black lines apply COGS weights to the full sample and the full sample excluding F&I, respectively. With COGS weighting, the increase in the average markup is greatly attenuated in the DLEU sample, and largely disappears in the full sample. The COGS-weighted average markup in the DLEU sample rises from 1.20 in 1980 to 1.32 in 2016, an increase of 12 points, compared with 40 points under sales weighting. In the full sample, the COGS-weighted average markup rises from 1.13 in 1980 to 1.20 in 2016, and excluding F&I it rises from 1.12 to 1.16; both series end the sample period below their 1960s levels. Thus, the rise in the average markup reported in DLEU rests on the combination of the sample restrictions and sales weighting: with the full sample and cost weighting, there is little evidence of a sustained broad-based increase.

5 Other Headline Results

In addition to documenting the rise in average markups, DLEU offers two other headline findings: it decomposes changes in the average markup into changes in markups for existing firms and reallocation of sales across firms, and it documents long-term changes in the markup distribution. We explore the sensitivity of these results to sample selection and weighting.

[11]The assumption that the cost elasticity is common to all firms in the whole economy seems unlikely to hold. There is a third weighting scheme, the sales-weighted harmonic mean, that provides a correct measure of the aggregate markup under weaker conditions. However, a disadvantage of the harmonic mean is that it is nonlinear in the (estimated) firm markups. Sampling error in the firm markups, say from the output elasticities, can cause a downward bias in the harmonic mean even if the estimates themselves are unbiased. We computed the harmonic mean markup and found it to be almost indistinguishable from the COGS-weighted markup, so we do not report these estimates here.

[12]DLEU examines COGS weighting as a robustness check, and reports that the increase in the average markup with COGS weighting is similar to the baseline (DLEU Figure XVI(A)). However, we found that the code generating that figure contains an error: it averages the "cost-share" markup estimates rather than the baseline estimates. The cost-share estimates measure the output elasticity as the share of COGS in total cost, rather than estimating it from the production function. The estimates we show are based on corrected code.

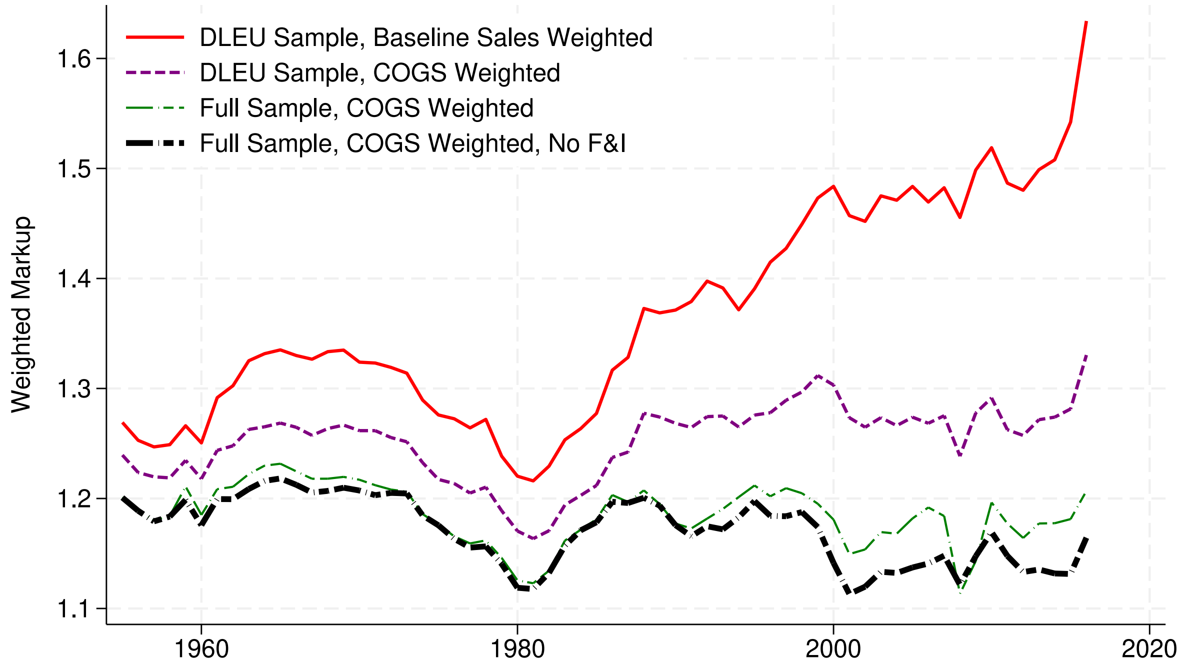

Figure 4: COGS-Weighted Average Markups

Notes: The figure plots estimates of the sales-weighted and COGS-weighted average markup over time. The solid red line is a near-exact replication of Figure I of DLEU, obtained by applying the DLEU code, including the code to estimate output elasticities, to the DLEU sample. The dashed purple line applies COGS weights to the DLEU sample, correcting a mistake in the code that generates Figure XVI(A) of DLEU. The dash-dot green line applies COGS weights to the full sample. The dash-dot black line applies COGS weights to the full sample, excluding the F&I sector.

5.1 Decomposition of Markup Changes

DLEU decomposes changes in the average markup since 1980 into three economic forces: within-firm changes in markups, net entry, and reallocation of sales between firms. DLEU finds that within-firm markups account for about one-third of the total increase in average markups, with reallocation between firms accounting for most of the remainder, and interprets the within-firm component as consistent with increased pricing power among existing firms. These findings are also sensitive to both the sample restrictions and the weighting scheme.

Figure 5 is a version of DLEU's Figure IV, created using the full sample excluding the F&I sector, and adding 1955–1979. In contrast to the DLEU findings, in the full sample, sales-weighted within-firm markups decrease over time. Under the DLEU interpretation, this would be consistent with a decrease in the pricing power of existing firms. As in DLEU, there is also a reallocation of sales to high-markup firms that more than offsets

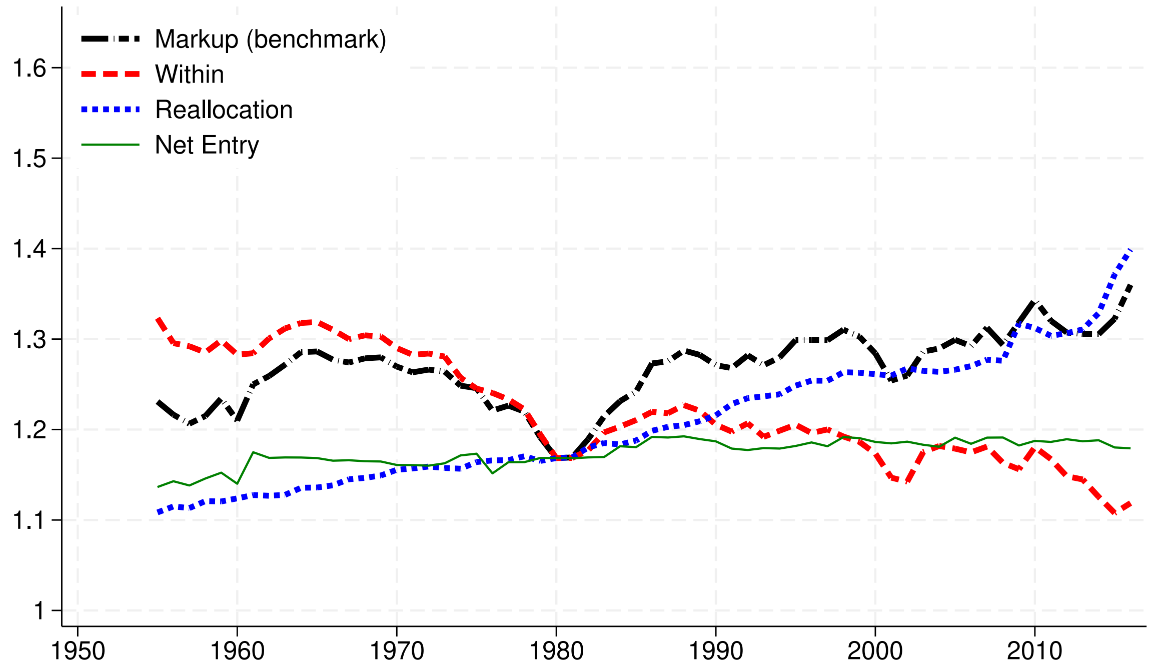

Figure 5: Decomposition of Sales-Weighted Markup Changes

Notes: The figure decomposes sales-weighted markup changes relative to 1980. It is a version of Figure IV of DLEU, created using the full sample excluding the F&I sector, and adding 1955–1979. The dash-dot black line shows the sales-weighted average markup for this sample, as in Figure 1. The dashed red line shows the contribution of within-firm markup changes, the solid green line shows the contribution of net entry, and the dotted blue line shows the contribution of reallocation.

the decrease in within-firm markups. These two findings are less supportive of the conclusion that the overall increase in markups was driven by a decline in competition.

The decomposition is also sensitive to the weighting scheme. Figure B.3 repeats the decomposition using COGS weights. Aside from the dip around 1980, COGS-weighted within-firm markups are roughly flat until 2000, with a modest increase thereafter. Thus, the full-sample analysis points to heterogeneity in within-firm markup changes, with the average sensitive to weighting. Under COGS weighting, the reallocation component also reverses sign: sales shares shift toward high-markup firms while cost shares shift away from them. Part of this divergence is mechanical. A firm whose markup rises faster than average gains sales share relative to cost share, and the sales-weighted decomposition records that gain as reallocation toward the firm. Because markup growth is concentrated in the upper tail of the distribution (see Section 5.2), the sales-weighted reallocation term exceeds the COGS-weighted term even if inputs have not moved toward high-markup firms.[13]

5.2 The Distribution of Markups

DLEU finds that the median markup has not changed over time and that the rise in the estimated average markup is instead driven by an increase in the upper tail of the markup distribution. Figure B.4 is a version of DLEU's Figure III(B), created using the full sample excluding the F&I sector. These results partially survive the removal of the sample restrictions: the upper tail of the markup distribution becomes fatter over time, but the increase in the 90th percentile is roughly half that in DLEU, and the median markup decreases slightly rather than remaining flat.

6 Census Analysis

In addition to the Compustat analysis, DLEU provides an analysis based on establishment-level Census data for the manufacturing, retail, and wholesale sectors. DLEU motivates this analysis as a robustness check to assess the extent of selection bias in the Compustat data.[14] Together, these sectors account for about 25% of GDP, on average, over 1997–2016.[15] We do not have access to the Census data or to the code used in the Census analysis. We therefore digitize the DLEU Census estimates from Figure VI of DLEU and compare them to the Compustat-based estimates obtained from the DLEU sample and the full sample.[16]

DLEU takes a different approach for the output elasticities used in the Census analysis. For all three sectors, DLEU uses a cost-shares approach that requires stronger assumptions. For retail and wholesale, DLEU also rescales the Census markup estimates by the time-varying output elasticity estimates from Compustat (see DLEU Appendix

[13] Let s_{it} and c_{it} denote the shares of firm i in aggregate Sales and COGS in year t. Because the output elasticity in equation (1) is common to all firms in a two-digit sector-year, that equation implies $\log c_{it} - \log s_{it} = -\log \mu_{it} + \kappa_{jt}$, where κ_{jt} depends only on the year and the sector j of firm i. Differencing over time, a firm's cost share grows relative to its sales share by the negative of its markup growth, up to a sector-year constant. Reallocation terms constructed with the two weights therefore diverge when markup growth is correlated with the contemporaneous markup level across firms.

[14] Compustat includes only publicly traded firms and their international sales, whereas the economic census covers all employer establishments, including private firms, and excludes international sales.

[15] Our calculation is based on publicly available data from the Bureau of Economic Analysis.

[16] DLEU reports Compustat results for the manufacturing, retail, and wholesale sectors in Figure 12.1 of the Online Appendix. The manufacturing sector comprises NAICS codes 31, 32, and 33. DLEU reports markups for these codes separately; we combine them in our analysis. Census estimates exist only for Economic Census years (1977, 1982, ..., 2012). We use linear interpolation to obtain a value for 1980, which we use to rescale the series.

13). This rescaling transmits the sample selection issue documented earlier to the Census results for these two sectors.[17]

Figure 6 summarizes the results for the manufacturing sector. Because the Census markup estimates are much higher than those from Compustat, we rescale all three markup series to equal one in 1980, allowing us to better compare how the markup estimates change over time. The solid red line shows changes in the average markup from the DLEU Compustat sample, and the dash-dot black line shows changes in the average markup from the full Compustat sample. The gap between the two reflects the sample screens documented earlier.

In the full Compustat sample for manufacturing, the average markup increases through the late 1990s and is roughly flat thereafter; as in Figure 1 for all sectors, the overall rise is much smaller than with the DLEU sample. The dashed green line shows the changes in the average markup that we digitize from Figure VI of DLEU, which uses the Census data. The Census estimates are closer to the full sample than to the DLEU sample.

We now turn to markup estimates for the wholesale and retail sectors, which we derive from figures in the published DLEU article. Recall that the Census estimates for these two sectors are rescaled using the Compustat output elasticities and are thus subject to the sample selection issue documented earlier, which makes the comparison less meaningful. Nevertheless, in both cases, the Census estimates differ substantially from the Compustat estimates. For wholesale, DLEU estimates that markups decrease from 14 in 1982 to 6 in 2012 in the Census (DLEU Figure VI(E)), while its Compustat estimates are much lower in level and roughly flat at around 1.15 (DLEU Appendix 12.1). This contrasts with DLEU's characterization of the wholesale Census figures as in line with its Compustat series. The comparison for retail is similar, if less stark: DLEU estimates a large increase in markups in the Census analysis, from around 2 to over 3 (DLEU Figure VI(C)), while its Compustat estimates for retail are broadly decreasing (DLEU Appendix 12.4).

Our conclusions from this analysis differ from DLEU's. The Census estimates generally do not support the DLEU Compustat estimates. For manufacturing, the changes in markups over time from DLEU's Census analysis better match those from the full sample than those from the DLEU sample. For retail and wholesale, the estimated markups from the Census do not match those from either Compustat sample well.

[17]Foster et al. (2024) estimates markups on the Census data using the production approach, with output elasticities estimated from a production function rather than cost shares, and finds markup increases that are more muted than those reported in DLEU.

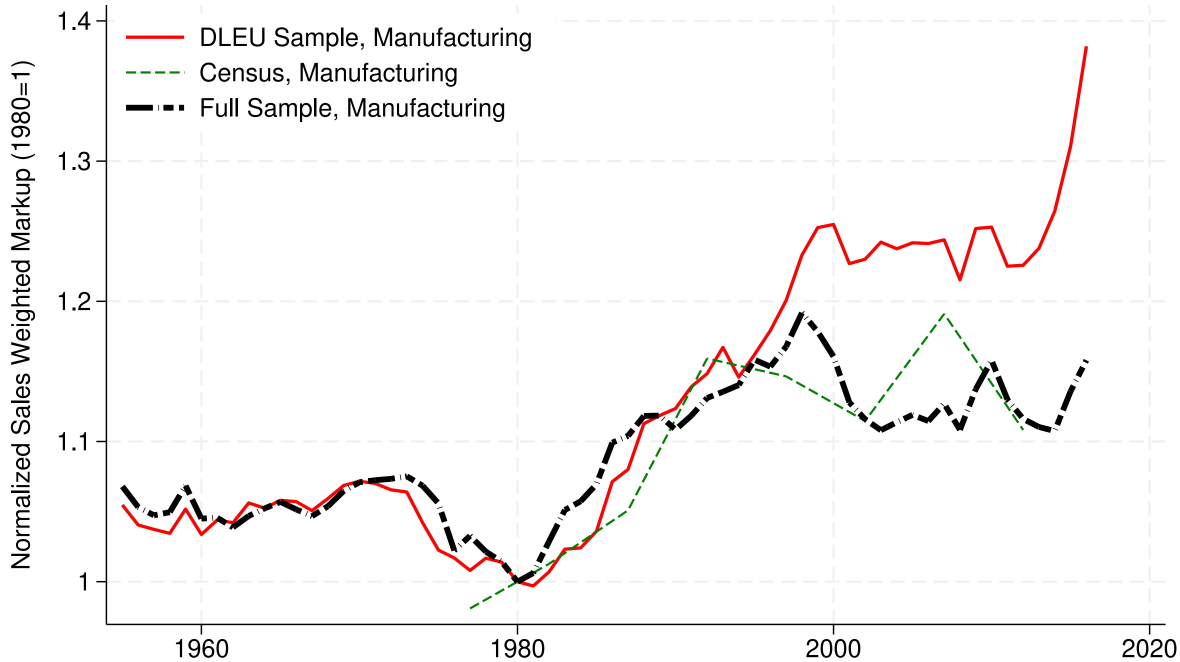

Figure 6: Comparison to DLEU Census Results for Manufacturing

Notes: The figure compares changes in markups over time from three sets of estimates. The solid red line is obtained by applying the DLEU code, including the code to estimate output elasticities, to the DLEU sample for NAICS codes 31, 32, and 33. The dash-dot black line is obtained by applying the same code to the full sample for the same NAICS codes. The dashed green line is digitized from Figure VI of DLEU, which uses Census data for manufacturing; it does not require the DLEU code. Because Census estimates are much higher than Compustat estimates, we rescale all series to equal one in 1980.

7 Conclusion

Whether the U.S. economy has become less competitive over time is a fundamental question in economics, with real policy implications. A leading piece of evidence is the finding of DLEU that the average U.S. markup rose from 21% to 61% above marginal cost between 1980 and 2016. This finding has shaped a large body of subsequent research, generated widespread media coverage, and influenced policy debates—helping to form a conventional wisdom that competition has declined significantly, and leading to calls for more antitrust enforcement.

We find that the DLEU results are sensitive to both sample selection and weighting. Sample restrictions implemented in the DLEU code exclude 30% of the otherwise usable observations. When these restrictions are removed, the rapid rise of the 1980s and 1990s disappears. Instead, the full sample shows a late rise, driven almost entirely by a single sector, Finance and Insurance, caused largely by an accounting artifact that distorts the estimates. When we exclude this sector, the increase in average markups is modest. On the second dimension, weighting markups by COGS rather than sales substantially attenuates the increase in markups in the DLEU sample and largely eliminates it in the full sample. DLEU's robustness analysis using Census data for the manufacturing sector also fails to support a large increase in average markups.

Taken together, these findings indicate that the production approach applied to Compustat does not provide robust support for a rapid, economy-wide rise in markups. So where does that leave us? Due to the many measurement and specification issues inherent to the production approach implemented with Compustat data, we hesitate to strongly endorse any single one of these estimates as correct. That said, we believe that the results from the full sample excluding F&I likely best reflect the path of economy-wide markups. We do not believe that there are good reasons for excluding observations based on SG&A reporting, particularly those of many large, well-known firms. We also believe that F&I is fundamentally different from the rest of the economy, and that neither the accounting data nor the production approach is well suited to constructing reliable markup estimates for that sector. The question of weighting is more difficult. Sales weighting does not have strong theoretical support, but COGS weighting requires assumptions that are strong when applied to the whole economy. However, for the full sample excluding F&I, the choice is the difference between a modest increase and essentially none. On this evidence, we conclude that aggregate markups have increased at most modestly over the past six decades, and possibly not at all.

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Appendix Materials

A Production Function Estimation

To recover markups, we estimate production functions using the regression model of DLEU. The key parameters of interest are the elasticities of output with respect to COGS. The regression model is described in the DLEU appendix, but the publicly provided replication package does not contain estimation code for this purpose; instead, it takes the estimated output elasticities as given, treating them as data. We therefore rely on additional code, provided to us by one of the authors, that estimates these parameters. In this appendix, we describe the model and its implementation.

To start, DLEU specifies a Cobb-Douglas production function for the baseline specification. For firm i and year t,

$$q_{it} = \theta_t^V v_{it} + \theta_t^K k_{it} + \omega_{it} + \epsilon_{it} \tag{A.1}$$

where q_{it}, v_{it}, and k_{it} are log output, the log quantity of the variable input, and log capital, respectively, ω_{it} is a persistent productivity shock that is known to the firm when it chooses v_{it}, and ϵ_{it} is a productivity shock that is realized after input decisions are made. The parameters, θ_t^V and θ_t^K, are output elasticities.

Compustat provides revenue and expenditures, rather than quantities. Adding and subtracting prices yields the following conversion:

$$p_{it} + q_{it} = \theta_t^V \left(p_{it}^V + v_{it}\right) + \theta_t^K \left(p_{it}^K + k_{it}\right) + \omega_{it} + \epsilon_{it}^* \tag{A.2}$$

where the left-hand side is log revenue ($p_{it} + q_{it}$), the right-hand side depends on log expenditures ($p_{it}^V + v_{it}$ and $p_{it}^K + k_{it}$), and the unobservables include a wedge between the output and input prices, as $\epsilon_{it}^* \equiv \epsilon_{it} + p_{it} - \theta_t^V p_{it}^V - \theta_t^K p_{it}^K$.

DLEU maintains the assumption of Markov transitions for the persistent productivity shock: $\omega_{it} = g(\omega_{it-1}) + \xi_{it}$. DLEU also assumes that investment is monotonic in productivity and capital, allowing the productivity shock to be written as $\omega_{it} = h_t(i_{it}, k_{it}, z_{it})$, where $h_t(\cdot)$ is referred to as the control function, and z_{it} contains control variables that DLEU states are intended to control for the wedge between input and output prices. In the code that we were supplied, control variables are not used in the baseline specification. We therefore omit z_{it} from the model hereafter. We also omit ϵ_{it}^* to better track the DLEU regression model, although in principle it remains present even without z_{it}.

Imposing these restrictions on equation (A.2) and substituting variable names yields:

$$\log(Sales_{it}) = \theta_t^V \log(COGS_{it}) + \theta_t^K \log\left(Capital_{it}\right) + \beta_{1t}\log\left(Investment_{it-1}\right) \\ + \beta_{2t}\log\left(Capital_{it-1}\right) + \beta_{3t}\log\left(Capital_{it-1}\right)^2 + \xi_{it} \quad \text{(A.3)}$$

where the control function is specified as being linear in investment and quadratic in capital. DLEU estimates the production function of equation (A.3) using 2SLS, treating COGS as an endogenous regressor. The excluded instrument is lagged COGS. The orthogonality conditions are provided in equation (27) of DLEU Appendix A.

As we have specified the model, the coefficients are time-varying, and DLEU also lets them vary across 2-digit NAICS sectors. Depending on the sector, coefficients are held constant before 1970 or 1985 and estimated on data through 1971 or 1984, respectively. For each subsequent year, the regression samples are constructed using observations from within two years; that is, the estimation uses 5-year rolling windows. The 2SLS regression is then estimated separately on each of these samples.

B Additional Figures and Tables

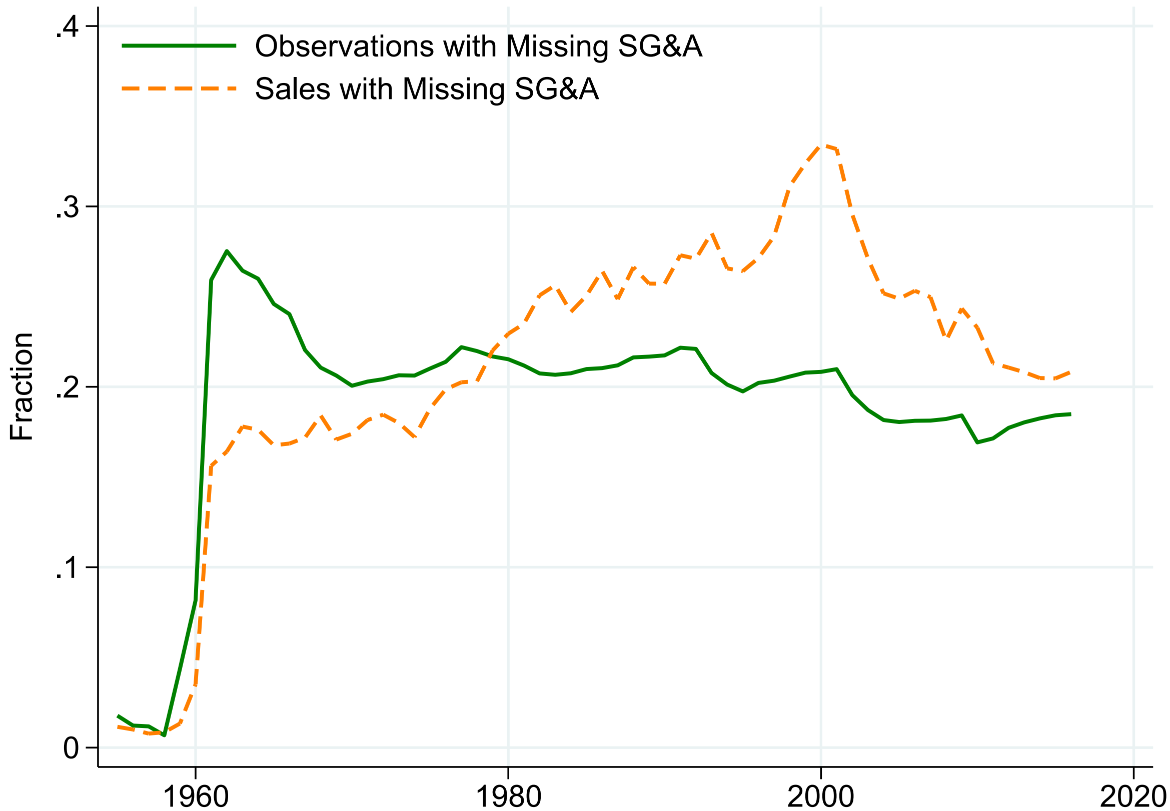

Figure B.1: Summary of Missing SG&A Values over Time

Notes: The figure plots the fraction of otherwise usable observations that have missing values for SG&A over the sample period, both unweighted (solid green line) and weighted by sales (dashed orange line).

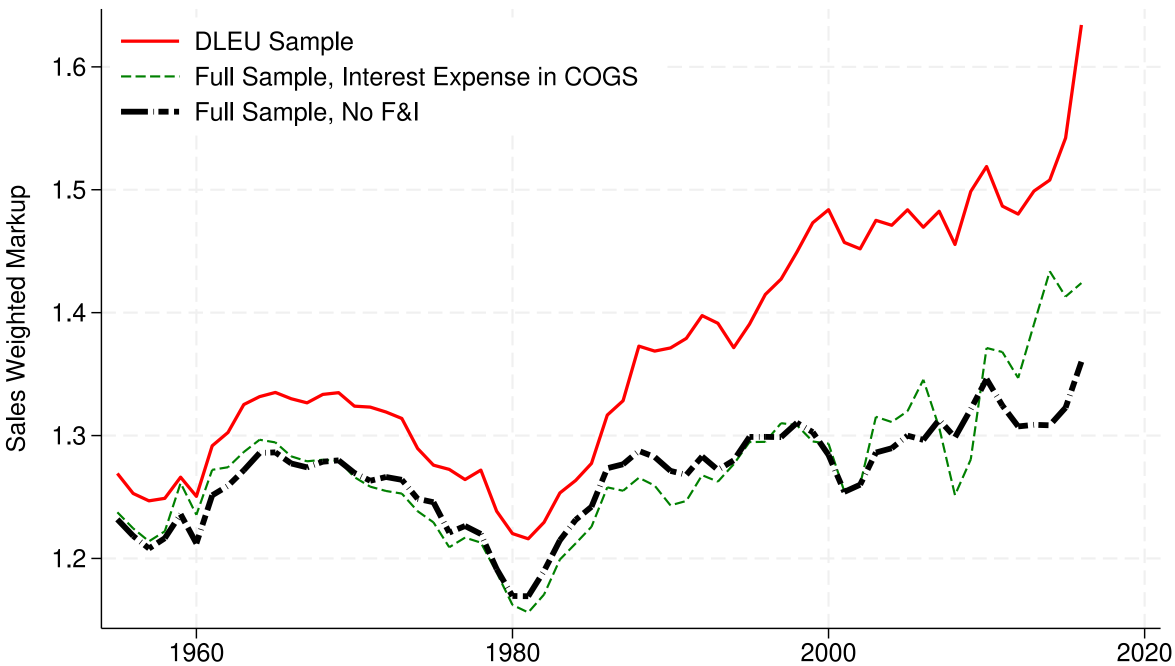

Figure B.2: Markup Estimates that Incorporate Interest Expense in COGS

Notes: The figure plots estimates of the sales-weighted average markup over time. The solid red line is a near-exact replication of Figure I of DLEU, obtained by applying the DLEU code, including the code to estimate output elasticities, to the DLEU sample. The dash-dot black line is obtained by applying the same code to the full sample, excluding the F&I sector. The dashed green line is obtained by applying the same code to the full sample, including F&I, with a data correction that adds interest expense to COGS.

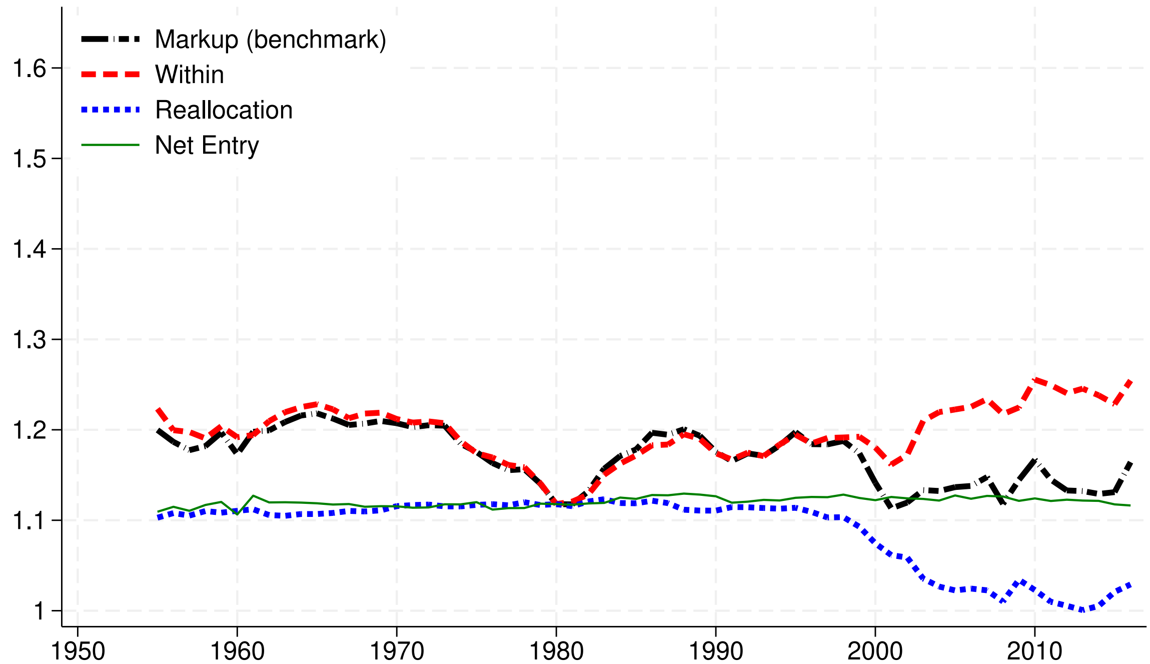

Figure B.3: Decomposition of COGS-Weighted Markup Changes

Notes: The figure decomposes COGS-weighted markup changes relative to 1980. It uses the full sample excluding the F&I sector. The dash-dot black line shows the COGS-weighted average markup for this sample, as in Figure 4. The dashed red line shows the contribution of within-firm markup changes, the solid green line shows the contribution of net entry, and the dotted blue line shows the contribution of reallocation.

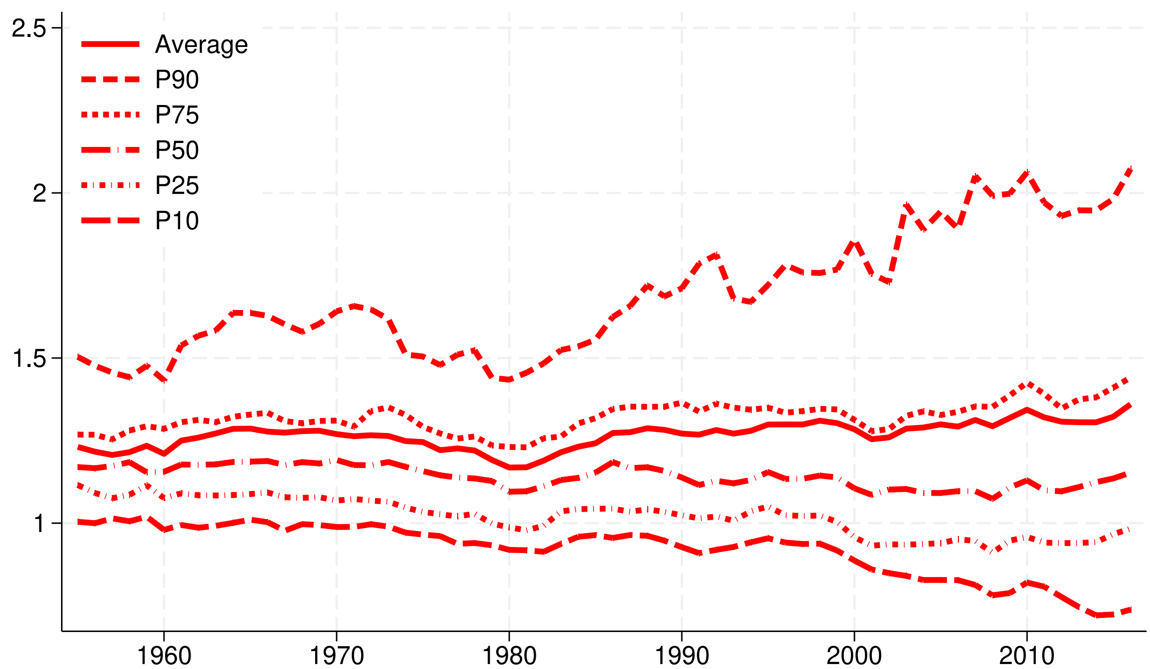

Figure B.4: Markup Percentiles

Notes: The figure is a version of Figure III(B) of DLEU that uses the full sample excluding the F&I sector. The solid line shows the sales-weighted average markup, as in Figure 1. The dashed lines show sales-weighted percentiles of the markup distribution.

Table B.1: Summary of Missing SG&A Values by 2-Digit NAICS Code

NAICS	Definition	Share of Sales (%)	Missing SG&A (%) Observations	Missing SG&A (%) Sales
11	Agriculture, Forestry, Fishing and Hunting	0.15	12.19	1.80
21	Mining, Quarrying, and Oil and Gas Extraction	3.56	9.09	23.40
22	Utilities	5.65	90.82	94.35
23	Construction	0.55	10.93	7.80
31	Manufacturing	4.96	4.97	8.39
32	Manufacturing	18.09	15.50	7.34
33	Manufacturing	20.20	4.27	8.46
42	Wholesale Trade	4.06	7.38	5.81
44	Retail Trade	3.95	8.45	9.70
45	Retail Trade	4.92	5.33	6.45
48	Transportation and Warehousing	3.07	41.41	54.27
49	Transportation and Warehousing	0.66	31.78	79.11
51	Information	8.70	19.61	32.52
52	Finance and Insurance	15.28	38.85	50.44
53	Real Estate and Rental and Leasing	0.70	41.60	34.04
54	Professional, Scientific, and Technical Services	1.35	11.53	8.94
56	Administrative and Support and Waste Management and Remediation Services	0.61	11.12	7.59
61	Educational Services	0.08	5.63	2.14
62	Health Care and Social Assistance	0.84	24.20	28.58
71	Arts, Entertainment, and Recreation	0.11	26.36	9.56
72	Accommodation and Food Services	0.81	14.75	21.75
81	Other Services (except Public Administration)	0.08	6.74	2.94
99	Unclassified	1.64	17.75	18.28

Notes: Compustat assigns each firm-year observation to a 2-digit NAICS code. The table provides, for each code, (1) the share of total Compustat sales accounted for by firm-year observations assigned to the code, (2) the fraction of firm-year observations assigned to the code for which SG&A is missing, and (3) the fraction of sales of firm-year observations assigned to the code that is attributable to firm-year observations for which SG&A is missing.