RBA Lecture:

The Rise of Market Power and the Macroeconomic Implications*

Jan Eeckhout†

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†UPF Barcelona (ICREA-GSE) and University College London

In this lecture, I draw on research results from the papers De Loecker, Eeckhout, and Unger (2018), De Loecker and Eeckhout (2017), De Loecker and Eeckhout (2018a), De Loecker and Eeckhout (2018b), and De Loecker, Eeckhout, and Mongey (2018). First, I will document what we find regarding the facts about the rise of market power. Then I will discuss the causes and consequences for the labor market and the macroeconomy in general.

1 Facts about Market Power

Based on the analysis of markups for all publicly traded firms in the United States (De Loecker, Eeckhout, and Unger (2018)), we find the following facts.

1. Markup heterogeneity. There is a distribution of markups in the economy, and since 1980, this distribution has become more unequal. Median markups have remained constant and some of the lower percentiles have slightly decreased. The main finding is that the upper percentiles, especially P90, have increased enormously (Figure 8.a., De Loecker, Eeckhout, and Unger (2018)). This indicates that market power has been extremely beneficial for some firms, and not for most firms. The top percentiles drive the average markup, which has seen a 40 points increase, from 1.21 in 1980 to 1.61 in 2016 (Figure 1, De Loecker, Eeckhout, and Unger (2018)).

2. The technology matters. To calculate the markups, we need to estimate the production technology. The output elasticity of the variable input has remained fairly constant, but the expenditure on fixed overhead costs (as measured in the firms' income statement by SG&A, Sales, General and Administrative Expenses) has increased. It was on average 15% of total cost in 1980 and reaches an average of 22% in 2016. Moreover, those firms with higher markups tend to have higher expenditure on fixed costs, as can be seen from the regression table (Table 3, De Loecker, Eeckhout, and Unger (2018)). In addition, there is some evidence that the returns to scale are slightly increasing.

3. The magnitude of the increase in markups depends crucially on several factors. First, the increase in average markups where weighting is done with inputs is only about half of the average markup where weighting is done with sales. Because in addition to the increase in the markup itself, there is reallocation of market share from low markup to high markup firms,

input weights are lower for high markup firms than output weights. This confirms that the rise of market power is the result of a decrease in the competitiveness of the firms. Second, using industry averages to calculate markups as done by Hall (2018) shows a much slower increase in markups. This is due to the absence of aggregation of the micro level observations and the fact that most of the rise in market power occurs within industry (see Figure 3 De Loecker and Eeckhout (2018b)). Third, even though the rise in the profit rate is substantially smaller than the rise in markups – about 7-8 percentage points (Figure 14.a. De Loecker, Eeckhout, and Unger (2018)), there is a tight relation between the profit rate for a firm i π_i and the markup μ_i:

$$\pi_i = \frac{P_i Q_i - C(Q_i)}{P_i Q_i} = 1 - \frac{1}{\mu_i} \frac{AC_i}{MC_i} \tag{1}$$

where P_i is the output price, Q_i is the quantity produced, $C(Q)$ is the cost of production, $\mu_i = \frac{P_i}{MC_i}$ is the markup, $AC_i = \frac{C(Q_i)}{Q_i}$ is the average cost and MC_i is the marginal cost. Now there is potential for a lot of confusion between the magnitude of the markup increase (by 40 points, from 1.21 to 1.61) and that of the increase in the profit rate (by 7 percentage points from 1% to 8%). And if – as several authors have done – we plug in the average markup for 2016 in equation (1) above, and we assume that the ratio of average cost over marginal cost remains unchanged, then the implied profit rate is of the order of 40-50%. Such a profit rate is not only unrealistically high: 40% of sales means approximately 80% of GDP economy wide since GDP is about half of gross output, the sum of all sales. In addition, this implied profit rate does not match the rate of profits that we observe in the data, hovering around 8% in 2016. However, we can reconcile this discrepancy, if we account for two facts: 1. that the economies of scale have changed, as we pointed out above; 2. that using averages does not properly aggregate firm level observations in the light of Jensen's inequality, in particular given dispersion in markups and sales has increased substantially. Once we properly account for fixed costs (economies of scale) and aggregation (instead of using averages), we show in Figure 4, in De Loecker and Eeckhout (2018b) that the profit rate implied by our markup measure is consistent with the profit rate in the data.

4. Finally, we decompose the change in markups in the portion that is due to changes in markups themselves, and the change in the market share that goes to high markup firms. We

find that about two thirds of the increase in markups is due to an increase in the market share going to firms with high markups (see Figure 10, De Loecker, Eeckhout, and Unger (2018). This is consistent with the fact that weighting matters (sales weights make the high markup firms more dominant), and the fact that the rise in markups can be explained by a model of market power a la Cournot where higher markup firms also generate higher market shares of sales.

The rise of market power is not exclusive to the United States. We use data on some 70,000 publicly traded firms in 134 countries between 1980 and 2016. We calculate the markup for each of those firms in every year, and then construct the sales weighted average markup as we did for the United States. We find a strikingly similar pattern of increasing average markups, with a steep increase in the 1980s and 1990s, some leveling off in the 2000s and then again an increase after the great recession (see Figure 1, De Loecker and Eeckhout (2018a)). This pattern appears in Europe, North America, Asia and Oceania (Figure 3, De Loecker and Eeckhout (2018a)). In the emerging economies in South America and Africa where we have fewer data, the pattern different with typically higher markups throughout the period and no increase. The are of course differences across countries, but the overall pattern is remarkably similar. For example for Australia, there is an increase of the markup of around 1 in 1980 to nearly 1.6 in 2016. The increase occurs somewhat later in the sample period in the late 1990s.

2 Causes

In De Loecker, Eeckhout, and Mongey (2018) we construct a general equilibrium model with a large number of sectors and with Cournot competition within each sector. In addition, firms have stochastic productivity realizations, and as a result, there is heterogeneity amongst firms. Firms all face a fixed operating cost, and there is free entry. The market structure is determined by the number of potential entrants M, based on which the actual number of entrants is determined once the fixed cost is taken into account.

Within this framework, we estimate the model to match four moments from the data: the

average markup, the profit rate, the fraction of job destruction by exiting firms, and the labor reallocation rate. The parameters that we estimate are the number of potential entrants (M) and captures the market structure, as well as the variance of the productivity shocks (σ) and the fixed cost (ϕ), both of which capture the technology. We estimate the model for 1980 and for 2016, and the change in the estimated market structure as well as the technology informs us about what drives the change in market power.

Note that a change in the market structure by means of an increase in the number of potential entrants generates more competition as more firms have the potential to enter. This affects the distribution of markups and profits, and as a result, also the number of entrants. Our comparative statics results show that a larger number of potential entrants increases the mean and higher percentiles of the markup distribution.

An increase in the variance of the distribution of productivity shocks leads to higher markups, but it lowers entry as more firms now have both extremely high productivity and extremely low productivity. This leads to more firms having lower (negative) profits.

3 Consequences

We evaluate the effect of rise of market power on the labor market outcomes. We focus on the labor share, the level of wages, labor force participation and labor reallocation (or business dynamism).

1. Labor Share. The decline in the labor share has extensively been documented in the literature (see amongst many others Karabarbounis and Neiman (2014), Gollin (2002), Karabarbounis and Neiman (2014), Autor, Dorn, Katz, Patterson, and Van Reenen (2017) and Kehrig and Vincent (2017)). When market power increases, the decline in the labor share is an immediate and natural consequence. To see that, consider the firm's first order condition that solves the cost minimization decision. That is the condition that we also use to construct markups:

$$\mu_i = \theta^L \frac{PQ_i}{wL_i} \quad \Rightarrow \quad \frac{wL_i}{S_i} = \frac{\theta^L}{\mu_i}. \tag{2}$$

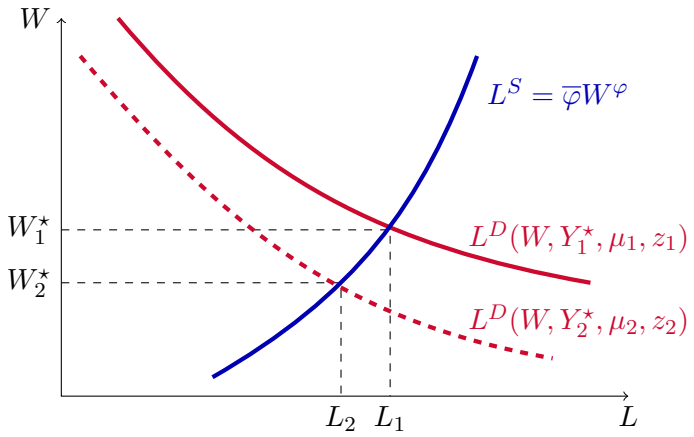
This expression for the markup can be written as the cost share of labor (wL_i) out of total

Sales (S_i). It is immediate from equation (2) that for a given output elasticity, as the firm's markup increases, the labor share of that firm will fall. Aggregated over all firms therefore, with an increase in the aggregate markup, we expect a decrease in the aggregate labor share. This is indeed what we see in Figure 7, De Loecker and Eeckhout (2017). Not surprisingly, the negative relation between markups and the labor share holds also at the firm level, as we can see from the regression of labor share at the firm level on the firm's markup (Table 4, De Loecker, Eeckhout, and Unger (2018)). This provides direct evidence that markups play a role in the decline in the labor share.

2. Wages. The labor share in a firm is calculated as the product of unit wages (say annual wages) and the amount of labor hired. Abstracting from the role of heterogeneity in skills and the choice of hours worked, we can thus think of the labor share as the unit cost of labor (the wage) times the number of employees as a share of total sales (or value added). At the level the aggregate economy, that is the wage level times the labor force participation. The median wage in the economy has in real terms been constant, at around $830 per week (from CPS). But since GDP has grown, wages as a share of total output have declined by about 40%. Of course, the wage level is not just the median wage, but we use the median wage rather than the average wage to capture the wages of production labor rather than overhead labor. Quantitatively estimating a general equilibrium model with endogenous wages, in De Loecker, Eeckhout, and Mongey (2018) we find that the rise of market power has a strong equilibrium effect on wages, with a substantial decrease of between 10-15%. This is similar to the decline in average wages excluding the top percentiles.

The key insight here is that market power depresses the demand for labor: firms set higher prices and therefore they produce less output, for which they need less labor. For the labor market to be in equilibrium, the economy moves along the upward sloping labor supply curve until a new, lower wage is obtained. This is illustrated in the following Figure.

3. Labor Force Participation. As is immediate from the Figure, the other side of the same coin is that in conjunction with the drop in wages, there is a drop in labor force participation. Since the mid 1990s, labor force participation has declined by about 10% (see Figure 11



De Loecker and Eeckhout (2017)). This is striking because since the second world war there has been an enormous inflow of women in the labor force. Female labor force participation rose from just over 30% to over 60%. But despite the enormous progress, now even women are dropping out of the labor market. The negative impact of stagnating wages (falling wages as a share of GDP) on labor force participation is so large that it has offsets the growing trend in female labor force participation.

4. Labor Reallocation (Business Dynamism). One of the implications of the rise of market power is that typically, passthrough declines. In response to productivity shocks, firms with market power pass on less of the productivity gains in prices to the customer. There is ample evidence that passthrough as measured from exchange rate fluctuations is around 50% in the United States (see for example **?**). Now if firms change their prices less in the light of changes in productivity and pass on less of the gains to the consumer, that means that they also adjust quantities of production less. By the law of demand, if prices don't change much, nor do quantities. Therefore incomplete passthrough of cost to prices also implies incomplete passthrough of cost to quantities produced. This then leads to firms adjusting their inputs less frequently, including the amount of labor. This has implications for labor market dynamism. In Figure 1, De Loecker, Eeckhout, and Mongey (2018) we document the decline in labor market dynamism, which has declined by about 50%, and this is the case for both large and small firms and is not driven by a composition effect.

When we quantify the effect the rise of market power in a model with productivity shocks,

we find that the effect on labor market dynamism is consistent what we observe in the data. It is generated by a decline in competitiveness of markets.

5. Migration. Once labor market dynamism declines, it is only a small step to explain the decline in migration rates. New job opportunities in different cities or states comprise a substantial fraction of the reasons for inter-city migration. Therefore, if firms adjust the labor force less frequently and workers thus switch jobs at a lower rate, there will be a decrease also in the fraction of families that migrate to different cities. This is consistent with the sharp decline in migration rates that we see in the data. From Figure 13.b De Loecker and Eeckhout (2017) it is evident that migrations rates have halved, from around 3 percent per year to 1.5 percent.

6. Inflation and interest rates. Finally, market power also has important implications for monetary policy. While it may seem puzzling that rising markups does not translate in higher inflation, this is the result of the Central Banks adjusting the money supply to target a 2% inflation rate. With technological progress and absent money, prices could actually fall. If we only consumed computers, inflation reflecting the quality adjusted price of computers would drop exponentially. But the money supply adjusts to ensure that there is always 2% inflation. With market power, the amount of money needed to achieve this inflation target is lower than under competitive markets. Therefore the inflation outcome is the same (2%), but the amount of money circulating is larger under competition than under market power.

More challenging is the effect of market power on the interest rate. The rise of market power leads to an increase in the supply of capital (profit rates increase from close to zero to at least 6% of GDP) and at the same time to a decrease in the demand for capital (due to a reduction in output, less capital is used). The increase in supply and the decline in demand leads to a lower price for capital, a falling interest rate.

Figures

Figure 1, De Loecker, Eeckhout, and Unger (2018)

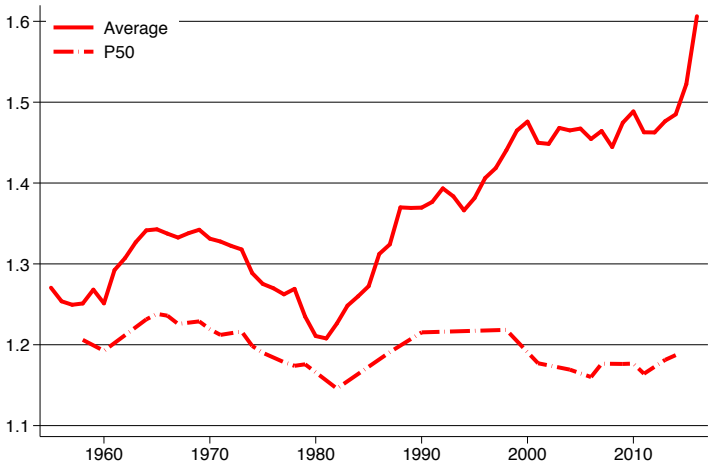


Figure 8.a., De Loecker, Eeckhout, and Unger (2018)

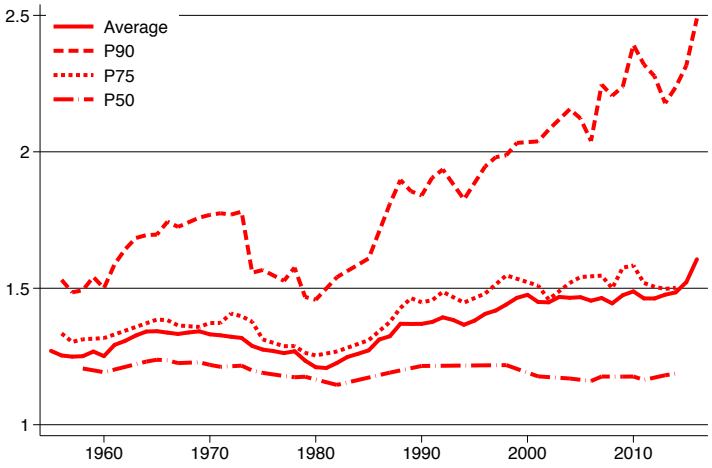


Table 3 De Loecker, Eeckhout, and Unger (2018)

	Markup (log)			Profit Rate (log)	
	(1)	(2)	(3)	(4)	(5)
SG&A (log)	0.56			0.15	
	(0.01)			(0.03)	
R&D Exp. (log)		0.16			0.10
		(0.01)			(0.01)
Advertising Exp. (log)		0.05			0.03
		(0.00)			(0.01)
R&D dummy			0.06		
			(0.01)		
Advertising dummy			-0.00		
			(0.03)		
R^2	0.61	0.07	0.43	0.04	0.05
N	26,743		247,615	26,743	

Figure 14.a., De Loecker, Eeckhout, and Unger (2018)

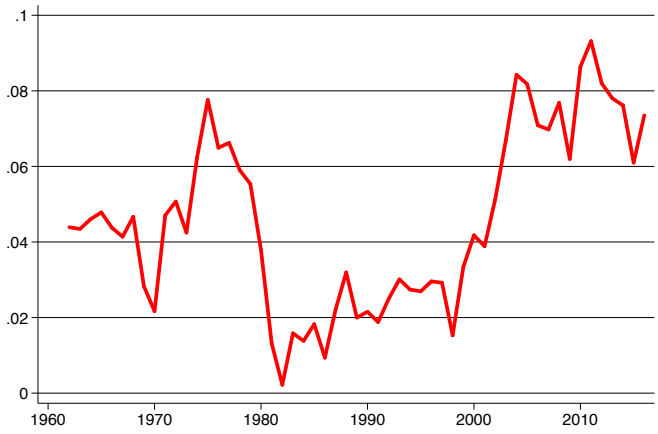


Figure 3, De Loecker and Eeckhout (2018b)

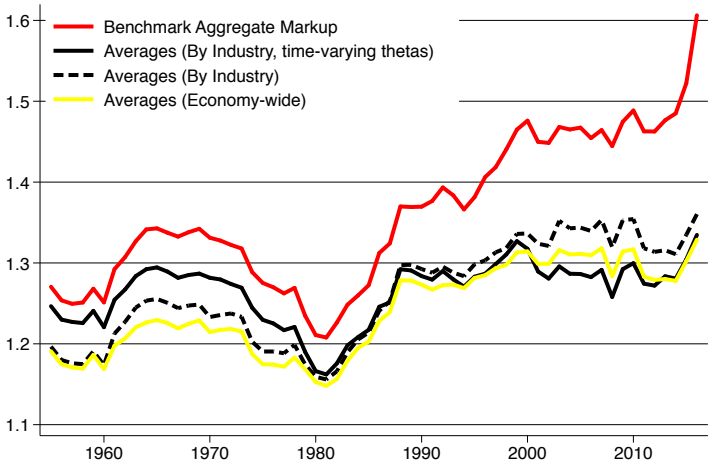


Figure 4, De Loecker and Eeckhout (2018b)

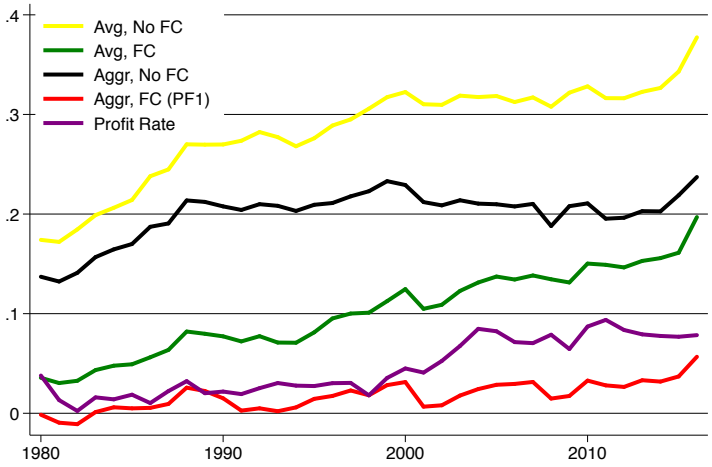


Figure 10, De Loecker, Eeckhout, and Unger (2018)

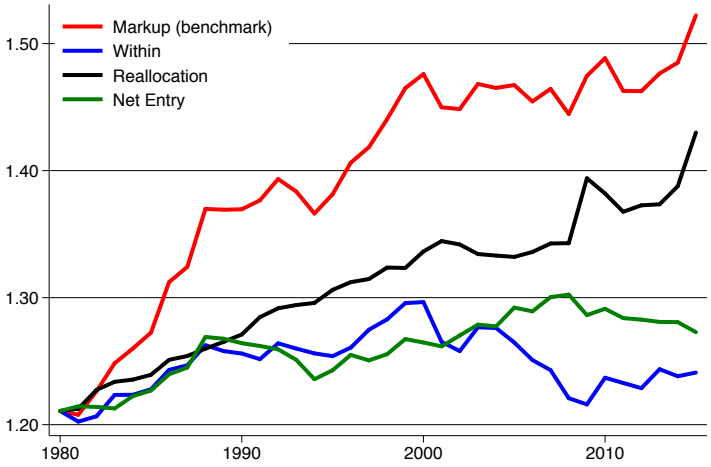


Figure 1, De Loecker and Eeckhout (2018a)

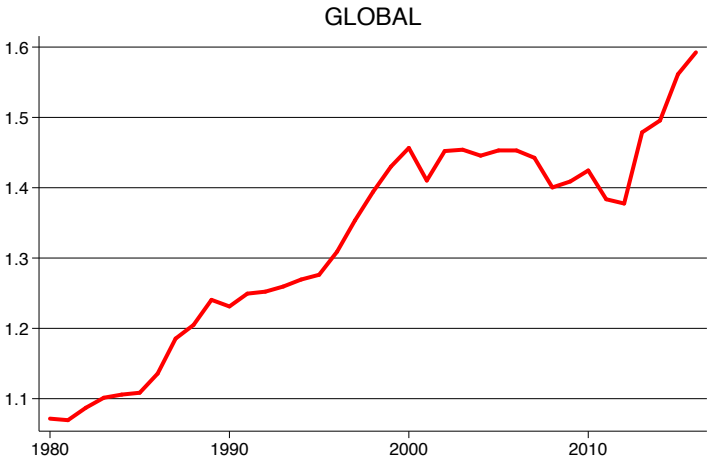


Figure 3, De Loecker and Eeckhout (2018a)

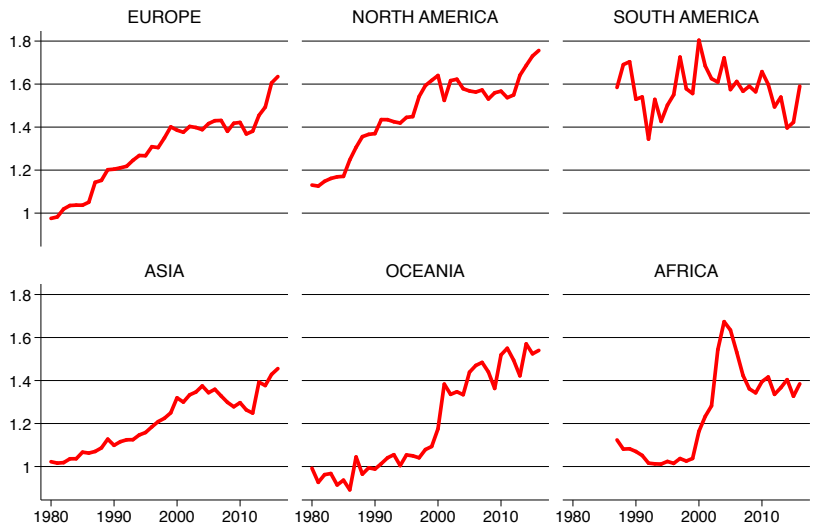


Figure A.2, De Loecker and Eeckhout (2018a)

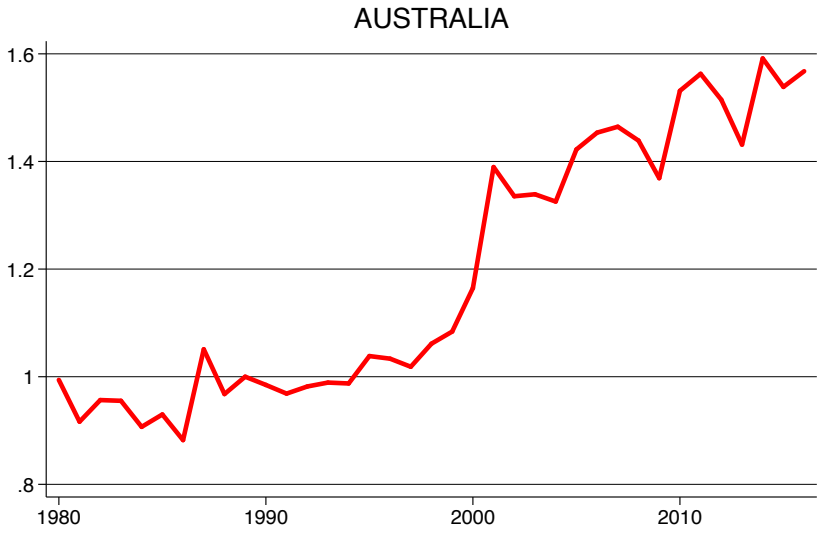


Figure 7, De Loecker and Eeckhout (2017)

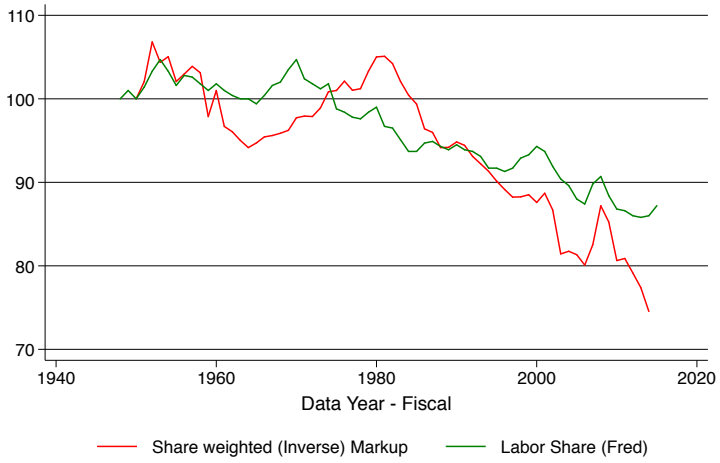


Table 4, De Loecker, Eeckhout, and Unger (2018)

	Labor Share (log)			
	(1)	(2)	(3)	(4)
Markup (log)	-0.24	-0.23	-0.20	-0.24
	(0.03)	(0.03)	(0.03)	(0.03)
Year F.E.		X	X	X
Industry F. E.			X	
Firm F.E.				X
R^2	0.02	0.08	0.21	0.88

Figure 1, De Loecker, Eeckhout, and Mongey (2018)

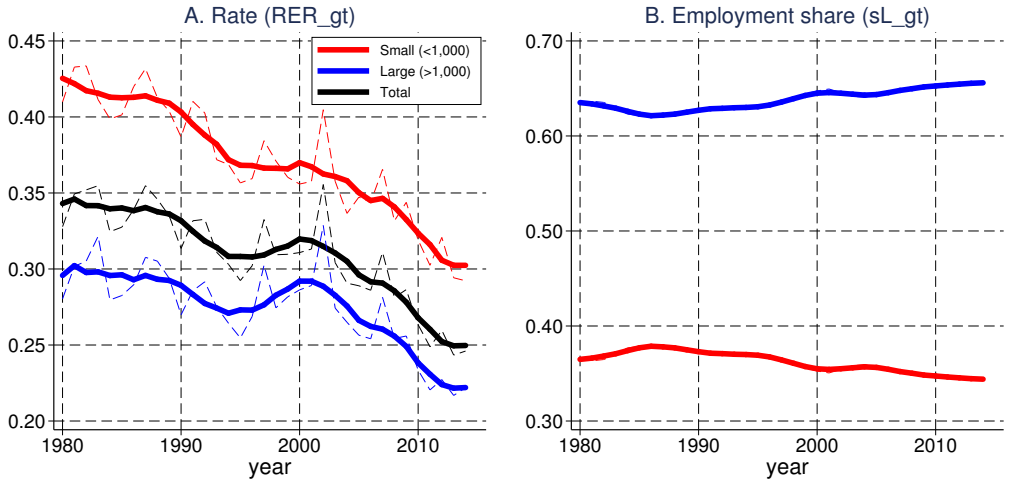


Figure 11, De Loecker and Eeckhout (2017)

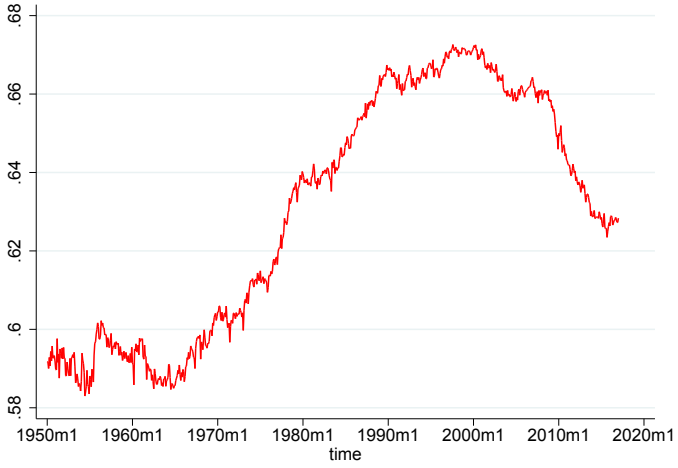
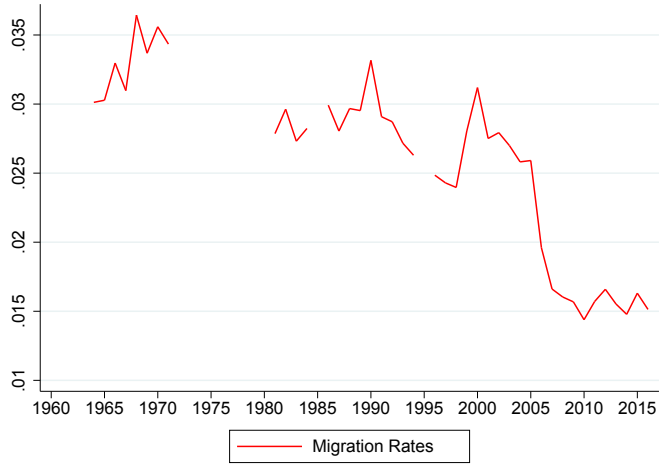


Figure 13.b De Loecker and Eeckhout (2017)



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