

GLOBAL MARKET POWER*

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Abstract

To date, little is known about the evolution of market power for the world economy. We extract data from the financial statements of over 70,000 firms in 134 countries, and we analyze and document the evolution of markups over the last four decades. We show that the aggregate global markup has gone up from close to 1.15 in 1980 to around 1.6 in 2016. Markups have risen most in North America and Europe, and least in emerging economies in Latin America. While the overall trend and magnitudes in developed economies are remarkably consistent across regions, we do find that the reallocation of economic activity towards large firms, the so-called superstar phenomenon, varies considerably across regions in the world economy. We analyze the effect of market power on the labor share as well as the effect of Globalization and Mergers and Acquisition on market power.

Keywords: *Markups. Market Power. Globalization. International Trade. Technological Change. M&A. Labor Share. Profits.*

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1 Introduction

Competition is essential for a well-functioning economy. In the absence of competitive pressure, firms grab market power which in turn allows them to sell goods at higher prices. Market power naturally leads to redistribution of resources from workers and consumers to the owners of firms: the profit share is higher, while the labor share to workers is lower and the goods are sold at higher prices to consumers. Market power also has welfare effects: due to higher prices, consumption is lower and a suboptimal number of consumers is priced out of the market (Harberger (1954)), and market power stifles innovation and investment (Aghion et al. (2005)).

In this paper, we construct a measure of market power for the world economy. There are two important reasons why we want to obtain a global measure. First, a precise measure of market power is crucial for numerous policy decisions, from taxation and redistribution to antitrust enforcement. With increasingly globalized firms, antitrust enforcement, taxation and redistribution policies increasingly require a globally coordinated policy response, just like climate change and enforcement of tax compliance. In an integrated and globalized world, we therefore need information on market power for the whole world.

Second, globalization fundamentally alters production structures and therefore the cost of production, while potentially affecting market size and thus revenues. Recent work has demonstrated that international trade, through product and inputs markets (through e.g. global value chains and outsourcing) can affect the degree of market power – see for example De Loecker et al. (2016) and Worldbank (2019). Taking a global perspective is therefore critical to gain insight in how differences in economic development are associated with trends in market power. By comparing firms across regions, and therefore potentially different parts of the global value chain, we can explore whether previously claimed mechanisms for the US economy (Autor et al. (2017) and De Loecker et al. (2020)), such as the reallocation towards high-markup firms, and the link between market power and the declining labor share, are also present in the rest of the world, and whether market power trends are related across countries through changes in global exchange of products and services, and merger and acquisition activity.

In addition, when focusing on one country (or region) only – including our own work De Loecker et al. (2020) – the markup obtained using the firm’s total reported sales and (variable) costs may not correspond uniquely to the specific country under study. While this is still a correct measure of the markup for the firm, it need no longer to correspond to the specific region. Once we focus on the entire world economy, all trade is within the economy and as a result all sales and costs are correctly assigned.¹

Despite its central importance in evaluating the health of the economy, little is known about the evolution of global market power. The two most commonly used methods to measure market power – 1. the so called demand approach, and 2. direct measures of concentration such as the Herfindahl-Hirschman Index (HHI) – are not conducive to analyzing market power economy wide. For the estimation of markups,

¹The measurement of the markup can still be plagued by various other sources such as technology heterogeneity across regions if we only observe firm-level sales and input usage.

academic researchers typically rely on the demand method (Bresnahan (1989), Berry et al. (1995)). This is a well-tested and reliable way to measure markups. However, it requires not only detailed information on transactions (prices and quantities), but also assumptions on how firms compete and in which market they compete. Due to these demanding data and modeling requirements, to date markups have only been obtained for short periods of time and for specific industries for which such detailed information is available, e.g. cars (Berry et al. (1995)), breakfast cereal (Nevo (2001)), beer (Goldberg and Hellerstein (2012)), and a variety of other retail products. Because the required data is not available for all goods and industries, this method cannot be used to obtain estimates economy-wide, let alone to document the evolution over several decades for the global economy.

While policy makers in anti-trust enforcement sometimes use the estimates from the demand approach that academics prefer, they most often calculate, or are forced to rely on, measures of concentration, most notably the HHI. As long as firms compete according to Cournot quantity competition, and produce identical products, the HHI is a direct indicator of market power. However, this holds only as long as products are perceived as identical to all consumers. When products are differentiated (for example brands of cars, such as Volkswagen and Land Rover), there is no longer a relation between concentration and market power (see Bresnahan (1989)). In a world with increasingly differentiated products, the HHI is not an adequate measure of market power. In addition, these concentration measures require precise knowledge of what constitutes a market in terms of the geographical location as well as the product definition, and this is often a point of disagreement, when evaluating market power, between antitrust agencies and the merging parties. For example, does Procter & Gamble compete against Unilever in the US market for all personal care products, or do they compete in the market for soap in the Cleveland, OH with the specific products Olay against Dove?

Finally, because concentration measures are calculated at the market level, determining the market power of one firm requires data on the universe of all firms in the market (for a recent discussion, see Van Reenen (2018), Syverson (2019) and Berry et al. (2019)). If some firms are missing, then the concentration measure for a given market is always higher. While there is progress in obtaining data on the universe of firms, the definition of a market will always be ambiguous and susceptible to subjective interpretation. More importantly, products are increasingly differentiated, and as a result, concentration ratios as a proxy for market power will always remain contentious. Add to this the increasing import and exports as the world economy further integrates, then the notion that all relevant markets can be correctly specified becomes hard to maintain.

The main insight of our analysis is that there is a change in the distribution of markups. The rise in aggregate markups is driven by the upper tail of the distribution only. Most firms see no rise in markups, while a few firms see a substantial increase. The gains from increased markups are for a few firms only. We find that this is true around all regions of the global economy.²

²Some of our results that were first reported in De Loecker and Eeckhout (2018), on aggregate global markups, were simultaneously and independently obtained by Diez et al. (2018).

There is however one major difference between different countries, namely the reallocation of economic activity towards high markup firms. In the United States, we see that about two thirds of the rise of markups is driven by an increase in the market share of high markup firms. This superstar firm phenomenon (Autor et al. (2017)) leads to large firms with market power. We find however no evidence of this reallocation phenomenon in Europe.

Even though markups measured as the ratio of price to marginal cost are the most commonly used measure of market power, they do not tell the whole story. Even in a competitive economy, firms will raise markups if there is an increase in their fixed cost to avoid making losses. Therefore we also analyze the evolution of profitability of firms, both in the aggregate and at the firm level. Since most of the firms in our sample are publicly traded, we not only compute profits, but we can also rely on market valuation to evaluate profitability. Both these measures are in line with our estimated markups, indicating the our estimated markups track reported profits accurately.

The rise in market power has distributional consequences. Not only do profits increase, also the labor share decreases. This is the immediate implication of the firm’s optimization decision. We establish the negative relation between markups and the labor share in the aggregate and at the firm level. In addition, we show that the decline in the aggregate labor share (see for example Karabarbounis and Neiman (2014)) is driven largely by the reallocation of market share towards firms with smaller labor shares. This is a novel finding and is consistent with the superstar hypothesis driving the decline in the labor share (Autor et al. (2017)).

The paper is organized as follows. In Section 2 we introduce the data and the approach to measure markups. In Section 3 we report the findings for the world economy. In Section 4 we analyze market power more broadly by looking at measures of profitability, and we examine the implications of markups. Section 5 analyzes the evolution of the labor share. In Section 6 we study how market power relates to globalization and to merger and acquisition activity. We discuss how our findings relate to the literature in Section 7, and we conclude in Section 8

2 Data and Empirical Framework

In this paper, we use the Production Approach to markup estimation, originally developed in Hall (1988) for aggregate data and recently developed for micro data (De Loecker and Warzynski (2012)), and the calculation of aggregate markups (De Loecker et al. (2020)). With this method, we do not need to make any assumptions on the competitive behavior of firms nor do we need to be able to define a market. Because the amount of information required is less stringent, we can extract all necessary information from the financial statements of firms. This allows us to construct a database of firm level markups for a long time series and aggregate to an entire economy, be it a country, a region or the world. This database contains estimates of markups for each *individual* firm, one for every year. Based on firm-level markups, we then study the evolution of the distribution of markups. In particular, we construct a weighted aggregate

markup for the entire global economy, as well as for any country, or region.

2.1 Data

We estimate markups using data on individual firms' financial statements. Because financial accounting practices around the world are very diverse, we need to rely on uniform definitions and standardized statements. Ideally, we require a large enough sample of firms with information on a long time series in order to document the evolution of markups over the last decades, while covering a broad geographical coverage.

Each firms' financial statements includes the Income Statement, the Balance Sheet, and the Cash Flow. This allows us to extract a measure of variable costs (cost of goods sold), a measure of the overhead cost (selling, general and administrative costs), of capital expenditure, as well as the firm's sales. We also obtain information on some of the firms' wage bill as well as the dividends and the stock market valuation, and we observe the firm's primary industry classification. We extract the data from the Worldscope dataset³ which contains standardized financial statements for over 70,000 companies worldwide. Data coverage starts in 1980 and spans 134 countries. The individual companies tend to be large and consist mainly of publicly traded, though there are also privately held firms. While there is a genuine concern about the representativeness of the sample, in De Loecker et al. (2020) we have found for the United States that the rise in market power occurs in all sectors.⁴ In the Appendix, we report a robustness exercise where we weigh the firms' markups by their country's or continent's share of GDP rather than the firm's sales share and find that the pattern of markups is similar. Despite the concerns of selection, the most important feature of the data is that we have a remarkable coverage. In the US, publicly traded firms account for nearly 40% of output, and we have those data for all economies in the world. This provides unprecedented coverage of economic activity around the world. Regardless of observing a selected set of firms, our analysis provides a unique view on a large sample of firms covering various regions of development over almost four decades, including periods of increasing global interaction and policy intervention.

2.2 Empirical Framework

The production approach specifies a production technology for a firm i at time t , denoted by $Q_{it} = \Omega_{it} V_{it}^{\alpha_{it}} K_{it}^{\beta_{it}}$. The technology represents the units output produced Q_{it} , where V_{it} is the variable input (labor, intermediate inputs, electricity,...), K_{it} is capital, Ω_{it} is Total Factor Productivity. While overhead costs affect profits, they are assumed not to be a factor of production (for the estimation of production technologies with overhead costs as a factor of production, see De Loecker et al. (2020)). Then the

³This is a dataset commercially provided by Thomson Reuters. We obtained institutional access via Wharton Research Data Services while at Princeton.

⁴Moreover, there we find similar results when using Census weights based on the entire universe of companies, and not just the publicly listed firms.

Lagrangian of the firm's cost minimization problem is written as

$$\mathcal{L}_{it} = P_{it}^V V_{it} + P_{it}^K K_{it} - \lambda_{it}(\Omega_{it} V_{it}^{\alpha_{it}} K_{it}^{\beta_{it}} - \bar{Q}_{it}) - F_{it}, \quad (1)$$

where P_{it} is the output price, P_{it}^V, P_{it}^K are the input prices, λ_{it} is the Lagrangian multiplier, and \bar{Q}_{it} is a constant, and F_{it} is fixed cost (overhead). Under the assumption that variable factors of production can be adjusted without frictions, the firms optimally adjusts the variable input immediately. We can then derive the markup from the firm's static optimization problem. The first order condition of this profit minimization problem is

$$P_{it}^V - \lambda_{it} \alpha_{it} \Omega_{it} V_{it}^{\alpha_{it}-1} K_{it}^{\beta_{it}} = 0. \quad (2)$$

We define the firm's markup μ_{it} as $\frac{P_{it}}{\lambda_{it}}$, the ratio of the output price to the marginal cost. The marginal cost is measured by the shadow value λ_{it} of the Lagrangian. Then after multiplying by $P_{it} V_{it}$, rearranging, and substituting for Q_{it} , the markup can be written as:

$$\mu_{it} = \alpha_{it} \frac{P_{it} Q_{it}}{P_{it}^V V_{it}}. \quad (3)$$

To derive the expression in (3), we impose that firms take input prices as given, but they are potentially marked-up by the input supplier. This is not a restriction imposed by the methodology. In fact, recent work has shown how to incorporate frictions in the factor market (monopsony in the labor market) when measuring product market margins.⁵ The restriction is imposed in the global dataset since we do not observe separate measures of, what can be plausibly thought to be, variable cost (such as e.g. intermediate inputs, energy use and labor expenditures) for all firms covering the world during the period 1980-2016.⁶

The implementation of this approach has two steps. First, we estimate the output elasticity α_{st} for each sector and year (a sector s is defined by a two digit NAICS code; in what follows we use industry and sector interchangeably). We thus assign to all firms i in a sector s in a year t a common elasticity. The interpretation is that firms in the same sector have access to the same technology, yet they differ in TFP (Ω_{it}) and of course the optimally chosen input. In what follows we use the elasticity estimates from De Loecker et al. (2020) for the United States. Those elasticities are sector-specific and time-varying. The underlying assumption in our approach is that firms and therefore countries vary in their TFP and the chosen inputs, but not in the technology, which is common for firms within an industry, in a given year.⁷

⁵The approach in this recent literature, e.g. Morlacco (2017), Rubens (2019) and Mertens (2019), largely follows the approach suggested in De Loecker et al. (2016) Appendix D.

⁶For the US data, when separate variable cost measures are available, we found that the estimated markups, and the main patterns, are robust to the selection of variable inputs.

⁷In principle we can estimate country-sector-time specific output elasticities in our global dataset. However, this would imply that the number of observations in many country-sector-year cells would be insufficient to credibly estimate the technology parameter. We therefore rely on the US-based estimates. For the subset of countries for which we have sufficient data, experimentation with production function estimation did not suggest any meaningful changes of our main results when relying on different estimates of the output elasticities. This is consistent with our findings on the US data: a calibrated (time-industry invariant) output elasticity yielded highly similar results for the aggregate markup series.

Second, we use the information on Sales ($P_{it}Q_{it}$) and expenditure on variable inputs (Cost of Goods Sold $P_{it}^V V_{it}$), to derive a firm's markup.

This generates a database with 745,958 firm-year markup observations, for 67,491 distinct firms in 134 countries, over the period 1980-2016.⁸ With those individual markups, we calculate the aggregate annual markup of any geographical area denoted by \mathcal{G} , such as a country, a region or continent, or the entire world. The markup is the sales-weighted average of all firms' individual markup in the geographical area \mathcal{G} in a given year.⁹

3 Markups Around the World

In this section we report the evolution of aggregate markups (across the world and various subregions), and identify the underlying drivers where we distinguish between within-firm markup changes and reallocation of economic activity that affects aggregate markups.

3.1 The Evolution of Global Markups.

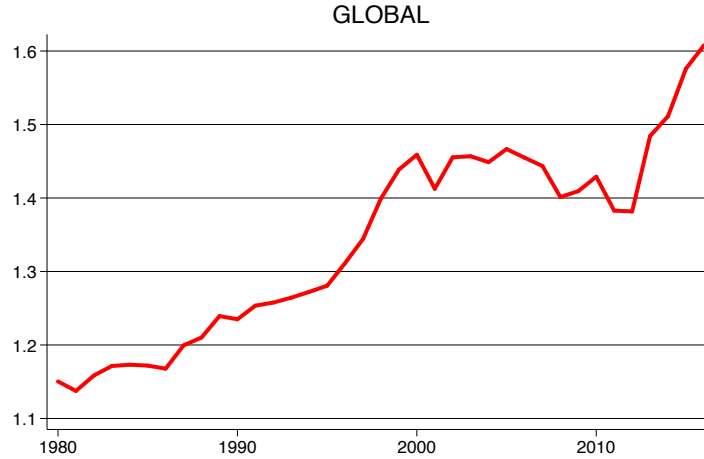


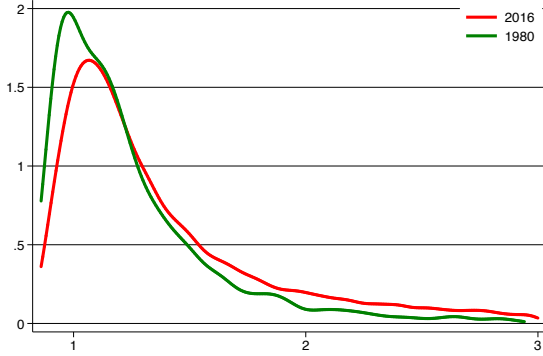
Figure 1: Global Market Power

In Figure 1 we report the evolution of markups for the world as a whole. Globally, since 1980 there has been a steady rise from a markup of around 1.17 to a markup of about 1.6 in 2016. Observe the steady rise in the first two decades (1980s and 1990s), and the virtually flat evolution in 2000s. In the last few years, there has again been an increase. Because we have the markup for each of the firms, we can investigate the change in the distribution. Figure 2a plots the unweighted markup distribution. It is evident that the increase in the markup is due to an increase in both the variance as well as the mode of the distribution. Most importantly, we observe the fattening of the upper tail. And while the values

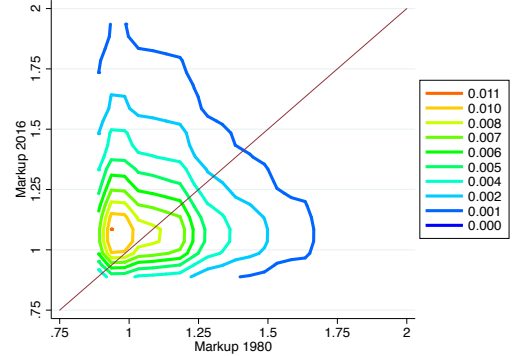
⁸We drop observations with missing data, and adjust for measurement error.

⁹Formally, the markup is $\bar{\mu}_{\mathcal{G}t} = \sum_{i \in \mathcal{G}} \frac{S_{it}}{\bar{S}_{\mathcal{G}t}} \mu_{it}$, where $\bar{S}_{\mathcal{G}t} = \sum_{i \in \mathcal{G}} S_{it}$. We also consider alternative weighting schemes.

of the higher percentiles have increased substantially, there is little change at or below the median. Even in 2016, most firms have markups that are relatively low. But in contrast, substantially more firms now have relatively high markups.¹⁰



(a) Distribution of Markups: 1980, 2016



(b) Contour Plot of Markups: 1980, 2016.

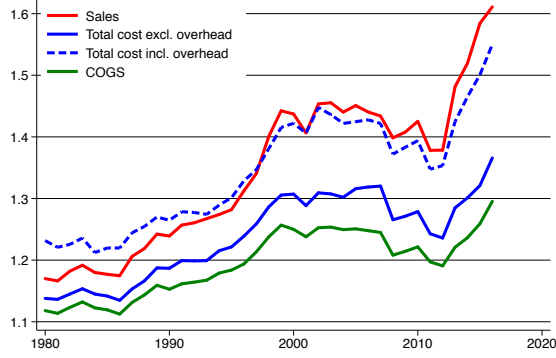
Figure 2: The Change of the Global Distribution of Markups

Figure 2b shows yet another way to analyze this distributional shift, with the contour plot for all firms in 1980 and in 2016. The mass of the distribution is disproportionately above the forty-five degree line which confirms that on average, firms have higher markups in 2016. Moreover, below the diagonal the density is steep (the contour lines are close together), and more spread out above the diagonal. This shows that the distribution of markups now has a fatter tail. Consider a firm with a markup of 1 in 1980 for example by drawing a vertical line through 1. By 2016, the distribution of markups is on average above the forty-five degree line, and the upper tail is less steep. The change in the distribution of markups indicates that there is rise of markups for a few firms only, while most firms see no increase.

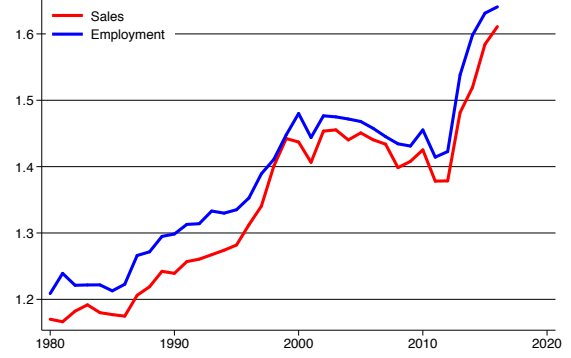
The aggregate markup relies on firm specific weights, and we have used sales weights. There has been a fruitful discussion on the impact of the specific weight used to aggregate markups. In the absence of a particular model of the world economy, we adopt an intuitive and often-used weight, sales. Recent work by Grassi (2017) and Edmond et al. (2019) has suggested to rely on the cost of goods sold (COGS) to weigh each individual firm, as byproduct of their specific model of the economy (featuring CES preferences). As discussed in De Loecker et al. (2020), however, this collapses the aggregate markup to an aggregate measure of the markup, hiding the important heterogeneity across firms. This is important in light of the increased dispersion in markups, and the associated reallocation process (the focus of the next subsection).

We do, however, think it is useful to show the various moments of the data, and in Figure 3a we plot the aggregate markup using cost weights, both the total cost (including the cost-of-goods sold, SG&A and the cost of capital – obtained by multiplying the capital stock by the user cost of capital as obtained

¹⁰To the extent that markups are related to firm size, this fattening of the tail has important implications for aggregate uncertainty. See Gabaix (2011).



(a) Total Costs Weighted



(b) Employment Weighted

Note: We restrict the sample to firms reporting all variables (sales and all inputs, cost of goods sold, capital and SG&A, and employment). This sample differs from the one used to produce Figure 1, but the patterns are identical.

Figure 3: Aggregate Markups with Different Weights

from De Loecker et al. (2020)) and the cost excluding overhead. Whether we rely on total cost weights (inclusive of overhead or not) or sales, it does not have any material impact on the level or trajectory of the aggregate markup. Of course, when an individual input (cost of goods sold) is used, we obtain the aggregate markup based on aggregate data, yielding both a lower level, and smaller increase in aggregate markups.¹¹ Finally, we use employment weights, a quantity-based input weight, and plot it next to the sales-weighted aggregate markup. Both series are very similar, although the difference is of direct economic interest. The wedge between sales and input weights is in fact direct evidence of the presence of markups.

In what follows, we use sales weights to aggregate markups. This has the advantage that it allows for a direct link between aggregate markups and the aggregate profit rate, and it permits to identify the role of market share reallocation in shaping aggregate markup outcomes.

The role of reallocation. For the United States economy, De Loecker et al. (2020) show that in addition to a change in the unweighted markup distribution there is a reallocation of economic activity from low to high markup firms. This is consistent with the superstar firm phenomenon documented in Autor et al. (2017): firms that exert market power grab larger market shares. De Loecker et al. (2018) show that a decline in the number of competitors (due to technological change, globalization or laxer antitrust enforcement) leads to a rise in markups. In turn, market power leads to higher market shares, hence the reallocation of economic activity towards high markup firms. This also hints at the mechanism behind this development.

To analyze the reallocation of economic activity, we study the revenue weighted markup distribution.

¹¹This is easily verified by using as weight $\frac{P_{it}^V V_{it}}{\sum_i P_{it}^V V_{it}}$ to compute the aggregate markup – i.e., we are left with the ratio of total sales to total cost of goods sold. This boils down to calculating aggregate markups as in Hall (2018).

First, we plot the percentiles of the revenue weighted markup distribution together with the sales weighted average (Figure 4a). It is clear that the rise of markups is driven by the upper tail of the distribution. The ninetieth percentile of the markup distribution increases from around 1.6 in the 1980s to over 2.4 in 2016. At the same time, there is little change in the lower percentiles. Because this is the revenue weighted distribution, markups for most of the sales remain unchanged. They change especially for high markup firms.

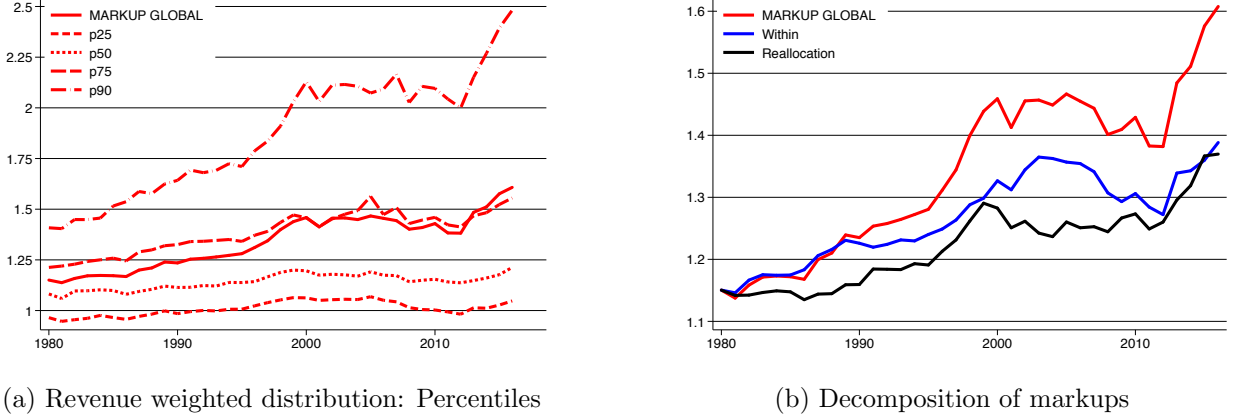


Figure 4: The Change of the Revenue Weighted Distribution of Markups

We already know from Figure 2a that the markups themselves, without weighting, have become distributed more unequally. This definitely contributes to the rise in markups. But we know from the US economy that an even bigger share of the increase in the revenue weighted markup is due to the reallocation of market share towards high markup firms. Even if the distribution of unweighted markups had remained the same, the revenue weighted markups may increase because there is a shift of the share of sales towards high markup firms.

To that end we decompose the change in the aggregate, revenue weighted markup. This decomposition tells us how much of the change in markups is due to the change of the markups themselves (keeping the weights constant), and how much is due to reallocation of economic activity towards high markup firms (keeping markups constant). This decomposition is calculated as follows:

$$\Delta\mu_t = \underbrace{\sum_i m_{i,t-1} \Delta\mu_{it}}_{\Delta \text{ within}} + \underbrace{\Delta R_t}_{\Delta \text{ total reallocation}} \quad (4)$$

where R_t is the reallocation term, which collects all terms related to direct reallocation and net entry (see Appendix for the derivation).

We construct a counterfactual of the markup distribution into the different components by cumulate changes over time. Each of the components indicates what the markup would have been had it been only due to the changes in the unweighted markups themselves (Δ within) and to reallocation (Δ total

reallocation). Each of these components is depicted in Figure 4b .

What we see here is that about half of the increase in markups is due to the change in the markup distribution itself, and the other half is due to total reallocation. This decomposition for the global economy is somewhat smaller from what we see in the United States where reallocation accounts for two thirds of the rise in markups. Such reallocation of sales towards large firms is linked to the rise superstar firms (see Autor et al. (2017)). This is consistent with the evidence that large firms are taking up a larger share in global trade.¹²

3.2 Regional Differences

The breakdown of the evolution of markups in different regions of the world is documented in Figure 5. The evolution of markups is comparable in Europe, North America and Oceania, with an increase from around 1 – 1.2 to 1.5 – 1.6, or an increase of about 0.4 – 0.6. In Asia, the increase is less pronounced. With some minor variation, these four regions are in line with the evolution of global markups. Instead, in the emerging economies of South America the markup is flat or even decreasing, though it has been high from the start of the data availability. In Africa, the markup increases sharply around 2000 and then drops, but is otherwise fairly flat.¹³

One interesting artifact of the global aggregate markup and the four regions that have a similar pattern is the fact that markups are flat in the decade starting in 2000. Until well after the great recession, there is virtually no change in the aggregate markup. In Europe and North America, there is then a sharp increase again in the second decade of the millennium.¹⁴

Table 1 shows the evolution of markups for a selection of individual countries (the Figures in the Appendix show the pattern graphically for each country). The first column reports the value of the aggregate markup in 2016, and the second column reports the change between 1980 and 2016. Within each geographical region, we rank countries by the change in markup. While the pattern that emerges in the aggregate, both globally and for the regions, is the amalgamation of each of the constituent countries, there is considerable variation across countries. Most European economies have seen steep increases, particularly Denmark, Switzerland and Italy. Except for Portugal, which had a modest decline in markups, the other European countries all show an increase in markups that is in line with the overall trend.

The pattern of the NAFTA countries Canada and United States, is very much aligned, though the US started 20 points above Canada. Instead, Mexico has experienced a much more modest increase, though it has had a high markup from the start.

¹²Bernard et al. (2018) report that “the top 1% of US trading firms (around 2,000 firms) account for over 80% of total US trade. Of these largest US exporters, 90% also import goods and account for around 66% of US goods imports. These global firms employed 13.8 million workers in 2007, around as many as the entire US manufacturing workforce.”

¹³Data coverage in Africa is low, and as a result, few firms have a large effect on the aggregate markup.

¹⁴This is consistent with some recent studies (Weche and Wambach (2018) and Calligaris et al. (2017)) that find little change in aggregate markups for the beginning of the millennium. They use alternative data sources that cover that period only.

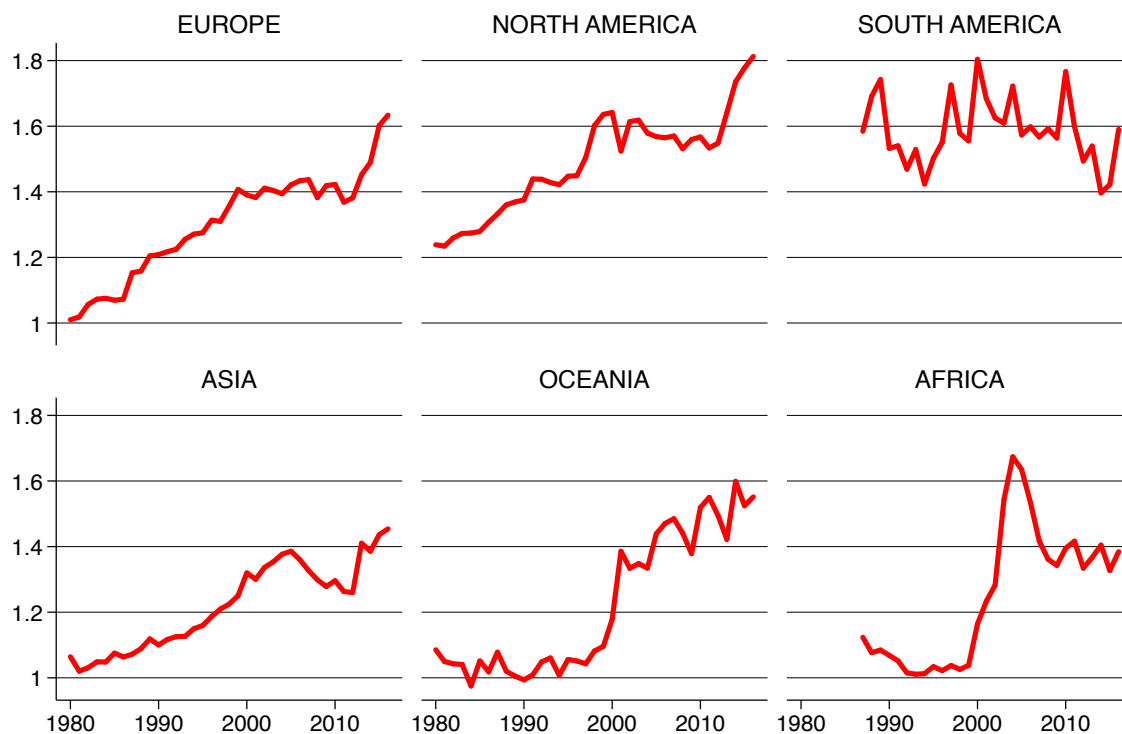


Figure 5: Global Regions

The evolution of the emerging economies of South America is more mixed. The aggregate for the region is flat, while Argentina and Colombia see an increase similar to the global aggregate. Instead, Venezuela and especially Chile see a substantial decrease. The economies of Peru and Brazil are invariant.

On average, Asia experiences a more modest increase than the global aggregate, and it exhibits some diversity within the region. South Korea has the biggest increase. The emerging economies of Taiwan, Turkey, China and the Philippines experience a decrease in their aggregate markups. The decrease in markups in China is consistent with recent evidence by Brandt et al. (2017) on the effect of trade liberalization on markups. They find that China's entry in the WTO in 2001 and the resulting lowering of tariffs has lead to a decline in markups.

Finally, the economies in Oceania experience an increase in line with the global aggregate, exemplified by Australia. New Zealand sees less of an increase. In Africa, the overall increase is more moderate, and its largest economy, South Africa, has a modest change.

In broad lines, markups are increasing across the board, in all continents. It appears that the more developed economies tend to have bigger increases in markups whereas some of the emerging market economies see a decline. The world map in Figure 6 summarizes the geographic dimension of the markup in 2016. Most developed economies have moderately high markups, with some high levels in Europe for Denmark, Belgium and Italy for example. Those in emerging economies in Asia, Africa and Latin America

		Markup	
		2016	change*
Global aggregate		1.61	+0.46
Europe		1.63	+0.62
1	Denmark	2.84	+1.88
2	Switzerland	2.72	+1.63
3	Italy	2.54	+1.54
4	Belgium	2.06	+1.03
5	Greece	1.80	+0.85
6	United Kingdom	1.68	+0.67
7	Ireland	1.82	+0.66
8	Norway	1.60	+0.60
9	France	1.51	+0.53
10	Netherlands	1.46	+0.42
11	Austria	1.32	+0.41
12	Finland	1.36	+0.39
13	Sweden	1.31	+0.37
16	Germany	1.35	+0.30
13	Spain	1.34	+0.24
16	Portugal	1.19	-0.09
North America		1.81	+0.57
1	United States	1.84	+0.59
2	Canada	1.53	+0.49
3	Mexico	1.55	+0.21
Africa		1.38	+0.32
1	South Africa	1.34	+0.14

		Markup	
		2016	change*
Asia		1.45	+0.38
1	South Korea	1.48	+0.51
2	Hong Kong	1.65	+0.41
3	India	1.32	+0.34
4	Indonesia	1.53	+0.26
5	Japan	1.33	+0.26
6	Thailand	1.44	+0.21
7	Malaysia	1.33	+0.03
8	Pakistan	1.17	-0.01
9	Taiwan	1.23	-0.15
10	Turkey	1.16	-0.32
11	China	1.40	-0.49
12	Philippines	1.50	-0.77
Oceania		1.55	+0.47
1	Australia	1.57	+0.46
2	New Zealand	1.35	+0.38
South America		1.59	+0.01
1	Argentina	1.45	+0.64
2	Colombia	1.56	+0.41
3	Brazil	1.61	-0.01
3	Peru	1.64	-0.04
5	Venezuela	1.47	-0.46
6	Chile	1.37	-2.24

Table 1: Sample of Individual Countries (40 countries out of 134). Countries in each region are ranked by their change in markup. The Region and Global aggregates are for all countries in that geographical area, not just those reported in the table.

*Difference between markup in 2016 and 1980. If the first observation (1980) is missing, we extrapolate linearly.

are more mixed, with both the highest levels (such as Russia, Bolivia and several African countries), as well as the lowest levels (such as India and several African countries).

In Figure B.1 in the Appendix we report the change in the markup. We see there that the developed economies have experienced an increase, while the experience of the emerging economies with already high levels of markup was more mixed.

Reallocation by Region. While the overall pattern for aggregate markups is the same across the regions at least of the developed economies, we get a hint that the drivers of the rise in market power are different when comparing the United States (or North America) to other developed economies.

Using evidence on the decomposition (see equation 4 above), we find that reallocation of market share towards high markup firms accounts for the highest share of the rise in market power in Asia (one third)

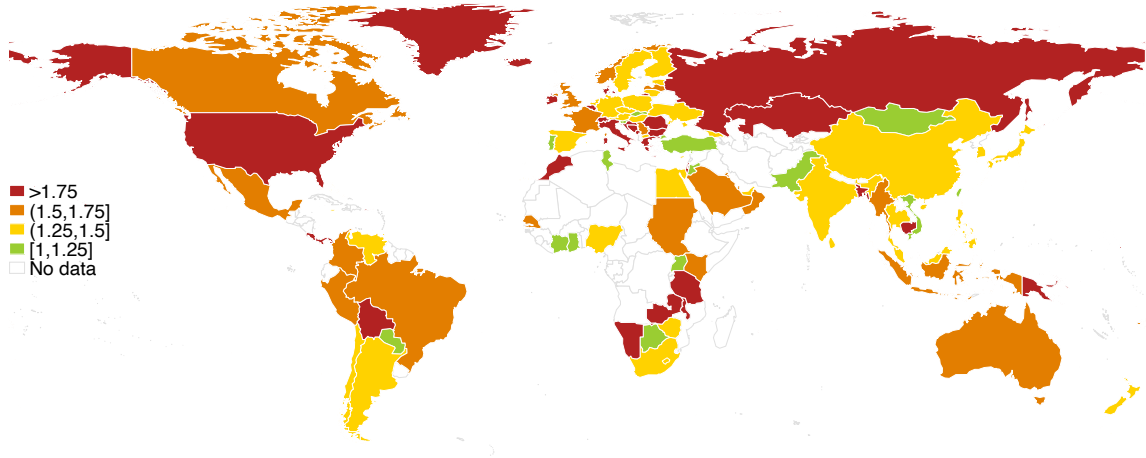


Figure 6: Markup by Country in 2016

and contributes nothing in Europe and Oceania (see Figure 7).

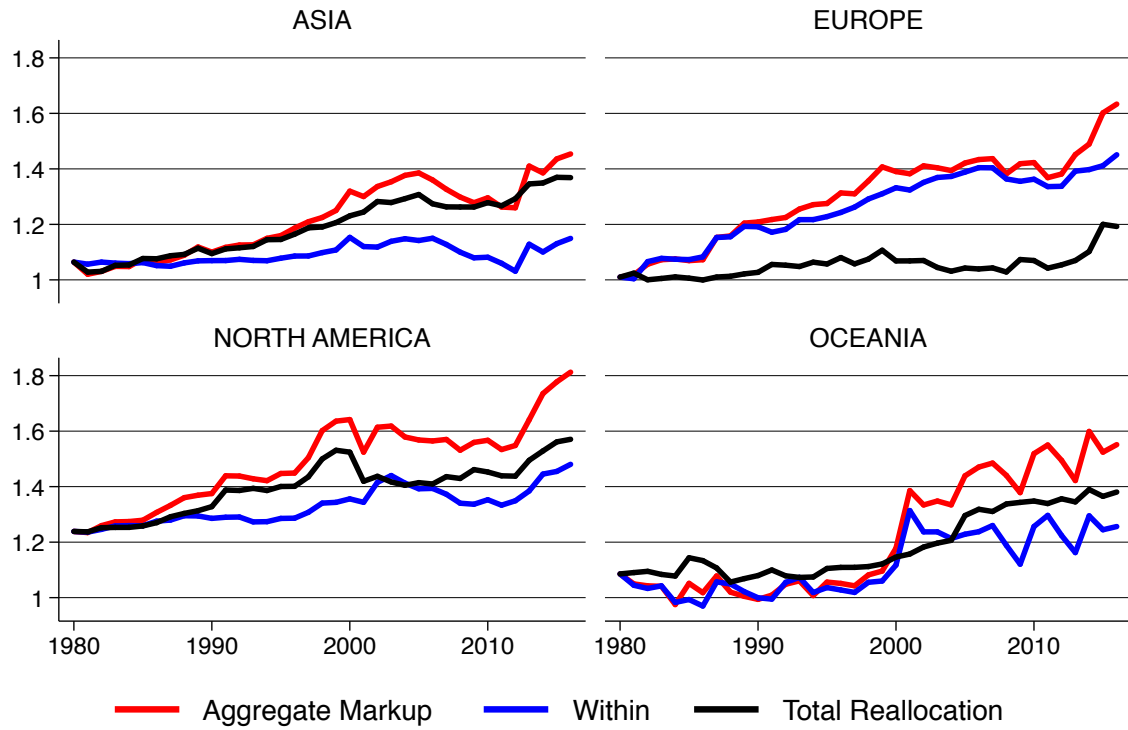


Figure 7: Decomposition in Global Regions

The pattern of North America echoes the findings of De Loecker et al. (2020) for the US. They document that reallocation of resources towards (relatively) high markup firms contributed significantly to the rise of aggregate markups.¹⁵ Europe stands out with a very large role for the pure within-firm

¹⁵The reallocation term here is smaller than when using the Compustat data, with a larger net entry term here. The

markup growth channel in generating aggregate markup growth. Asia and Oceania behave somewhat differently. Asia has a markup growth almost exclusively due to the total reallocation effect, except for the moderate within-firm markup growth during the first half of the sample. In Oceania both forces play an important role.

4 Markups and Profitability

Markups are the most commonly used measure of market power as they indicate how the unit price relates to the cost of producing that additional unit. Yet, markups do not tell the entire story. Even in a competitive economy where firms make zero profits, firms need to raise markups if fixed costs increase. And even in perfect competition, infra-marginal producers have markups larger than one.

Therefore, to capture the full picture of the change in market power, we also need to measure the evolution of profitability. Measuring profitability is difficult, so we study two measures of profitability. First, we calculate the firm level profits directly. Second, because virtually all firms in our data are publicly traded, we have information on their stock market valuation. In the long run, the stock market value represents the discounted stream of future dividends, which in turn are measures of the firm's profits.

In our setup and assuming the variable input is labor $V = L$, profits Π are given by $\Pi_{it} = P_{it}Q_{it} - w_{it}L_{it} - P_{it}^K K_{it} - F_{it}$, where F_{it} denotes the fixed cost. Then, after dividing by sales $P_{it}Q_{it}$, we obtain that the profits share $\pi_{it} = \frac{\Pi_{it}}{P_{it}Q_{it}}$ is given by

$$\pi_{it} = 1 - \frac{w_{it}L_{it}}{P_{it}Q_{it}} - \frac{P_{it}^K K_{it}}{P_{it}Q_{it}} - \frac{F_{it}}{P_{it}Q_{it}}. \quad (5)$$

The profit rate of the firm then consists of the labor share, the capital share and the average fixed cost. We turn to the labor share below. We do not have reliable measures for user cost of capital that are comparable across the 134 economies. We therefore rely on the user cost of capital for the US, and impose this on the entire dataset. We compute the aggregate profit rate by continent using $\sum_i s_{it}\pi_{it}$, and this collapses to the ratio of aggregate profits to aggregate sales. We compare the aggregate profit rate for the US and Europe in Figure 8 below.

The aggregate profit is related to the aggregate markup through an identity, that one only relies on the existence of a cost function (see Syverson (2019) and De Loecker et al. (2020) for more details). It is instructive to consider a cost function with constant returns to scale in production and fixed costs ($C(Q) + F$), this identity becomes

$$\frac{\Pi_t}{S_t} = 1 - \sum_i s_{it}\mu_{it}^{-1} - \frac{F_t}{S_t} \quad (6)$$

To compute profits and the implied aggregate profit rate we require data on fixed costs, in addition to sales and cost of goods sold (required to measure the markup). In what follows we are therefore left

datasets are different. The Worldscope data that we use here does not exhaustively contain all publicly traded firms. As a result, the net entry term is artificially high.

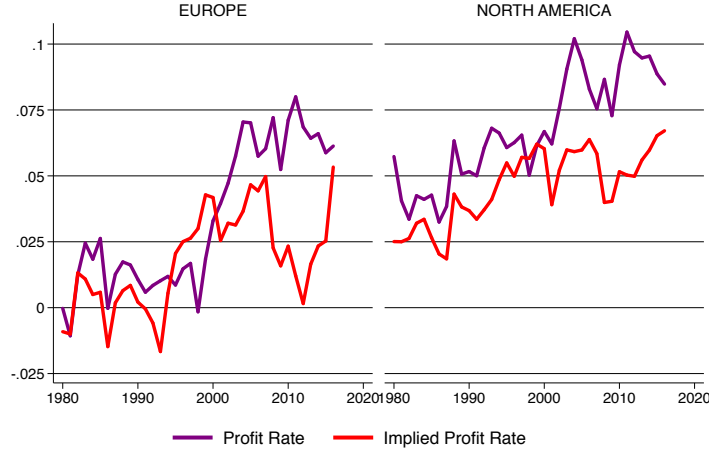


Figure 8: Aggregate Profit Rate in the US and Europe

with a subsample of firms reporting all required financial variables.

We overlay the left-hand side of the above equation in Figure 8 in red. The implied profit rate tracks the actual profit rate of both economies over time. The extent to which these two series differ depends on our estimates of the markup, and for both North America and Europe we find that our markup estimates deliver aggregate profit rates that are in line with the reported profit rates. In order to match the aggregate profit rate, we also need to acknowledge the presence of fixed costs, and that markups are heterogeneous. We refer to De Loecker et al. (2020) for a detailed discussion of these factors in the US economy.

We observe an alternative market-based measure of profitability for listed companies: the market capitalization. In Figure 9, we report the evolution of the global average of the market valuation as a share of sales, which tracks that of the global markup. In the period when markups rise in the 1980s and 1990s, we see a similar trend in this measure of firm profitability. From the 2000s, the average market value share of sales is noisy but with no particular trend. In the current decade starting in 2010, markups rise again as does the average market value as a share of sales.

The increase over the entire period is remarkable. In 1980, the average market valuation was 0.4 times the firm's sales. By 2016, that number was 1.2, an increase by factor three. Market value of course depends on many factors, most notably expectations and because it measures the discounted stream of future dividends, it changes with the discount rate, the interest rate and uncertainty. For example, the risk free rate has declined which would lead to an increase in market value. Yet, there is no evidence of an increase in uncertainty or the discount rate. This suggests that the rise in the market value is indicative of the rise in profitability.

The positive relation at the aggregate level depicted in Figure 9 originates in the tight relationship at the firm level between the share of market value and the markup. In Table 2 (columns (1) and (2)) we report the strong positive relation between the market value share and markups. This establishes that

	Market Value/Sales (log)	
	(1)	(2)
Markup (log)	0.67 (0.01)	0.29 (0.01)
Year F.E.	X	X
Industry F. E.	X	
Firm F.E.		X
R ²	0.25	0.73
N	592,654	594,574

Table 2: Regressions: $\log(\text{Market Value/Sales})$ on $\log(\text{Markup})$. F.E. = Fixed Effects; 4-digit Industries; Standard Errors (in parentheses) clustered at the firm level. The difference in the number of observations reflects firms not reporting an industry classification (360 firms leading to a total of 2,173 observations).

higher markups lead to higher profits, and that they are not driven by higher overhead costs.

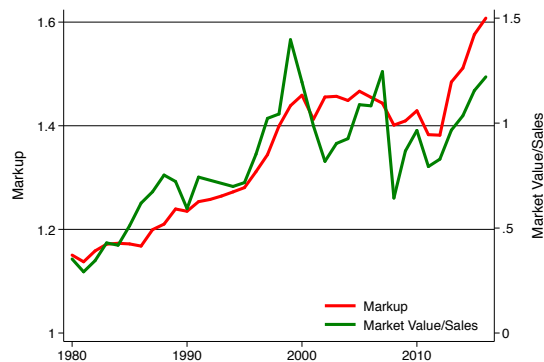


Figure 9: Aggregate Market Value and Markups

High markups have efficiency implications, quantified in the deadweight loss (Harberger (1954)). Because of high prices, marginal consumers choose not to buy. In addition, high markups have distributional implications. The increase in markups brings about a distributional change with more of the surplus going to the owners of the firms in the form of profits.

5 Market power and the Labor Share

This distributional change is tightly related to the effect that market power has on the share of output that goes to workers. Firms with high markups demand fewer variable inputs. Due to higher prices, demand for the output falls, and the quantity produced declines. As a result, the demand for inputs such as labor decreases.

Markups and the labor share are closely related through optimal input decisions. The exact relationship depends on the underlying production function and the degree of adjustment of labor in the

production process. In general the labor share relates to markups through:

$$LS_i = g(\mu_i, \theta_i^L, Z_i) \quad (7)$$

where Z_i captures factors containing adjustment cost or quasi-fixedness of labor (e.g. labor may be part of overhead costs which is included in SG&A and not in Cost of Goods Sold). In the Appendix, we discuss a few different technology specifications that micro found equation (7). Regardless of the specific technology, we expect a negative relationship between the labor share and the markup. Given that we rely on the variable input composite COGS, the markup patterns, both at the firm level and in the aggregate, have implications for the dynamics underlying secular changes in the labor share. See Appendix E for a detailed discussion on how to recover the firm-level labor share from the markup estimates under the production function used to estimate markups. However, we should not be surprised if after projecting the (log of the) labor share, the coefficient on the (log) markup is different from -1 . There are a host of reasons that would lead to this. Chief among them is the presence of overhead labor.

One feature of the worldscope data (and to some extent the US Compustat data) is that not all firms report the wage bill (this varies substantially across countries). We can, however, start from the markup estimates for each firm in the global dataset (based on reporting of Sales and COGS) and create an implied aggregate labor share series; and then confront this with the publicly available series. Figure 10 plots the global labor share (obtained from Karabarounis and Neiman (2014)) and overlays the implied aggregate labor share using the micro estimates of the markup and using $\sum_i m_{it} \mu_{it}^{-1}$, and we rescale the implied labor share series (Markup (inverse)) such that it starts from the observed aggregate global labor share in 1980.¹⁶ Both series track each other relatively closely.

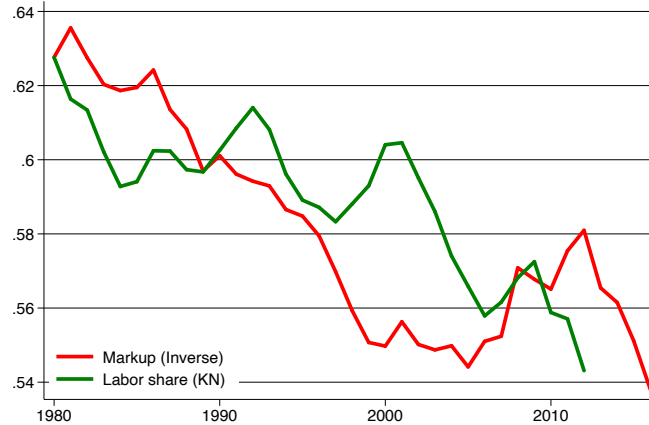


Figure 10: Global Observed and Implied Aggregate Labor Share

¹⁶The scale is different, as expected, since the aggregate data comes in the form of the labor share in value added, while the micro data is presented in terms of gross output. The rescaling also implies that we rely on a constant labor output elasticity, see Appendix E.

We know from the markup analysis in Section 3 that the increase in the aggregate was in large part due to the reallocation of economic activity towards (relatively) high markup producers. Comparing the labor share to markups is indicative whether the decline in the labor share is associated with a rise in markups, and market power. However, a separate measure of markups and the labor share is not always available to researchers. This is precisely the reason why researchers have a hard time identifying this mechanism outside of the manufacturing sector, where census data typically only reports the wage bill and sales, leaving no room to independently measure the markup and labor share; and are forced to rely on alternative measures of market power such as e.g. the HHI (see e.g. Autor et al. (2017)). Our estimates of markups are obtained using a composite variable input (COGS), that allows to independently measure the markup and the labor share at the firm level.

We can return to our discussion on the decomposition of the aggregate labor share using the estimates of firm-level markups and revenue weights. In what follows we rely on the implied aggregate labor share from the first order conditions discussed above. In particular, $LS = \psi \sum_i m_{it} \mu_{it}^{-1}$, with ψ the parameter that consists of a time invariant labor output elasticity that we set to 0.25 (θ^L) and rescales the implied aggregate labor share series to match the observed aggregate labor share (as a share of GDP) in the year 1980. We now perform the same decomposition to identify the importance of the reallocation process in explaining the observed decline in the aggregate labor share. We first take a global view, after which we focus on a few countries. The decomposition is given by:

$$\Delta LS_t = \psi \sum_i m_{it-1} \Delta \mu_{it}^{-1} + \Delta R_t \quad (8)$$

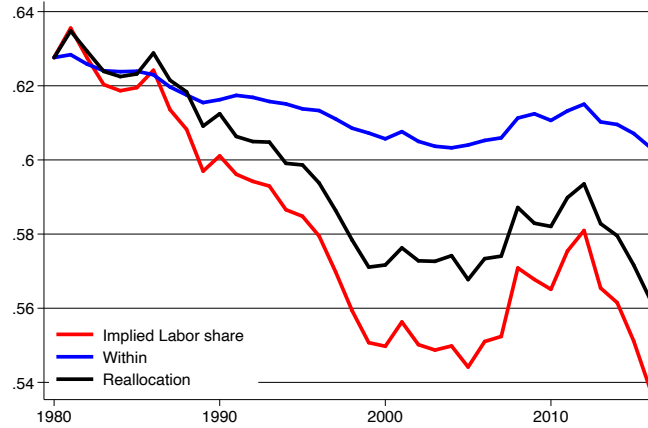


Figure 11: Global Observed and Implied Aggregate Labor Share

The counterfactual aggregate labor share where we hold market shares fixed (i.e. the *within* component, blue line) would only have declined by about two percentage points (from roughly 0.63 to 0.61). In other words, the reallocation of economic activity towards firms with (relatively) lower labor shares

explains the bulk of observed decline, 5 out of the 7 percentage point decline.

The relationship between the (inverse) of the aggregated firm-level markups and the aggregate labor share allows us to perform the decomposition for a few leading countries, even though the wage bill data is (notoriously) absent.¹⁷, so we can rely on the distribution of markups to perform the labor share decomposition. We present the decompositions for Australia, France, Japan and the United States in Figure 12. These are countries for which there is sufficient payroll data.

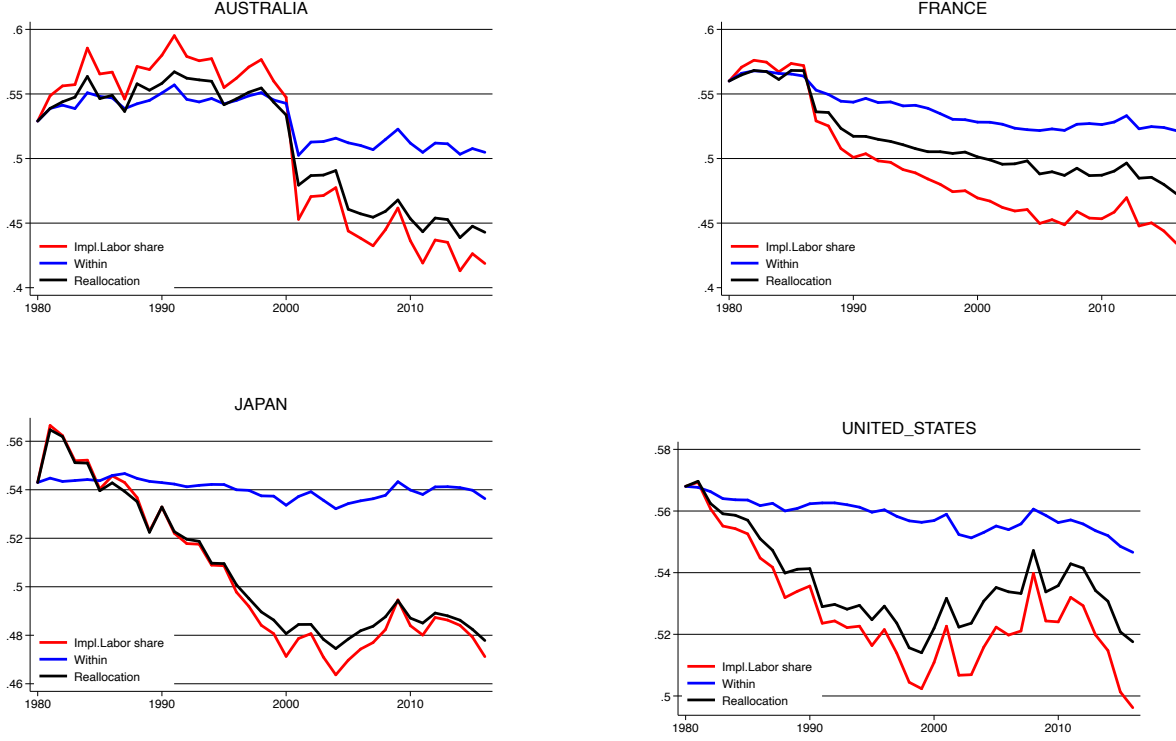


Figure 12: Observed and Implied Aggregate Labor Share: Selected countries

In all four countries we observe a falling (implied) labor share. This can be explained by and large by the reallocation process towards firms with lower labor share, rather than the within-firm process whereby over time the labor share declines (holding the weight of the firm in the economy fixed). The degree to which the reallocation component contributes to the overall pattern of the aggregate labor share does vary across countries.

The payroll data is most comprehensive for France, where we can perform an *internal* check of relationship between markups and the labor share. We plot the observed aggregate labor share (summing over all firms reporting a labor share that lies in the range $[0, 1]$) alongside the implied labor share (through aggregating the inverted firm-level markups, scaled by a calibrated output elasticity). The reported labor shares starts in the year 1992, since we do not have a reliable coverage prior to that year. The series is

¹⁷In the US data such as COMPUSTAT, less than 10% of the firms report a number for the wage bill.

calibrated to equal the aggregate labor share for France as reported in Karabarbounis and Neiman (2014).

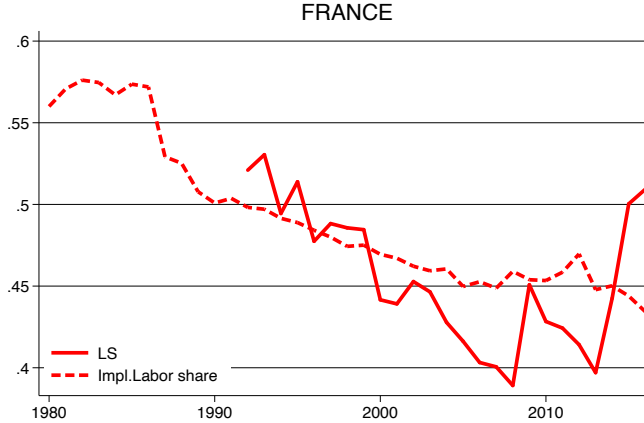


Figure 13: Observed and Implied Labor Share (France)

We observe that the implied labor share series for France tracks the reported labor share series relatively well. Both series indicate a declining labor share with about five percentage points. We can rely on the French data to verify the connection between the labor share and the markup at the firm level. We start by considering the standard setup (equation (7)) and regress the log of the labor share (minus $\ln(0.25)$, the calibrated output elasticity) on the log markup (without a constant term). We obtain a coefficient of -0.4 with a standard error of 0.049 (where standard errors are clustered at the firm level). This parameter is robust to the inclusion of either year, industry or firm fixed effects. In fact, in the specification with firm fixed effects, unobserved differences in firm-level (but time invariant) labor elasticities are controlled for, and we find that increasing (declining) margins are associated with decreasing (increasing) labor shares.¹⁸ In a final specification we follow De Loecker et al. (2020) and include the (log of) labor cost share (computed by dividing the wage bill by total cost $\text{COGS} + \text{SG\&A} + rK$). As in the US Compustat data, the coefficient on the cost share is statistically indistinguishable from 1, while the coefficient on the (log) markup remains -0.3 .

Expression (7) indicates that we do not expect the coefficient on the markup to be -1 ; except in the case where (E.1) holds exactly and equally important, when there is no measurement error the labor share and the estimated markup (classical and non-classical). We see this as evidence for the link between markups and the labor share, and consequently for the aggregate patterns in both series.

6 Globalization and M&A

Building on our measures of markups for the global economy, we ask what the role is of two salient candidate drivers of the rise in markups: Globalization and Mergers & Acquisitions. Our data can shed

¹⁸This number is in line with the findings of De Loecker et al. (2020) for the US where they found a coefficient of -0.24 .

new light on these questions because they cover the global economy and therefore we need not worry that certain biases arise when countries are net importers or exporters, or where headquarters are located does not reflect the main center of activity of a firm.

Globalization There is evidence at the micro level that globalization and openness to trade can both increase and decrease market power. This typically depends on the position in the overall global value chain. Direct head-to-head competition with low-wage producers is expected to push margins down (i.e. the pro-competitive effect), while increased outsourcing and cheaper inputs can lead to increased margins. In addition, increases in market size is expected to raise productivity through scale economies.

GLOBALIZATION INCREASES MARKET POWER. Alviarez et al. (2019) show how consolidation of brands in the beer industry affect markups. De Loecker et al. (2016) link the rise of international trade to the markups in the aggregate economy. For a large sample of Indian firms, they find that the trade reforms effectively lowered the cost of production, through lowering of input tariffs. However, the cost reduction was not fully passed on to prices, thereby extracting more rents from the consumer by raising markups.

GLOBALIZATION DECREASES MARKET POWER. At the industry level, access to global markets has raised productivity, and lowered markups in China. Brandt et al. (2017) show that markups in China have declined as a result of China’s entry in the WTO and the subsequent increase in international trade. Given China’s position in the global value chain, the markup decline is consistent with the lowering of the cost of production of users of Chinese products (intermediates for western economies).

The growth of Chinese exports has been documented extensively, and the strong productivity growth of Chinese manufacturing has had a profound impact on manufacturing activity across the world. Most notably, Autor et al. (2013) show that US manufacturing employment and wages were adversely affected by a rapid rise of Chinese import through increased product market competition. During the period 1999-2007 the overall US manufacturing import competition penetration (measured by the share of Chinese imports in total consumption, measured as the sum of US production, exports and total imports) increased with 4 percentage points, from 1.7 percent to 4.7 percent. We rely on our estimates of firm-level markups for US manufacturing firms and put both series side-by-side in the Figure 14 below.

Figure 14 suggests a negative relationship, confirming the pro-competitive hypothesis on markups, and seems to be consistent with the labor market outcomes (employment and wages) reported in Autor et al. (2013). However, the aggregate series mask the heterogeneity of markups and import competition at more disaggregate level. In our setting we can compute industry-level markups (at the 4 digit SIC87 level), and relate those to the Chinese import penetration experience for that 4 digit industry. We find that industry-level markups declined in industries with higher Chinese import competition growth. The results are summarized in Table 3 below.

On average over the period 1999-2007, industries with a change in import competition above the median experienced a markup decline of about 0.06. Industries below this threshold saw no significant

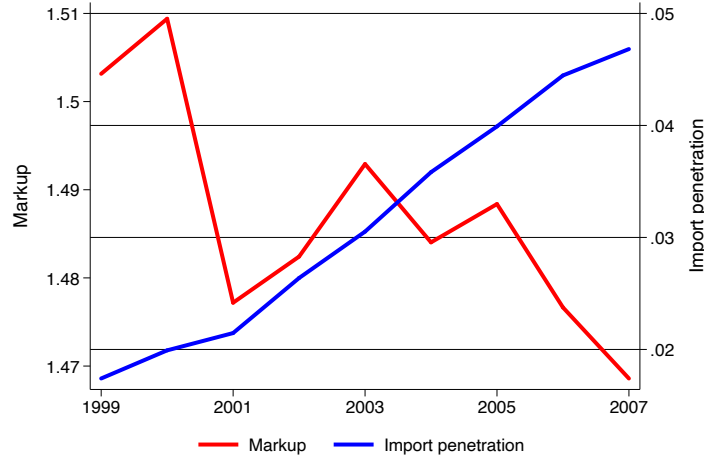


Figure 14: Chinese Import Competition and Markups
US Manufacturing (1999-2007)

change, either increasing or decreasing, in markups. When we perform this analysis on the period 1991-2007, we find a similar negative association between markups and Chinese import competition. However, the baseline markup, on average, increases. The results are robust to selecting a higher threshold, like the 75th or 90th percentile in the import penetration rate.

This result may suggest why the rise in markups in North America and Europe sees a stagnation in the first decade of the twenty-first century as is evident in Figure 5 as well as in Figure 1 with the Global average markup. While markups have increased between 1980 and 2000 and after 2010, they have stagnated during the period of the ascent of Chinese import competition (the China shock) between 2000 and 2010. Our results are suggestive that the China shock may provide an explanation for this stagnation of markups.

Finally, the link between a country-industry's position in the Global Value Chain (GVC) and the aggregate markup has been pointed out by the World Bank Development Report (Worldbank (2019)). They rely on our estimates of firm-level markups to create an industry-country-year specific markup aggregate, and relate it to the position in the WIOD's global input-output tables.

Mergers and Acquisitions Related to the globalization process is the surge in global merger and acquisition (M&A) activity, both within and across borders. While there may be efficiency gains, by reducing the number of competitors, M&A activity potentially allows firms to exert more market power which raises profits and markups. In the beer industry for example, Alvarez et al. (2019) find that consolidation as a result of M&A leads mainly to market power without generating efficiency gains. Of course, with global firms, the headquarter location may not accurately reflect the reach of the economic activity of a firm when we analyze the role of M&A within a country. Because we have global data, the location of the headquarter is irrelevant when we consider the global economy, in the sense that in this

	1999-2007		1991-2007	
constant	-0.003	0.007	0.050	0.047
(s.e.)	(0.040)	(0.041)	(0.025)	(0.026)
<i>High IPR</i>	-0.063	-0.077	-0.050	-0.046
(s.e.)	(0.047)	(0.049)	(0.029)	(0.031)
Sector FE	no	yes	no	yes
Nr. Obs.	211	211	426	426
R2	0.01	0.18	.01	0.11

Table 3: Markups and Chinese Import Competition

Notes We report the coefficients of a regression of the share-weighted markup (at the 4 digit SIC 87 industry level) on a dummy *High IPR* equal to one when that sector is above the median import penetration change over the relevant period – $\text{High IPR} = \mathbb{1}(\Delta IPR_s > \text{Med}(\Delta IPR_s))$.

analysis we are primarily interested in firm-level markups and not where margins are obtained, or how profits and implications vary across markets and regions.

To analyze the role of M&A activity, we plot both the value (in Panel a) and the number of transactions (in Panel b) in Figure 15 below. We overlay our global aggregate markup series (on the left vertical axis).

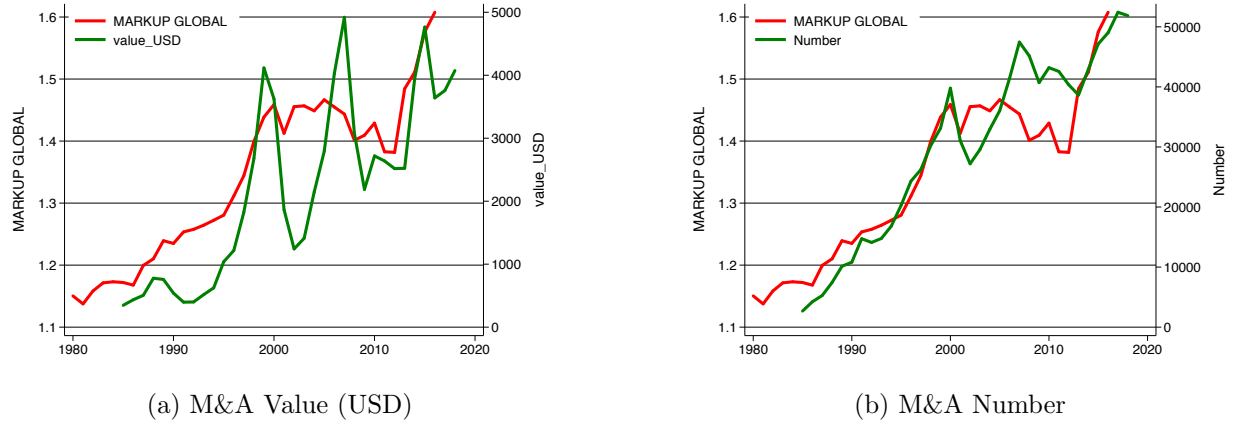


Figure 15: Global Markups and M&A Activity

This does not allow us to make any causal inference from increased M&A activity on increased markups, but the patterns are striking. During the period from 1985 to 2016 where global M&A activity increased more than tenfold (from 347 to 3640 billion USD), the aggregate markup increased with about thirty percentage points.

The surge in M&A activity is also related to the increase in common ownership. In a recent paper, Backus et al. (Forthcoming) link increased ownership concentration to increasing markups, and find

that changes in ownership can have a significant impact on markups. While the link between common ownership and M&A is of course complex, in their calibration they find a substantial increase in markups, from 1.21 to 1.56, predicted by the rise in common ownership as observed in the data.

7 Related Literature

The findings in our paper are in agreement with the findings for the United States, both for publicly traded firms and for the universe of firms in the Census of Manufacturers (De Loecker et al. (2020)). Also for the United States, Grullon et al. (2019) document the rise of concentration measures for the publicly traded firms.

For Europe our results are consistent with what other research finds. Here we find that markups in Europe rise sharply between 1980 and 2000, then they stagnate until 2010, after which they continue to rise again. For the period spanning 2000 to 2012, Gutiérrez and Philippon (2018) find stagnating concentration ratios (their Figure 2, second panel).¹⁹ Their evidence on the concentration measures is consistent with the measures of firm level markups as we calculate here. The reason is that in the first decade of the twenty-first century, markups are stable. This is true for the global markup (Figure 1) as well as for North America and Europe (Figure 5). So indeed, markups in Europe in the beginning of the century are stable or even declining, as they are for the United States and the whole world. But markups in Europe are increasing before 2000 and after the Great Recession.

Weche and Wambach (2018) analyze the same Orbis database to investigate the impact of the Great Recession on markups between 2007 and 2015 for most European countries. Rather than using measures of concentration, Weche and Wambach (2018) calculate markups in the way we do. They find that aggregate markups drop following the Great Recession and then pick up again after 2012. This is consistent with our findings for the publicly trade firms where there is also a dip in the Great Recession and a subsequent recovery.

Finally, using the Orbis database between 2001 and 2014, Calligaris et al. (2017) find that markups rise even during the first decade of the century, with an increase in the dispersion of markups as we do here. They show that the rise in markups is mainly coming from IT intensive firms. And Koltay et al. (2019) use the Orbis data to calculate concentration measures of the top 4 firms. This measure captures the increase in market power of the upper percentile firms.

We know of no work that has analyzed market power for the global economy, except for the paper by Diez et al. (2018) who rely on our methodology and approach (of both this paper and our previous work De Loecker et al. (2020)), using exactly the same data as we do, and they find similar results for the global markup series. Their study is complementary, and in support of our main facts, and their focus is on relating the markups to firm size, innovation and investment. We, however, start from the markup

¹⁹Gutiérrez and Philippon (2018) use Orbis, a privately provided database by Bureau Van Dijk. Like our data, it is not a census and does not cover the universe of firms, but it does include privately held firms as well as publicly traded firms. The downside of the Orbis database is that coverage is sparse in the earlier years, in particular before 2000.

analysis to investigate the importance of reallocation of economic activity, and link it to globalization, technology and the transactions in the market for corporate control (i.e. M&A).

8 Conclusion

We document the evolution of market power around the world. While there is a lot of variability across countries and regions, we find a remarkable pattern of rising aggregate markups across most countries in the world, especially in the developed countries. Globally, aggregate markups rise from 1.1 in 1980 to 1.6 in 2016. Firms now sell 60% over marginal cost compared to 10% over cost back then. We see an increase especially in the first two decades from 1980 to 2000, followed by a period of stagnation in the first decade of the twenty-first century, with a new episode of rising markups in the last decade.

The rise in markups is not a phenomenon exclusive to the United States. Europe, Oceania and Asia experience similar share rises. In the emerging economies of South America and Africa, we see less of an increase, mostly because the markups there were already high to begin with. There is a difference how the rise of markups decomposes: while in the US most of the rise is due to reallocation of sales from low to high markup firms, in Europe it is mainly driven by an increase in markups itself.

We also find that globally, the decline in the labor share is tightly linked to the rise of market power. We have decomposed this change in the labor share into a within component and a reallocation component and find that the decline in the labor share is predominantly driven by the reallocation of sales towards firms with low labor shares, rather than by the decline in the labor share in itself. This is consistent with the rise of superstar firms being responsible for the decline in the labor share (see Autor et al. (2017)).

Because firms operate in the global economy, we need not worry about mis-measured costs and sales that pertain to different countries. The rise of international trade in the global economy without country distinctions is yet another manifestation of technological change, where investments to accomplish these can be spread over a much larger market size, further fueled by declining costs of transportation and improved communication technology.

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Appendix A Country Specific aggregate Markups

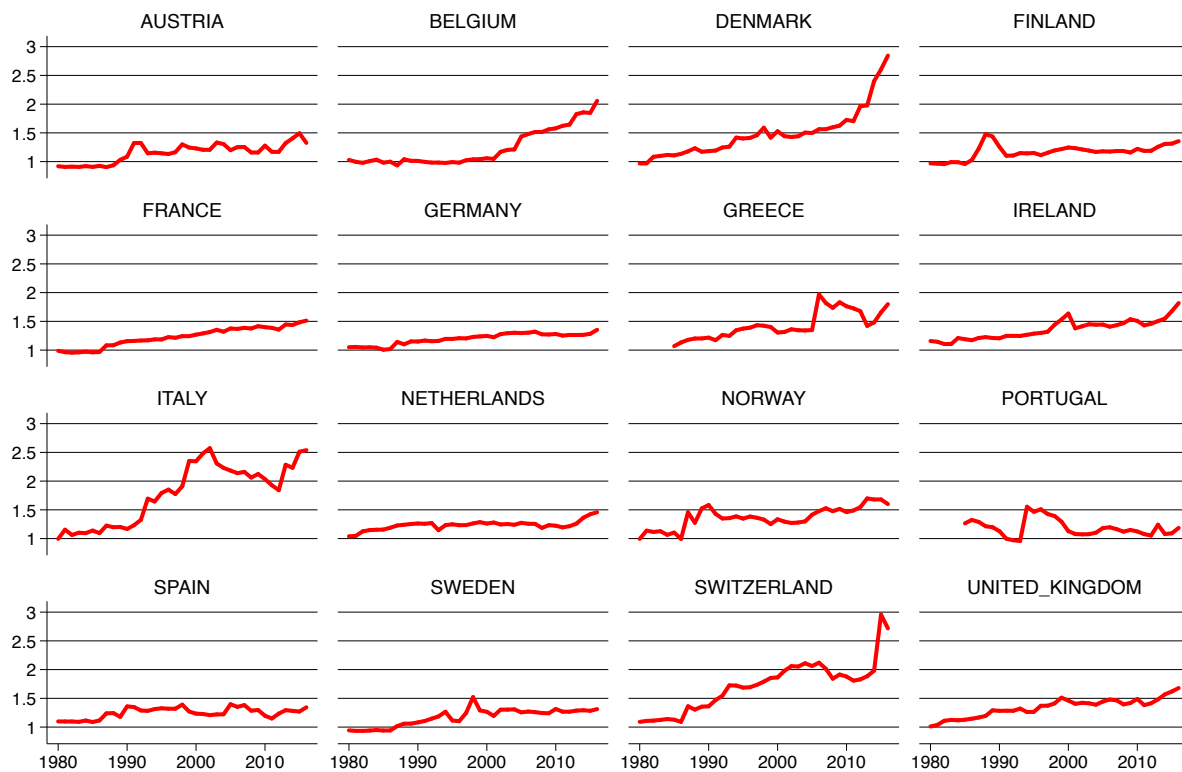


Figure A.1: Europe

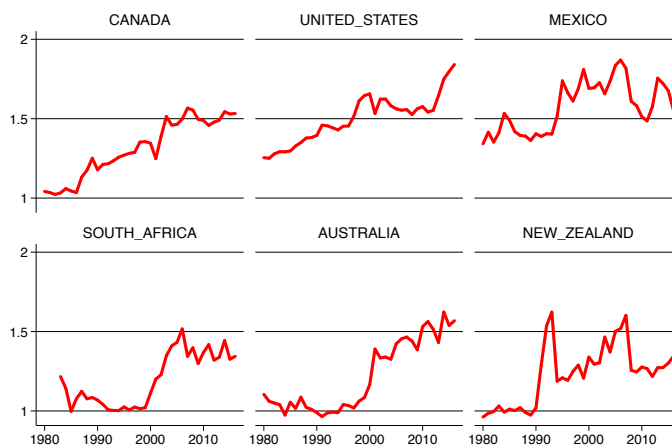


Figure A.2: North America, Africa, Oceania

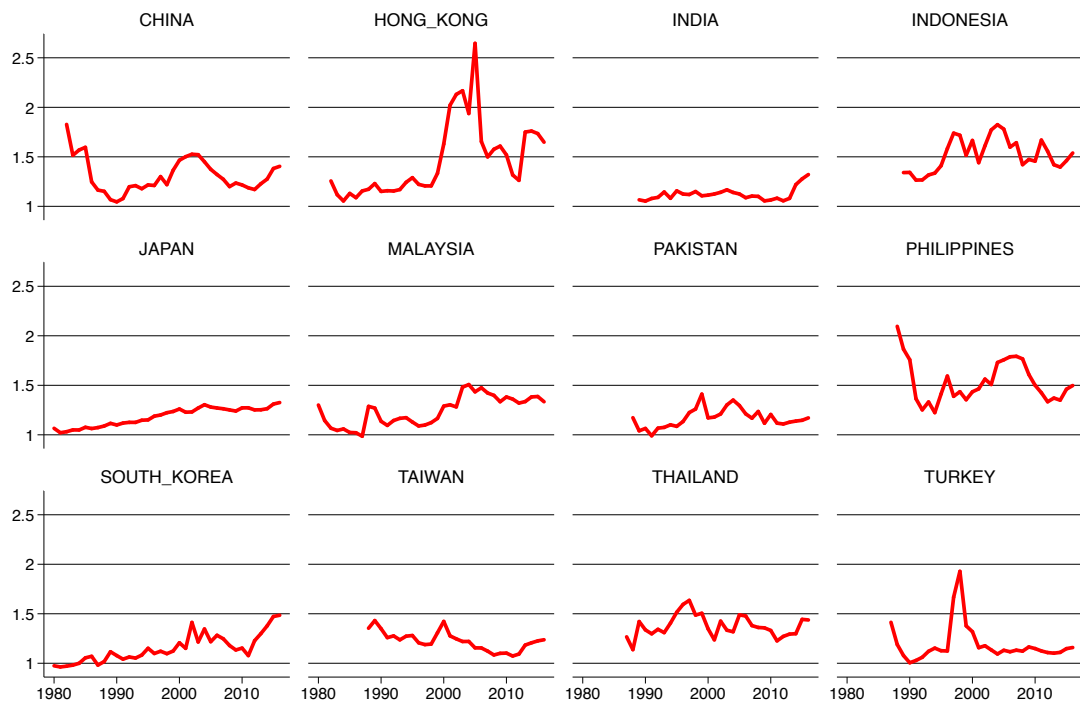


Figure A.3: Asia

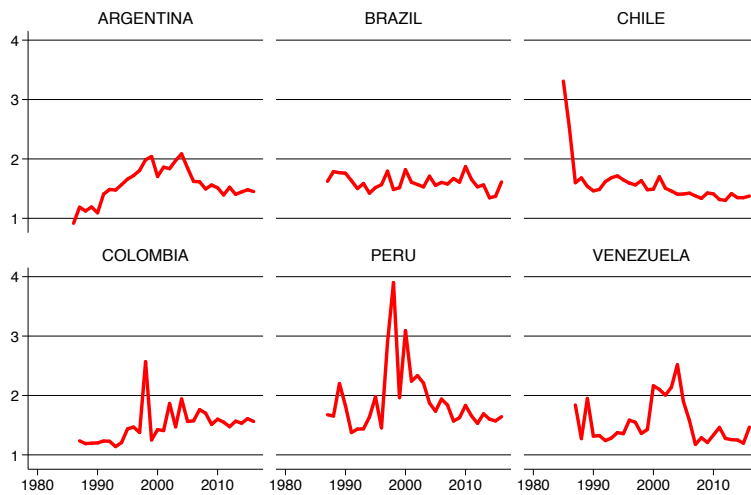


Figure A.4: South America

Appendix B World Map: Changes in Markups

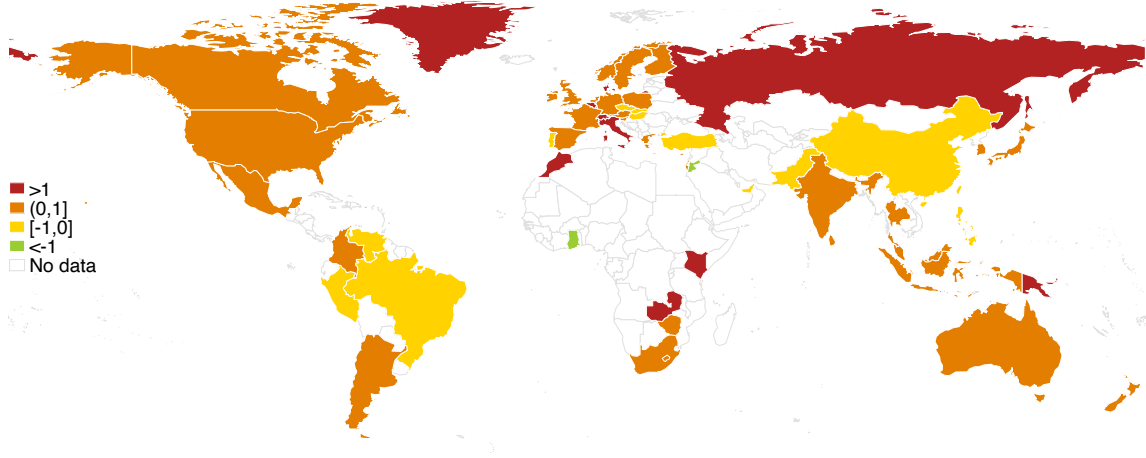


Figure B.1: Change in Markup 1980-2016.

Appendix C Derivation of Equation 4

$$\Delta\mu_t = \underbrace{\sum_i m_{i,t-1}\Delta\mu_{it}}_{\Delta \text{ within}} + \underbrace{\sum_i \tilde{\mu}_{i,t-1}\Delta m_{i,t}}_{\Delta \text{ market share}} + \underbrace{\sum_i \Delta\mu_{i,t}\Delta m_{i,t}}_{\Delta \text{ cross term}} + \underbrace{\sum_{i \in \text{Entry}} \tilde{\mu}_{i,t}m_{i,t} - \sum_{i \in \text{Exit}} \tilde{\mu}_{i,t-1}m_{i,t-1}}_{\text{net entry}}, \quad (\text{C.1})$$

$\Delta \text{ total reallocation} = \Delta R_{it}$

where $\tilde{\mu}_{it} = \mu_{it} - \mu_{t-1}$, and $\tilde{\mu}_{it-1} = \mu_{it-1} - \mu_{t-1}$.

Appendix D Markup weighted by GDP

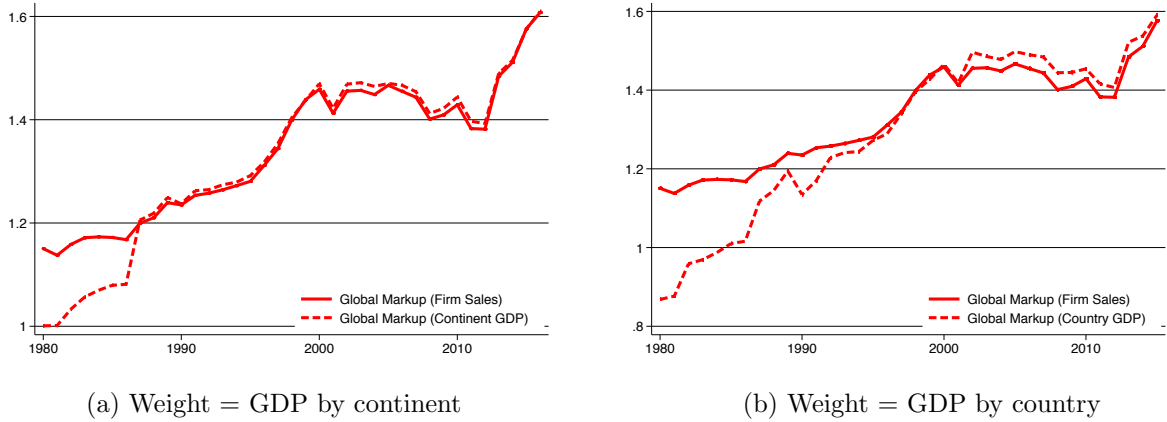


Figure D.1: Global Markup: Weighted by GDP and by Firm Sales (Benchmark)

One of the concerns about our data is that firms in some countries and continents are disproportionately represented compared to actual economic activity as measured by GDP. If firms from Europe and North America are overrepresented and firms in Africa are underrepresented, then the global markup estimate will disproportionately reflect the markup of Europe and North America. In order to adjust for the possible bias of a non-representative sample of firms, we weigh the markup of each geographical region (a continent or a country) by their share in global GDP,²⁰ instead of by the firms' sales share in the total sales of all firms in the world. In Figure D.1 we plot the aggregate global markup obtained weighted with the continents' GDP (D.1a) and the countries' (D.1b) weights together with the aggregate markup obtained with the sales weights from the firms in our sample, as in Figure 1. The pattern of the GDP weighted markups in both figures is remarkably close to the benchmark, except in the early 1980s. This indicates that, except in the early years, there is no systematic bias in the markup measures.

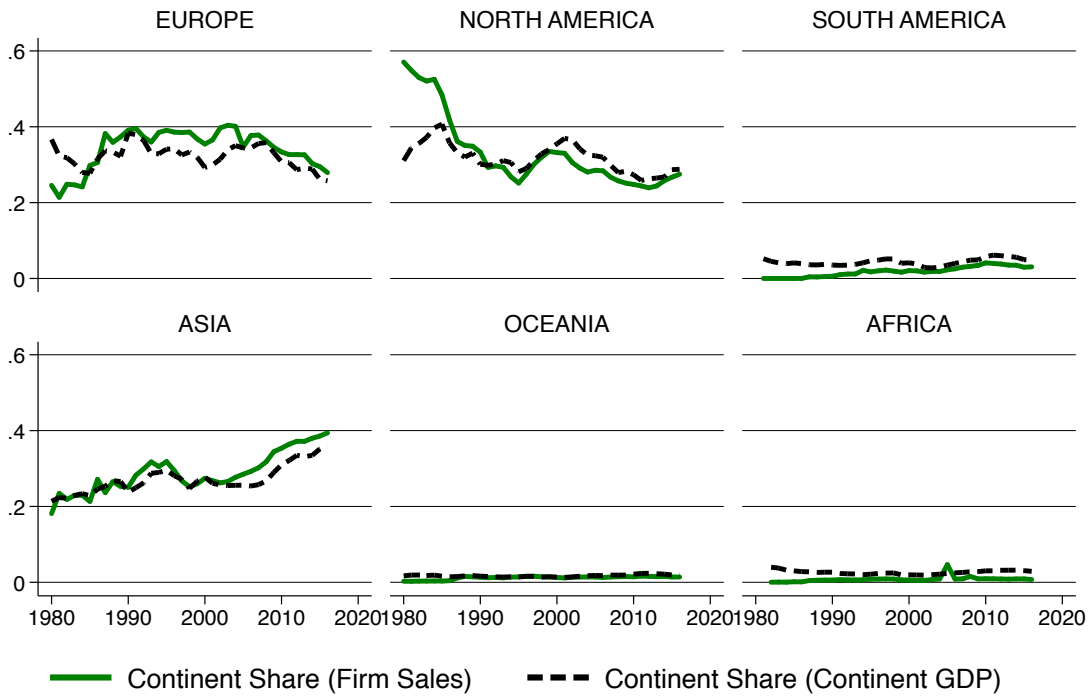


Figure D.2: Share of each continent: firm sales (baseline) and GDP.

To get a better understanding, in Figure D.2 we plot the GDP shares over time for every continent together with the sales shares of the firms in the continent. Both track each other closely in all 6 regions, except for the early 1980s when North America is overrepresented, and Europe.

We perform the same robustness using countries as the unit of observation for which we use GDP weights, and we plot the country-weighted global markup alongside the unweighted in Figure D.1b.

²⁰We use GDP data from the IMF.

Appendix E Labor Share: Different Technologies

The firm-specific labor share is tied to the markup through optimal (i.e. cost minimizing) input choices. The specific form of the production, and the presence of frictions in input markets determine the specific relationship. We discuss a few leading specifications adopted in the literature, and discuss the technology on which we rely to estimate firm-specific markups. The latter generates a specific expression for the output elasticity of labor. Finally, we present the details on how we construct implied aggregate labor shares, allowing for a comparison with the reported aggregate country-wide labor shares.

Baseline The standard Cobb-Douglas production function with variable labor generates the simplest relationship:

$$LS_i \equiv \frac{\theta^L}{\mu_i}, \quad (\text{E.1})$$

There is no independent measure of markup and the labor share, as the markup is a rescaling of the inverse of the labor share. This implies that if the FOC of labor is used to compute markups, that all facts about markups are facts about the labor share.

Gross Output with multiple variable inputs. If there are multiple variable inputs (L, V, \dots) an *independent* measure of the markup and the labor share can be obtained. In the case of two variable inputs (L, V), there are two FOCs with an immediate implication for the labor share. Having estimated the markup, using the FOC on the variable input V , the labor share is obtained using equation (E.1). This can be simplified to:

$$LS_i = \frac{\theta^L}{\theta^V} \frac{P^V V_i}{S_i} \quad (\text{E.2})$$

where V is any variable input such as materials or electricity.

Adjustment cost and dynamics. When there are adjustment costs for labor, or if part of employment consists of overhead labor (not used as a variable input), the labor share can no longer be retrieved from the markup estimate and a measure of the output elasticity of labor. In this case, additional factors drive a wedge between the labor share and the markup.

Markup estimates and the labor share. We rely on the markups as estimated by De Loecker et al. (2020). The underlying production function is an industry-time specific Cobb-Douglas production function in capital and a variable input bundle (COGS): $Q = V^{\theta^V} K^{\theta^K} \Omega$. This bundle V consists of intermediate inputs and labor ($L + V$).²¹ This implies that the output elasticity of labor is in principle firm-specific and given by:

$$\theta^L = \theta^V \frac{L}{L + V} \quad (\text{E.3})$$

²¹We abstract away from the presence of overhead labor, see De Loecker et al. (2018) for discussion.

We rescale the implied aggregate labor share such that the labor share in 1980 is equal to the observed country-specific aggregate labor share. This rescaling therefore adjusts the labor share measured in a gross output production function to the reported value-added based aggregate labor share. Second, it also implicitly keeps the output elasticity of labor fixed, which allows for a time varying input bundle output elasticity (as reported in De Loecker et al. (2020). although relatively small in magnitude), as long as it is offset by the ratio of employment to the bundle $(L + V)$. In practice the labor share is the rescaled sales-weighted average inverse markup:

$$LS = \psi \sum_i \frac{m_i}{\mu_i}, \quad (\text{E.4})$$

with $\psi = \theta^V \frac{L}{L+V} a$, where a is the value that makes the implied labor share equal to the reported aggregate labor share in value added in 1980.