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Pouvoir de marché et part du travail

Les tendances séculaires du pouvoir de marché et de la part du travail dans la valeur ajoutée ont des conséquences importantes sur les inégalités et l'efficacité de l'allocation des facteurs de production. Pour les analyser, il faut recueillir des données exhaustives et renseignant le détail du compte de chaque entreprise, couvrant plusieurs dizaines d'années. Nous exploitons une nouvelle base de données sur l'univers des entreprises françaises entre 1984 et 2016 et documentons une hausse de la concentration depuis le début des années 1990. Malgré une certaine stabilité de la part agrégée du travail, les entreprises de plus grande taille dont la part du travail est moins importante ont gagné des parts de marché, surtout dans les industries où la concentration a le plus augmenté. Le taux de marge, i.e. le ratio du prix au coût marginal, d'une entreprise *type* – que nous considérons ici comme un indicateur de son pouvoir de marché – a diminué, mais la redistribution des parts de marché vers les entreprises de plus grande taille a fait augmenter le taux de marge agrégé. Notamment, selon nos constatations, la hausse de la concentration ne s'accompagne pas d'un accroissement du pouvoir de marché dans les tranches supérieures. Nous montrons également qu'il est essentiel de tenir compte de la redistribution dans l'ensemble des entreprises pour bien comprendre comment les tendances du pouvoir de marché ont façonné la dynamique de la part globale du travail en France.

Mots-clés : Part du travail, taux de marge, concurrence, fonction de production

Market Power and Labor Share

Secular trends in market power and labor share have important implications for inequality and allocative efficiency. Studying them requires comprehensive and detailed firm-level data spanning several decades. For that purpose, we leverage a novel and detailed database on the universe of French firms between 1984 and 2016, that we use to document a rise in concentration in France since the beginning of the 1990s. Despite a relative stability of the aggregate labor share, we show that firms with lower labor shares have been gaining market shares. As low labor share firms also tend to be larger, this market share reallocation has been stronger in industries where concentration increased the most. We rely on markups as proxies of firm-level market power, and on a flexible production function that allows the identification of firm-specific output elasticities and markups. We find that the markup of the *typical* firm has decreased, but the reallocation of market shares toward larger firms contributed to an increase of the aggregate markup. Finally, we show how taking into account reallocation across firms is essential to understand how the aggregate market power evolution has shaped the dynamics of the aggregate labor share in France.

Keywords: Labor share, markup, competition, production function

Classification JEL : E10, E23, E25

1 Introduction

Large and productive superstar firms have been gaining market shares in many advanced economies, and the rise of their market power, measured either through their markup or their profitability, has been the focus of attention in many recent works. De Loecker et al. (2020) have documented an increase in top firm market power in the US that is large enough to have important macroeconomic consequences. They find that the weighted average markup in the United States rose from 21% above marginal cost at the beginning of the 1980s to around 61% now. Autor et al. (2020) also document a rise of the weighted average markup in the US. Gutiérrez and Philippon (2018) argue that European markets are more competitive, and exhibit lower levels of concentration, lower excess profits and lower barriers to entry, which raises the question of whether the secular trends above are specific to the US. We use detailed firm-level administrative data on the universe of French firms to document facts about market power and labor shares in France.

These questions are important for inequality concerns. One of the important macroeconomic implications of a rise of market power is a decline in the aggregate share of income going to workers. Given that there is ample evidence that labor is more evenly distributed than capital (Garbinti et al., 2018; Piketty et al., 2018) or firm ownership (Bauer et al., 2018), a decline in the aggregate labor share is a possible driver of inequality. Important work has shown that the aggregate labor share has indeed been declining in a wide range of countries (Karabarbounis and Neiman, 2014; Elsby et al., 2013; Grossman et al., 2018). Using aggregate data, Barkai (2020) and Boussard and Lee (2020) show that both the labor share and capital shares have declined in the United States and many advanced economies, while measures of the profit share have increased. Looking more closely at firm-level data, Autor et al. (2020); Kehrig and Vincent (2018) show that the labor share of the typical firm has actually increased, while the aggregate fall is attributable to reallocation from high to low-labor share firms.

Market power trends have also important but ambiguous consequences for allocative efficiency. As shown by Baqaee and Farhi (2020), a reallocation of market shares to high-markup firms, as in Autor et al. (2020) increases efficiency, but an increase in markup dispersion, as in De Loecker et al. (2020) reduces efficiency. Market power also has important but ambiguous dynamic implications: while lower competition may lead firms to under-invest (Gutiérrez and Philippon, 2017), the relationship between competition and innovation depends on the initial level of competition (Aghion et al., 2005).

Understanding the underlying micro-structural transformations behind these aggregate trends is crucial to identify their possible explanations such as changes in the competitive environment and changes in technology. For instance, Bonfiglioli et al. (2019) and Panon (2020) show that national firms compete in markets that are increasingly global, which reduces firm-level markups but benefits larger firms, and Melitz (2003) Mayer et al. (2014) show that international competition causes reallocation toward top producers. Recent work (Autor et al., 2020; Van Reenen, 2018) argues that technological change, such as the growth of platform competition in digital markets, may have caused reallocation from small to large firms that could lead to dominance by a small number of firms. Lashkari et al. (2019) find that the rise of Information Technology has disproportionately benefited larger firms.

We use France as a laboratory to study the link between variations in industry concentration and firm-level outcomes, and provide evidence on the sources of market power variations. France is an interesting case because in contrast to the US, the labor share in France appears to have been stable or increasing over the past decades (see Figure 1).

We document important facts about secular trends in France that are similar to what has been documented for other advanced economies. When we decompose labor share variations in France, we show that there has been an important reallocation of market shares from firms with high labor shares to firms with low labor shares, which tend to be larger. This reallocation is correlated with a rise of industry concentration, measured through a wide range of proxies, from the beginning of the 1990s. However, labor shares have on average increased at all points of distribution, a development that has offset the effect of reallocation and explains why the aggregate labor share in France is broadly stable.

To assess the extent to which firm-level market power dynamics has played a role in explaining the divergence between firm-level labor share in France and the US, as opposed to other explanations like technological change, we estimate firm-level markups and output elasticities using a flexible production function that allows variations in the marginal product of inputs both across firms and time periods. We follow De Loecker and Warzynski (2012) and first estimate firm-level elasticities of value-added to labor and capital, and then recover markups by assuming that firms minimize their costs and that labor is a flexible input. We rely on unique and comprehensive administrative data covering the universe of French firms. This data is produced by the French National Institute of Economics and Statistics (INSEE) and contains standard income and balance sheet information for almost all firms in France from 1984 to 2016.

Importantly, we find no evidence that the rise in concentration translated into an increase in firm-level market power. We find that there is substantial heterogeneity in markups, and that markups are increasing with firm size. We also find that much of the increase in firm-level labor shares is attributable to decreases in firm-level markups. All in all, high-markup firms gained market shares while the markup of the typical firm decreased, which indicates both an improvement in allocative efficiency and a reduction of the distorsive effect of markups. We also show that this reallocation is strongly correlated with the rise in concentration at the industry level.

Our paper contributes to the macroeconomic literature that documents a number of important secular trends that have recently swept across advanced economies. A number of recent papers have documented growing industry concentration and within-industry dispersion in firm outcomes (Andrews et al., 2016; Berlingieri et al., 2017; Song et al., 2018; Card et al., 2013). In parallel, there is a large body of evidence on a global fall in the labor share across many industries (Elsby et al., 2013; Karabarbounis and Neiman, 2014, 2018; Barkai, 2020; Boussard and Lee, 2020; Grossman et al., 2018). We show that concentration and firm-level market power are not necessarily correlated, even at the top, even though at the aggregate level the reallocation of market shares toward high-markup firms contributes to a rise in the aggregate markup. Our results (i) that firm-level markups have decreased, and (ii) that reallocation towards high markup firms reflects a rise in concentration and contributes to a rise in aggregate markup are consistent with Autor et al. (2020). However, in France, the decrease in firm-level markups is larger, and the reallocation effect does not offset it.[1] This difference is also consistent with evidence in Gutiérrez and Philippon (2018) that European markets have become more competitive than US markets.

The rest of the paper is organized as follows. Section 2 presents our theoretical framework, Section 3 presents our strategy for estimating firm-level markups, Section 4 presents the data that we use to implement this strategy, Section 5 documents important macro and micro facts about labor share and concentration in France, and Section 6 presents our results about markups in France. Finally, Section 7 concludes.

2 Theoretical Framework

In this section, we provide a general theoretical framework that allows us to map variations in aggregate the labor share to variations in firm-level market power, input elasticities and market shares. Consider an industry with N firms indexed by i. Consistent with a wealth of evidence and in the spirit of canonical models (Melitz, 2003; Hopenhayn, 1992), we assume that firms have heterogeneous exogenous productivity Ω_{it} and have access to a common production technology $\mathcal{Q}(.)$ defined as:

$$Y_{it} = \mathcal{Q}(\Omega_{it}, L_{it}, K_{it}),$$

that they use to produce value-added Y_{it}, using variable labor input L_{it}, and capital stock K_{it}. We assume that adjusting the capital stock is subject to cost $\mathcal{C}_a(.)$, which depends only on the current and previous levels of capital, and crucially not on variable inputs levels. The sum of discounted costs of the firm is:

$$\mathcal{V}(\boldsymbol{Z}_{it}) = \min_{\boldsymbol{X}_{it}} \mathcal{C}(\boldsymbol{X}_{it}, \boldsymbol{Z}_{it}) + \beta \mathbb{E}\left[\mathcal{V}(\boldsymbol{Z}_{it+1})\right],$$
$$\text{s.t } \mathcal{Q}(\Omega_{it}, \boldsymbol{X}_{it}) = Y_{it},$$

where $\mathcal{C}(.)$ is the total cost of the firm, $\boldsymbol{X}_{it} = (L_{it}, K_{it})$ refers to inputs, and $\boldsymbol{Z}_{it}$ to variables that are exogenous to the firm at time t, such as previous year capital stock, productivity and input

[1] Possible interpretations of these difference are that the market power of French firms is more sensitive to the underlying cause, for instance if French firms are more exposed to globalization or to competition on internet platforms than US firms, or if the productivity gap between top French firms and laggards is not as large as for top US firms.

prices. The Lagrangian associated with the right-hand-side of the Bellman equation is defined as:

$$\begin{aligned}\mathcal{L}(\boldsymbol{X}_{it}, \xi_{it}, Y_{it}, \boldsymbol{Z}_{it}) = W_{it}L_{it} + r_{it}\left(K_{it} + \mathcal{C}_a(K_{it}, K_{it-1})\right) + F_{it} \\ + \beta\mathbb{E}\left[\mathcal{V}(\boldsymbol{Z}_{it+1})\right] - \xi_{it}(\mathcal{Q}(\Omega_{it}, \boldsymbol{X}_{it}) - Y_{it}),\end{aligned}$$

where W_{it} is the wage, r_{it} is the user cost of capital, F_{it} is an exogenous fixed cost, and ξ_{it} is the Lagrange multiplier. The first-order conditions at the optimal choice of inputs $\boldsymbol{X}^*_{it}$ and ξ^*_{it} imply that:

$$\nabla\mathcal{L}(\boldsymbol{X}^*_{it}, \xi^*_{it}, Y_{it}, \boldsymbol{Z}_{it}) = 0, \tag{1}$$

where ∇ denotes the gradient vector of partial derivatives with respect to inputs. Applying Equation (1) to the flexible labor input yields the following cost-minimization condition linking the wage and marginal product of labor:

$$\frac{\partial\mathcal{L}}{\partial L}(\boldsymbol{X}^*_{it}, \xi^*_{it}, Y_{it}, \boldsymbol{Z}_{it}) = W_{it} - \xi^*_{it}\frac{\partial\mathcal{Q}}{\partial L}(\Omega_{it}, \boldsymbol{X}^*_{it}, .) = 0.$$

The output elasticity with respect to the labor input L, $\theta_{l,it}$, can therefore be expressed at the optimum as:

$$\theta_{l,it} \equiv \frac{L^*_{it}}{Y_{it}}\frac{\partial\mathcal{Q}}{\partial L}(\Omega_{it}, \boldsymbol{X}^*_{it}) = \frac{1}{\xi^*_{it}}\frac{W_{it}L^*_{it}}{Y_{it}}. \tag{2}$$

Using the first order conditions in Equation (1) to express the optimal choice of inputs $\boldsymbol{X}^*_{it}$ and ξ^*_{it} as functions of output Y_{it} and exogenous variables $\boldsymbol{Z}_{it}$, we derive the optimal total cost as a function of output and exogenous variables:

$$\mathcal{C}^*(Y_{it}, \boldsymbol{Z}_{it}) = \mathcal{C}(\boldsymbol{X}^*_{it}(Y_{it}, \boldsymbol{Z}_{it}), \boldsymbol{Z}_{it}).$$

At the optimum, the Lagrangian is equal to total cost, and from the envelop theorem it follows that the marginal cost is equal to the Lagrange multiplier ξ^*_{it}:

$$\frac{\partial\mathcal{C}^*}{\partial Y}(Y_{it}, \boldsymbol{Z}_{it}) = \frac{\partial\mathcal{L}^*}{\partial Y}(Y_{it}, \boldsymbol{Z}_{it}) = \frac{\partial\mathcal{L}}{\partial Y}(\boldsymbol{X}^*_{it}, \xi^*_{it}, Y_{it}, \boldsymbol{Z}_{it}) = \xi^*_{it}.$$

Dropping for simplicity the superscript $*$ to denote optimal variables, we define the markup as the ratio of the output price of the firm P_{it} to the marginal cost:

$$\mu_{it} = \frac{P_{it}}{\xi_{it}}. \tag{3}$$

The markup captures the degree of pricing power of the firm, and is a widely used measure of firm-level market power. As noted by De Loecker and Warzynski (2012), this expression is robust to various static price setting models, and does not depend on any particular form of price competition among firms. The markup itself will, however, depend on the specific nature of competition among firms. Moreover, it follows from Equations (2)) and (3) that the markup is defined as the elasticity of output with respect to the labor input, divided by the share of this labor costs in total firm revenue, *i.e* the labor share λ_{it}:

$$\mu_{it} = \theta_{l,it} \frac{P_{it} Y_{it}}{W_{it} L_{it}} \equiv \frac{\theta_{l,it}}{\lambda_{it}}. \tag{4}$$

It is important to note that Equation (4) only applies to inputs that are freely adjustable, at least at the margin. In the case of capital, the relationship between the markup and the output elasticity becomes:

$$\mu_{it} = \frac{\theta_{k,it}}{\lambda_{it}^k (1 + \Delta_{a,it})}, \tag{5}$$

where λ_{it}^k is the capital share of revenue, $\theta_{k,it}$ is the output elasticity with respect to capital, and $\Delta_{a,it} = \frac{\partial \mathcal{C}_a}{\partial K}(K_{it}, K_{it-1}) + \frac{\partial \mathcal{C}_a}{\partial K_{-1}}(K_{it+1}, K_{it})$ is the wedge attributable to the adjustment costs. The sign of the wedge is not straightforward and depends on the convexity of the adjustment cost function as well as on expectations of future target stock of capital. De Loecker and Warzynski (2012) show that abstracting from adjustment costs generally results in a negative wedge, and therefore an overestimated markup.[2]

Another important source of gap between the output elasticity of an input and its share in revenue is when firms are not price-takers on the market for inputs, for instance if the firm has monopsony power in the labor market, or engages in efficient bargaining (Dobbelaere and Mairesse, 2013; Dobbelaere and Kiyota, 2018). In that case, the relationship between the markup and the output elasticity becomes:

$$\mu_{it} = \frac{\theta_{l,it}}{\lambda_{it} (1 + \Delta_{m,it})}, \tag{6}$$

where the sign of the wedge $\Delta_{m,it}$ depends on the labor market setting. Dobbelaere and Kiyota (2018) show that in the case of efficient bargaining, the wedge is positive, and in the case of monopsony the wedge is negative. We abstract from these two possible wedges but discuss in more detail the implications for our results in section 6.

In what follows, we map the aggregate labor share into firm level markups, and the output elasticity of labor. First, we define the aggregate labor share Λ_t as the value-added-weighted average of firm-level labor shares:

$$\Lambda_t \equiv \frac{\sum_i W_{it} L_{it}}{\sum_i P_{it} Y_{it}} = \sum_i S_{it} \lambda_{it},$$

where $S_{it} = \frac{P_{it} Y_{it}}{\sum_i P_{it} Y_{it}}$ is the market share of firm i. From Equation (4) we know that the labor share is the product of the output elasticity of labor and the inverse markup:

$$\lambda_{it} = \theta_{l,it} \mu_{it}^{-1}. \tag{7}$$

We decompose the output elasticity of labor $\theta_{l,it}$ into a component stemming from returns to scale, which tells us how much output expands when all inputs increase proportionally, and a component

[2]See Doraszelski and Jaumandreu (2019) for a discussion of the sign of adjustment cost wedges.

stemming from the labor intensity of the production process relative to capital:

$$\theta_{l,it} = \underbrace{\theta_{l,it} / \left(\theta_{l,it} + \theta_{k,it}\right)}_{\text{Labor Intensity}} \underbrace{\left(\theta_{l,it} + \theta_{k,it}\right)}_{\text{Returns to Scale}} \equiv \alpha_{it}\gamma_{it}, \tag{8}$$

noting that when α_{it} is high the production process is intensive in labor relative to capital. It follows from Equations (2), (7), and (8) that the aggregate labor share can be expressed as a function of firm level labor intensity, returns to scale, and markups:

$$\Lambda_t = \sum_i S_{it}\alpha_{it}\gamma_{it}\mu_{it}^{-1}. \tag{9}$$

We compute the aggregate markup M_t as the value-added weighted harmonic average of firm-level markups:

$$M_t \equiv \left[\frac{\sum_i P_{it}Y_{it}\mu_{it}^{-1}}{\sum_i P_{it}Y_{it}}\right]^{-1} = \left[\sum_i S_{it}\mu_{it}^{-1}\right]^{-1},$$

In the next section, we describe the estimation procedure we follow to recover estimates of firm-level output elasticities of labor and capital, which together with firm-level labor and market shares observed in the data, allows us to compute the contribution of markups, labor intensity, and returns to scale to the aggregate labor share.[3]

3 Estimation Procedure

To recover markup from production data, we rely on Equation (4). This framework is particularly convenient to analyze the evolution of markups in the long run because it does not require observing consumer-level attributes to estimate demand elasticities. Second, it makes no assumption on firms pricing behavior and competition environment. It only requires two assumptions: firms minimize production cost and freely adjust at least one variable input.

We can directly observe firm-specific input shares in production data. It is not the case for output elasticities with respect to inputs. Because these elasticities can vary across time and firms, we estimate a flexible production function, with a minimum number of parametric restrictions. In what follows, we assume that firms belonging to a particular industry j share the same technology $f_j(.)$, using labor and capital to generate value added. Moreover, we assume that productivity is Hicks-neutral and evolves according to an AR(1) Markov process. For firm i in industry j, our empirical model is given by:

$$\begin{cases} y_{it} = f_j(k_{it}, l_{it}) + \omega_{it} + \epsilon_{it}, & (10) \\ \omega_{it} = \rho_{jt}\omega_{it-1} + \eta_{jt} + \nu_{jt}t + \xi_{it}, & (11) \end{cases}$$

[3] We abstract from input-output linkages by considering value-added production function. Baqaee and Farhi (2020) show that input-output linkages are important for the propagation of productivity shocks, and Grassi (2017) shows that they matter for market power in the case oligopolistic competition.

where y_{it} stands for the logarithm of value added firm i at time t, and l_{it} and k_{it} are the logarithms of employment and capital stock. Productivity ω_{it} is Hicks-neutral, ϵ_{it} is an i.i.d measurement error, and ξ_{it} is the i.i.d innovation to productivity. Steady-state productivity η_{jt} and time trend ν_{jt} are common across firms in industry j in period t.

One issue that prevents us for simply running Ordinary Least Squares (OLS) on Equation (10) is that we do not observe productivity ω_{it} but firms have information about their productivity when they choose their inputs. ω_{it} is therefore correlated with k_it and l_it and OLS estimates are biased. In what follows, we make the following standard assumptions regarding the timing of firm decisions:

Assumption 1. *(Information Set) The firm's information set at t, i.e. I_t, includes current and past productivity shocks $\{\omega_{i\tau}\}_{\tau=0}^{t}$ but does not include future productivity shocks $\{\omega_{i\tau}\}_{\tau=t+1}^{\infty}$. Measurement errors ϵ_{it} satisfy $\mathbb{E}\left[\epsilon_{it}|I_t\right]=0$. The productivity process defined in Equation eq11 is known to firms and stochastically increasing in ω_{it-1}*

Assumption 2. *(Input Choices) Labor and capital inputs used at time t are chosen with information set I_t.*

Assumptions (1) and (2) are straightforward: firms do not observe ω_{it} until time t, but the Markov process defines what the firm knows about the distribution of future productivity shocks. We rely on an approach to control for unobserved productivity that is usually called dynamic panel estimation (Blundell and Bond, 2000). We use the AR(1) structure of the productivity process to write current value-added as :

$$y_{it}=\rho_{jt}y_{it-1}+(f_j(k_{it},l_{it})-\rho_{jt}f_j(k_{it-1},l_{it-1}))+\eta_{jt}-\nu_{jt}t+u_{it},$$

where the composite error $u_{it}=\xi_{it}+\epsilon_{it}-\rho\epsilon_{it-1}$ has by assumptions (1) and (2) a zero mean conditional on information set I_{t-1}. Conditioning on a set of instruments included in I_{t-1}, we estimate the model using non-linear GMM. Our moment conditions can be written as:

$$\mathbb{E}\left[u_{it}|I_{t-1}\right]=\mathbb{E}\left[y_{it}-\rho_{jt}y_{it-1}-(f_j(k_{it},l_{it})-\rho_{jt}f_j(k_{it-1},l_{it-1}))-\eta_{jt}-\nu_{jt}t|I_{t-1}\right]=0. \quad (12)$$

We assume that technology $f_j(.)$ in sector j is a translog production function of capital and labor:

$$f(k_t,l_t)=\beta_{l,jt}l_{it}+\beta_{k,jt}k_{it}+\beta_{ll,jt}l_{it}^2+\beta_{kk,jt}k_{it}^2+\beta_{lk,jt}l_{it}k_{it},$$

and we use past values ω_{it-1}, l_{it-1}, m_{it-1}, k_{it-1} and higher order combinations of those terms, a time trend t and a constant as instruments in Equation (12). From the estimates of the parameters of the production function, we compute the firm-level output elasticity of labor and capital for firm i in year t as:

$$\theta_{l,it}=\beta_{l,jt}+2\beta_{ll,jt}l_{it}+\beta_{lk,jt}k_{it},$$
$$\theta_{k,it}=\beta_{k,jt}+2\beta_{kk,jt}k_{it}+\beta_{lk,jt}l_{it}.$$

From Equation (8), we retrieve firm-level labor intensity and returns to scale.

Previous studies estimating markups with production data have often estimated production functions with the proxy variable method. This method relies on a non-parametric estimation of unobserved productivity ω_{it} from observed variables using the assumption that some proxy variable, either investment (Olley and Pakes, 1996) or intermediate input demand (Levinsohn et al., 2003; Ackerberg et al., 2015), is an invertible function only of other inputs and productivity. However, this approach is not valid if the proxy variable is also a function of some unobserved shock, such as an input cost shock to all inputs, or a demand shock. Let us define intermediate input demand m_{it} as a function of capital, labor, productivity, and some unobserved shock d_{it}:

$$m_{it} = m(\omega_{it}, k_{it}, l_{it}, d_{it}). \tag{13}$$

Assuming that this function is invertible in ω_{it} and using Equation (10), one can write that value added y_{it} is an unknown function of inputs and the unobserved shock:

$$y_{it} = f_j(k_{it}, l_{it}) + \omega(m_{it}, k_{it}, l_{it}, d_{it}) + \epsilon_{1,it} = g(m_{it}, k_{it}, l_{it}, d_{it}) + \epsilon_{1,it}. \tag{14}$$

Ignoring the unobserved shock, and using assumption (1) that ϵ_{it} is independant from input choices, we can apply Ackerberg et al. (2015) and obtain a non parametric estimate $\hat{g}_{it}$ of $g(.)$ that is a high-order polynomial in m_{it}, k_{it}, and l_{it}, but not of d_{it}:

$$y_{it} = \hat{g}_{it} + \hat{\epsilon}_{it}, \tag{15}$$

where the residuals $\hat{\epsilon}_{it}$ are correlated with d_{it}. In practice, when we apply this procedure, we find that the residuals are not i.i.d. As Doraszelski and Jaumandreu (2019) have recently discussed, d_{it}, as ω_{it}, should also be recognized as an autocorrelated unobservable. If so, the instruments used in the second stage of the proxy variable method are not consistent. Nevertheless, because the proxy variable method has been widely used to study aggregate markup trends, we present in appendix results obtained following this method.

4 Data

To carry out our empirical analysis we rely on several sources of micro data produced by the French Institute of Statistics and Economic Studies (INSEE), covering the universe of French firms spanning the 1984-2016 period. These data are in particular one of the main sources of the elaboration of National Accounts. Our sources are gathered out of the universe of firms' tax forms and provide balance sheet, income, and cost information at the firm level, as well as employment, the industry in which the firm operates, the type of legal entity (micro-firms, sole proprietorship entities, or limited liability companies and corporations) and the tax regime to which it is affiliated (micro-regime, simplified regime, or normal regime).

From 1984 to 2007, we rely on the SUSE sources (*Système Unifié de Statistiques d'Entreprises*), gathering information from firms affiliated to two tax regimes, the BRN regime (*Bénéfice Réel Normal*) and RSI regime (*Régime Simplifié d'Imposition*). These files allow to distinguish between payments to labor, material inputs, other intermediary inputs, and investment, and provide information of the book value of capital of the firm and total employment. Hence, they have been widely used in previous research (di Giovanni et al., 2014; Caliendo et al., 2015).

From 2008, we rely on the ESANE sources (*Élaboration des Statistiques Annuelles d'Entreprises*), that result from the unification of the previous SUSE data with Annual Surveys of Firms that were conducted each year for broad sectors of industries. Because there is some overlap of information between tax forms and surveys, INSEE has a process to reconcile diverging information. To construct our panel of firms we exclude from the post-2008 data firms affiliated to the micro-BIC regime.[4] Moroever, we restrict our analysis to legal units with a unique and valid identifier number.[5]

We focus on market sectors[6] and exclude agriculture because our sample does not cover well firms in that sector, which are mostly affiliated to a tax regime that is not included in the micro-BIC, BRN and RSI regimes. We also exclude real estate and finance, because we focus on the production side of value-added distribution among workers and owners of capital and firms. We have 5.7 million firms in our sample, 3.7 million of which have at least one employee. Finally, we rely on industry-level data from KLEMS (van Ark and Jäger, 2017) for information on investment and output prices to compute deflated values for value-added and capital stocks.

Overview of the data

Table 1 reports the year-by-year total number of observations, as well as aggregate labor costs, value-added, investment, both in level and in share of their aggregate values for the corporate sector in France. There are on average 800 thousand observations per year, accounting for 87% of total labor costs, 84% of total value-added, with little variations over time. Our data only accounts for 68% of total investment in the corporate sector. This is due to the fact that many small firms affiliated to the simplified regime report missing investment. To construct measures of capital input, we use instead the reported book values of the capital stock.

Table 2 describes the main variables that we use in our empirical analysis. Our sample of 3.7 million firms with at least one employee spans over 33 years, with 27 millions firm-year observations, average sales is 2.6 M€, average number of employees: 14, and average capital stock: 1.3 M€. This data is highly skewed as the median level of sales is 285 K€, median number of employees is 3, and median

[4] An extremely simplified regime introduced in 2008 applicable to very small firms, whose total sales do not exceed 170 K€ if the firm operates within the real estate and trade sectors, or 70 K€ otherwise. This regime has been widely used by free-lance workers who do not report any capital nor employment.

[5] A firm is defined as a legal unit with a unique SIREN identifying number. In ESANE, legal units belonging to the same conglomerate are brought together and their accounts are consolidated (Deroyon, 2015). We do not use this information here.

[6] The market sectors are total economy excluding public administrations, healthcare, and education.

capital stock: 76 K€. This reflects the fact that our data is nearly exhaustive and includes many small firms. For firms that report non missing investment, the average reported value is 185 K€, and the median is 4 K€, which also partly reflects the fact that investment is lumpy.[7] The average labor share in our sample, computed as the ratio of the sum of the wage bill and payroll taxes to value-added, is 75%, close to the median at 74%.

Aggregate Labor Share

Figure 1 reports the ratio of compensation of employees, including payroll taxes, to total value-added in the macro and micro data, from 1984 to 2016. The aggregate labor share in our sample, is lower than the average firm-level labor share. As discussed below in Section 5, larger firms have a lower labor share, which brings down the weighted average labor share. In the sample of firms with at least one employee on which we rely in the rest of the paper, the aggregate labor share decreases from 69.3% in 1984 to 64.7% in 2000, and then increases back to a level close to its initial level, reaching 69.1% in 2016. The aggregate level is on average 67.1% over the period. Aggregate data in principle also includes firms that have no employee, and doing so in our micro data decreases the aggregate level of the labor share by around 1 percentage point: it stands at 66.1% of value-added on average over the period, and has the same U-shaped trajectory. This aggregate pattern differs substantially from the decrease of the labor share in the US, discussed by Autor et al. (2020); Kehrig and Vincent (2018), while others have argued that France, as many advanced economies, also experienced a secular decrease in the labor share (see e.g Grossman et al., 2018; Karabarbounis and Neiman, 2014). Because of the U-shaped trajectory of the labor share, both in the micro and macro data, we find that conclusions of a secular decline in France are misguided.

Our sample is limited to incorporated firms in the market economy outside agriculture, real estate, and finance. Despite the fact that there is no available aggregate data for France for this particular sample, the aggregate labor share in our data closely matches the aggregate patterns of the labor share that we can measure on similar spheres of activity, both in levels and in variations.

French National Accounts provide detailed operating accounts for spheres that are larger than our data in various dimensions. Figure 1 reports the labor share of the entire corporate sector, including corporations operating in the agriculture, real estate, and finance. Before 2000, the average level of the labor share in the corporate sector, reported by INSEE, is the same as the aggregate labor share in our sample including firms with no employees (65.4%). It starts from a slightly higher level in 1984 (71.6%) than our sample estimate (68.4%) and reaches a slightly lower level in 2000 (63.4% as opposed to 64.1% in our sample). After 2000, however, the corporate labor share rises by 2 percentage points, but the labor share in our sample rises by 4 percentage points.

Figure 1 also reports the total labor share (corporate and non-corporate) excluding agriculture, real estate, and finance. The non-corporate sector is mainly composed of self-employed workers with few salaried workers. As a result, the total labor share reported by INSEE is lower - on average 61%

[7] Average mean firm investment across years is 140 K€and mean investment is 8 K€.

over the period, against 66.1% in our data with all firms. Nevertheless, after 2000, and despite this difference in levels, the rise of the total labor share measured with the same industry composition as our data matches the 4 percentage point increase that we observe in our data. One possible explanation, as Cette et al. (2019) discuss, is that because the real estate sector has a labor share close to zero, its growing share in total value-added contributes negatively to the aggregate labor share of the corporate sector, especially during the housing boom after 2000.

5 Labor Share and Concentration

In this section, we revisit five important facts about concentration and labor shares in the French context. In particular, we find that the rise in concentration in France is associated with an increase in firm-level labor shares, and a reallocation of market shares towards large and low-labor-share firms.

Rise in concentration

Figure 2 reports the cumulative change since 1984 in sales weighted average levels of industry concentration indexes, where each index measures concentration of sales at the 3-digit national industry level. The share of sales of the largest 1% or 5% firms in each industry increased sharply on average since 1984, by 9 and 7 percentage points respectively. The concentration ratios, defined as shares of the 4 and 20 largest firms in each industry, followed a different pattern before 1995, but have increased by close to 4 percentage points each on average since 1995.[8]

Overall, we find that concentration ratios and top shares have increased in more than half of the 211 industries since 1995: the median increase of both concentration ratios is 2 percentage points, and the median increases of the top 1% and 5% shares are 4 and 5 percentage points respectively. Figure E.1 in the Appendix shows that the average rise in concentration is observed across broad sectors of the economy: the magnitude of the increase is similar in both the manufacturing (3 to 7 percentage points from the lowest point to 2016, depending on the index) and non-manufacturing sector (4 to 10 percentage points).

These results are consistent with evidence across the US and other OECD countries (CEA, 2016; Autor et al., 2020; Andrews et al., 2016). It is important to note that concentration is calculated as the share of sales of largest firms in a narrowly defined industry at the national level. It is best to interpret it as a measure of firm dispersion of outcomes rather than firm market power, as the national industry level is not necessarily the relevant market. In fact, Section 6 shows that the industry-level correlation between these measures of concentration and the largest firms market power is not significantly positive.

[8]The median 3-digit industry has around 900 firms in a given year, but because 25% of the industries have more than 5,000 firms, and 25% have less than 200 firm, the number of firms in the top 1% and 5% differs greatly from one industry to the next. The median size of the 3-digit manufacturing industry is around 500 and the median size of the 3-digit non manufacturing industry is 3,600.

Reallocation of labor shares

We build on Kehrig and Vincent (2018) and decompose the variations of the aggregate labor share to understand whether they are driven by variations at the firm level or by composition effects. Figure 3 reports for each decile of labor share, the value-added-weighted average labor share and the share of industry value added of firms in that decile, in the first and last five years of the sample. To account for industry-specific differences in the joint distributions of labor share and value-added, they are first calculated within each 3-digit industry. These distributions are then averaged across these 211 industries using value-added weights in a given period. The vertical bars illustrate how low labor share firms gained market share in the last 30 years. Firms in the lowest decile of labor share accounted for 12% of their industry value-added before 1990, compared to 16% in after 2010. The rise in industry shares is verified for four out of the five lowest deciles of labor share, while all five highest deciles of labor share accounted for less of industry value-added in 2011-2016 than in 1984-1989. The connected lines illustrate how the raw distribution of labor shares has shifted upwards. The average labor share of each decile is higher in after 2010 than before 1990. Figure E.2 in the Appendix shows that these patterns are observed across broad sectors of the economy, in manufacturing as well as non-manufacturing industries.

Figure 4 quantifies the contribution of three components to the variation of the aggregate labor share in France: a term accounting for reallocation of value added shares across industries, and the two within-industry components discussed above: within and across quantiles of labor shares.[9] The figure first confirms that reallocation across industries plays only a minor role for aggregate labor share variations. The increase in the value-added shares of low-labor-share firms contributed to an accumulated 5 percentage points decrease of the aggregate labor share since 1984, holding the distribution of labor shares constant from one year to the next. This was offset by the upward shift in the labor share distribution, that contributed to a rise of the aggregate labor share of 5 percentage points, holding the value-added distribution constant.

Figure E.3 in the Appendix presents the 1984-2016 cumulative results of the same decomposition for manufacturing and non-manufacturing industries separately. In both macro sectors, as in the whole economy, the reallocation across industries had a negligible impact, the reallocation of value-added contributed negatively to the aggregate labor share and the labor share distribution shifted upwards and contributed positively to the aggregate labor share. In manufacturing, the aggregate labor share decreased because the upward shift in the labor share distribution did not offset the reallocation.[10]

Our decompositions show that the typical industry in France experienced a consistent trend in reallocation of value-added shares towards low-labor-share firms throughout the period, as in the

[9] The details of decomposition are presented in Appendix B.

[10] Interestingly, the aggregate labor share decreased in both manufacturing and non-manufacturing but it does not on aggregate. This is because while reallocation across industries within each macro sectors contributed negatively to each macro sectors aggregate labor share, reallocation from manufacturing to non-manufacturing industries contributed positively to the total aggregate labor share.

US. The upward shift of the labor share distribution has also been documented in the US manufacturing industry by Kehrig and Vincent (2018), but is less significant than in France. As emphasized by Kehrig and Vincent (2018), this decomposition groups firms into labor shares quantiles, which allows us to compare two static equilibria. It is conceptually distinct from standard within and cross firm decompositions, because it abstracts from the contributions of firm entry and exit. We focus on long term shifts in the joint distribution of labor and value added shares, not on the role of entry nor on the trajectories of specific firms.

Correlation of rise in concentration and reallocation of labor shares

We now ask whether variations in industry concentration are correlated with labor share variations within industries. To that end we estimate the industry-level relationship between long-term changes in concentration and labor share. We run the following regression:

$$\Delta\lambda_{jt} = \psi_\lambda \Delta Conc_{jt} + FE_t + \epsilon_{jt}, \tag{16}$$

where $\Delta Conc_{jt}$ is the 10-year change of sector j concentration level, proxied by the top 1% of top 5% share of sales and FE_t is a set of time fixed-effects that control for year-specific shocks and $\Delta\lambda_{jt}$ is the 10 year change in industry j labor share.

Table 3 presents the results of these regressions. The first two columns show that long term variation of industry concentration are negatively correlated with long term variation of industry labor shares. This relationship is significant and hold for all proxies of concentration. The first two columns of Table D.1 in the Appendix show that this result holds among both manufacturing and non-manufacturing industries. We find that a 10 percentage point rise in concentration is associated with a 0.7 to 1.1 decline in the weighted average labor share of the industry. These results are close to those documented in the US (Autor et al., 2020).

Next we ask whether this result is driven by a correlation between the rise in concentration and the shift in value-added shares from high to low labor share. We consider two components of the 10-year change of the labor share: the cross-quantile contribution to the labor share variation discussed in the previous paragraph, and the evolution of the average labor share of the 5% firms with the lowest labor share within each industry. We use these components as dependent variable in regression (16).

On the one hand, we find that larger increases in concentration are associated with a more negative contribution of value added share reallocation to the aggregate labor share. All coefficients are negative and significant. Table D.1 in the Appendix shows that this result holds among both manufacturing and non-manufacturing industries. On the other hand, we find a positive correlation between change in concentration and change in the average labor share of low labor share firms, defined as firm with labor share in the bottom 5% of their 3-digit industry. These firms are sometimes referred to in the literature as 'hyper-productive' (Kehrig and Vincent, 2018) or 'superstar' firms

(Autor et al., 2020). As we will show next, firms with low labor shares also tend to be larger in our sample. Our result suggests that the negative correlation between labor share and concentration is not driven by the fall in the labor share of these 'superstar' firms. Table D.1 in the Appendix reports the results for manufacturing and non-manufacturing industries: the correlation between variations of concentration and variations of the labor share of low-labor-share firms is mostly positive in manufacturing, indicating that the 'superstar' firms in manufacturing today have not only higher market shares but also higher labor shares. Results for non-manufacturing are mixed and vary with the concentration index, but we do not find a negative correlation that is significant at the 5% level.

Labor share and size

To reconcile these facts, we show that there is a negative correlation between labor share and firm size, and that this relationship is monotonic. We run the following regression:

$$\lambda_{it} = FE_{size_{it}} + FE_{j_{it}} + \epsilon_{it}, \tag{17}$$

where $FE_{size_{it}}$ is a set of dummies indicating in the size of firm i in industry j in terms of employment categories, $FE_{j_{it}}$ is a set of interacted fixed effects at the 3-digit industry j and year level.

Figure 5 presents the results of this regression, considering labor share in value added and in gross output. Relative to 10-20 employee firms, larger firms tend to report lower labor shares even after controlling for industry and year fixed effects. This decreasing relationship is monotonic, at all levels of employment. Labor shares of firms with 50 to 100 employees tend to be 2 percentage points lower than labor shares of 10 to 20 employees firms of the same industry at the same year. For firms with 2500 to 5000 employees the gap rises to 5 percentage points considering labor share in value added and to 7 percentage points considering labor share in sales.

This decreasing relationship between firm size and labor share helps reconcile our previous results: in industries where concentration increased, the weighted mean labor share decreased and the distribution of labor shares shifted upwards. The reallocation effect due to rising concentration, drives the change in the weighted mean labor share, as larger firms who gain market shares also have lower labor shares.

Firm level trends

So far, we have focused on describing long term shifts in the distribution of firm outcomes, without discussing whether these firms are the same over time. In what follows, we look at the within-firm variation of labor share, for different groups of firm size. We run the following regression:

$$\lambda_{it} = FE_i + \Psi_\lambda t + Control_{it} + \epsilon_{it}, \tag{18}$$

where λ_{it} is the labor share of firm i in year t, FE_i is a firm fixed effect, and $Control_{it}$ is either the logarithm of employment or a set of categories of employment size fixed effects. We run this regression on four samples, with different thresholds of employment size, and two panels, an unbalanced panel of firms possibly entering and exiting, and a balanced panel of firms that are present in the sample from 1984 to 2016.

Table 4 presents the results of these regressions. We find that average firm experienced a trend increase in labor share of around 0.6 percentage points per year, including controlling for changes in the employment level. Firms that are present in the sample from 1984 to 2016 experienced a trend increase of around 0.25 percentage points per year. If we restrict our sample to firms with more than 50, 100, or 1000 employees, we find results that are similar across all specifications and panels: the average firm of any size experienced a trend increase in labor share of around 0.3 percentage points per year. Finally, for larger firms, we find a negative within-firm correlation between the logarithm of employment and the labor share, which complements the negative correlation across firms reported in Figure 5: as a firm's level of employment grows, its labor share decreases.[11] This negative relationship is not verified for smaller firms, many of which are sole-proprietorship firms that tend to increase salaried employment relative to non-salaried employment as they grow.

6 Estimation Results

In this section, we first present the results of our estimation procedure, and then show how aggregate and firm-level markups have evolved in France. We document additional facts about market power and concentration, and how variations in market power have contributed to the aggregate labor share, compared to other technological factors.

Production function

Table 5 reports the results of the non-rolling estimation of the production and Table 6 reports the results of the rolling estimation of the production function, for the 27 sectors of our data.[12] Rolling estimations are obtained by first estimating the parameters of the production function $\beta_{jt} \in \{\beta_{l,j}; \beta_{k,j}; \beta_{ll,j}; \beta_{kk,j}; \beta_{lk,j}\}$ in industry j on 11-year rolling window samples, and then averaging for each firm each year the various estimated output elasticities based on samples that include that year:

[11] Several papers (Lashkari et al., 2019; Autor et al., 2020) have put forward a theoretical explanation of the negative relationship between labor share and firm size, both in the cross-section and within firms.

[12] Estimation is done at the 27 sector level. Each sector includes several 3-digit industries.

$$\beta_{jt}^{\text{rolling}} = \frac{1}{11} \sum_{n=-5}^{5} \beta_j^{t+n},$$

where β_j^t is the estimated parameter on the sample restricted to years $t-5$ to $t+5$. For the first and last five years of our sample, the average is calculated on fewer estimates. Unlike in a Cobb–Douglas production function, output elasticities also vary across firms of the same sector, even in a given year. We report, for the different sectors, the average and the standard deviation of the elasticities of labor and capital across firms.[13] Since the returns to scale vary across firms, it is possible for many firms in a sector to have increasing returns to scale, while the estimate of the industry average returns to scale is close to 1. On average, the output elasticity of labor in our data is 0.74 according to the non-rolling estimates and 0.72 according to the rolling estimates.

Aggregate markup

Figure 6 reports the evolutions of the value-added weighted and unweighted average markups across all firms in our sample for both sets of estimates. The unweighted average markup is smaller than the weighted average markup, because firms with larger value-added have on average higher markup. As we will see below, the positive relationship between markup and size holds in our data, with employment as a measure of size.

We find that according to both non-rolling and rolling estimates, the unweighted average markup has decreased. Overall, the unweighted average markup has fallen from 1.3 to 1.0. The value-added weighted markup has decreased from 1.6 to 1.4 according to non-rolling-window estimates. When we allow the parameters of the translog production function to vary over time, we report an increase of the weighted average markup from 1.4 to 1.6. This suggests sizeable variations in the translog elasticities over time and shows that constraining them to be constant over time is not a valid assumption.

Figure E.4 in the Appendix presents the levels of the unweighted and weighted average markups for firms in the manufacturing and non-manufacturing sectors separately. Patterns are qualitatively similar in both sectors to what they are in the overall economy. We find a decrease in unweighted markups for both non-rolling and rolling estimations both in manufacturing and non-manufacturing sectors, that broadly matches the one observed in the whole economy. Similarly, the variations of the weighted average markup estimates observed in both manufacturing and non-manufacturing, and according to both sets of estimates, quantitatively matches the one observed in the whole economy. These aggregate patterns are therefore neither specific to one sector nor driven by a reallocation

[13] Because the translog production function imposes that the heterogeneity of output elasticities across firms within a given sector is entirely explained by the heterogeneity of labor and capital demand, in a log-linear manner, we note that a few sectors appear to have negative average capital elasticities or low returns to scale. These results are similar to those obtained by De Loecker et al. (2016), who estimate negative average capital elasticities from translog production functions in 3 out of 11 manufacturing indutries. Tables D.2 and D.3 in the Appendix report the median output elasticities which are less influenced by outliers.

from manufacturing to non-manufacturing. Interestingly, our results show that, regardless of the pre-crisis trend, the weighted average markup of manufacturing firms sharply dropped after 2008, and only recovered its pre-crisis level at the end of the period.

Figure E.5 in Appendix shows how relying on the proxy-variable method in Ackerberg et al. (2015) (ACF) would have changed our results. The level of the estimated markups differ, because DP estimates of the output elasticity of labor are on average lower than the ACF estimates. Second, in non-rolling estimation, the unweighted markup is not always larger than the weighted markup, suggesting that the increasing relationship between size and markups is not verified. Third, the trend of the average ACF estimated aggregate markup, is significantly different from the average DP estimated aggregate markup. For instance, with rolling estimations, average markup remained however broadly stable around 1.6 according to the ACF estimates. As discussed in Section 2, we do not favor estimates used with this method.

Markup decomposition

Figure 7 shows the decomposition of the aggregate - weighted average - markup into within-markup-quantile and across-markup-quantile components. It shows the importance of controlling for industry and disentangling the respective contributions of variations in value-added shares holding markup constant or in markup holding value-added shares constant to interpret aggregate variation.

The decomposition of the aggregate markup mirrors the decomposition of the aggregate labor shares shows how the within-markup quantile component contributed negatively to the evolution of the aggregate markup, while the cross-quantile contributed positively.[14] The contribution of reallocation across industries is negligible. Firms with relatively higher markups within narrowly defined industries have been gaining value-added shares, while the typical firm markup has slightly decreased. Figure E.6 in the Appendix shows that the reallocation from low to high markup firms holds both in manufacturing and non-manufacturing separately.

Comparing rolling and non-rolling window estimations shows why accounting for variations over time of the production function parameters matter. Even though both estimations yield qualitatively similar contributions of the within and across terms, the within term dominates with rolling estimations and the cross term dominates with non-rolling estimations. This quantitative differences translate into qualitative difference in the aggregate trends of markups estimated with both estimations.

Markup and concentration

As for the labor share, we ask whether the observed rise in concentration is correlated with markup variations, on aggregate or along the distribution of markups. To that end we estimate the industry-level relationship between long term changes in concentration and the industry aggregate markup,

[14] For ACF, this contribution decreased after 2005.

or the contributions to the aggregate variation. We run the following regressions:

$$\Delta\mu_{jt} = \psi_\mu \Delta Conc_{jt} + FE_t + \epsilon_{jt}, \tag{19}$$

where $\Delta\mu_{jt}$ is the 10-year change of sector j aggregate markup level, or one of its contributions according to the decomposition described in Appendix B. The independent variables are the same in Equation (16).

Table 7 reports the results of the estimation of Equation (19). The first two columns show that there is a positive and significant long-term relationship between the evolution of aggregate markup and the evolution of concentration at the 3-digit industry level. This relationship is significant and hold for all proxies of concentration. It holds both for markups estimated with rolling and non-rolling estimations. The two first columns of Tables D.4 and D.5 in the Appendix confirm that this positive correlation is separately present for industries belonging to the manufacturing and non-manufacturing sectors.

Next, as for the labor share, we ask whether this result is driven by a correlation between the rise in concentration and the shift in value-added shares from low to high markup firms. The coefficients of the third and fourth columns of Tables 7 are the results of regressions described in Equation (19), where the dependent variable is the cross-quantile component to the evolution of aggregate markup, while in the last two columns the dependent variable is the within-quantile component of firms high markups, defined as firms with the markup in the top 5 % of their 3-digit industry. They show a positive correlation between the rise in concentration and the cross-quantile component of the evolution of the aggregate markup. As for the labor share, this means that the cross-quantile component contributed more to the rise in markup in those industries that have become more concentrated at the top.[15]

The fifth and sixth columns of Table 7 find no robust evidence that a rise in concentration is correlated with increases in top markups. The correlations with variations in the top 1% and 5% shares of sales are not significantly positive, the correlations with variations in the shares of the 4 and 20 largest firms are all negative, and significant at the 5% level for three out of four estimations. These results are also observed on the samples of industries belonging to the manufacturing and non-manufacturing sectors separately, except in non-manufacturing, where the correlation of the average top markup with the top 1% and 5% shares is positive and significant, but small relative to the other components. The fact that top markups are not linked with rises in concentration are consistent with theories (see e.g Aghion et al., 2019) where high productivity firms with higher markups, benefit from an external shock more than laggard firms, and expand without increasing their markup. However, it is in contrast with results in the US documented by De Loecker et al. (2020) where top markups contributed to a third of the overall increase in weighted average markups. However, the authors do not provide evidence that the rise in top firm markups is

[15]See also Tables D.4 and D.5 of the appendix)

correlated at the industry level with the reallocation component, or with concentration.

Markup and size

As for the labor share, we investigate whether markups are increasing with firm size to understand the correlation between the growing share of the largest firms in each industry's total sales and the reallocation of market shares towards high markup firms. To that end, we run the following regression:

$$\mu_{it} = FE_{size_{it}} + FE_{jt} + \epsilon_{it}, \tag{20}$$

where $FE_{size_{it}}$ is a set of dummies indicating in the size of firm i in industry j in terms of employment categories, FE_{jt} is a set of interacted fixed effects at the 3-digit industry j and year level.

Figure 8 reports the results of this regression. In our data, we find that larger firms have higher estimated markups. Firms with more than 5000 employees have, on average, markups larger by 30 percentage points than firms with 10 to 20 employees firms, within the same 3-digit industry, on the same year. This increasing relationship is well observed at all levels of employment, and both for markups obtained with the non-rolling and rolling estimations. The top two panels of Figure E.7 in the Appendix show that this result holds both in manufacturing and non-manufacturing sectors separately, although for larger manufacturing firms the relationship flattens out.

The markup is defined in Equation (4) as the ratio of the output elasticity of labor to the labor share. It is important to note that because the output elasticity of labor vary across firms, the markup is not perfectly correlated with the labor share, and therefore the positive relationship between a firm's markup and its size does not flow directly from the negative relationship between its labor share and its size that we document in section 5. The other four panels of Figure E.7 in the Appendix plot the results of the same regression with labor intensity α_{it} and returns to scale γ_{it} as the dependent variable, and shows that the intensity of labor in the production process decreases with size, while returns to scale increase with firm size.

Markup trends

Before turning to the link between the evolution of markups and labor shares in France, we look at the within-firm variation of markups, for different groups of firm size. We run the following regression:

$$\mu_{it} = FE_i + \Psi_\mu t + Control_{it} + \epsilon_{it}, \tag{21}$$

where μ_{it} is firm i markup in year t, FE_i is a firm fixed effect, and $Control_{it}$ is either the logarithm of employment or a set of categories of employment size fixed effects. We run this regression on four samples, with different thresholds of employment size, and two panels, an unbalanced panel of firms possibly entering and exiting, and a balanced panel of firms that are present in the sample from 1984 to 2016.

Table 8 reports the results for markups obtained with non-rolling estimation and Table 9 for markups obtained with rolling estimation. We find that the average firm experienced a trend decrease in markup of around 1.3 to 1.6 percentage points per year. The decrease in larger firm markups is around 0.8 to 0.9 percentage points per year according to non-rolling estimates, and close to zero according to rolling estimates. For the balanced panel of firms that remain in the sample, markups decreased by 0.6 to 0.9 percentage points per year depending on group of size, according to non-rolling estimates, and close to zero according to rolling estimates. Overall, we find that firm level markups on average decreased, but less so for large and surviving firms. This result indicates that part of the decrease of the within-quantile contribution to aggregate markup is driven by smaller firms and by firm entry and exit.

Link between labor shares and markups

In this section, we circle back to the labor share and ask whether variations in firm-level labor share are mainly driven by markups - i.e. are labor shares increasing because markups are decreasing? - or by technology - i.e. are labor shares increasing because production has become *more* labor intensive?

First, we find that there is a clear negative relationship between firm-level labor shares and markups in France. We run the following regressions:

$$\lambda_{it} = \phi\mu_{it} + FE_{ijt} + +\epsilon_{it}, \tag{22}$$

where μ_{it} is the markup of firm i in year t, λ_{it} is the labor share, and FE_{ijt} is a set of fixed effect, either industry, or firm-level, and year.

Table 10 present the results of these regressions, and show that firms with high markup have low labor shares both across industries and across firms within the same industry. We also find that as a firm markup grows, its labor share decreases. The absolute value of coefficient ϕ is around 0.3 to 0.5 depending on the estimation: as a firm's markup increases 10 percentage points, its labor share decreases by 3 percentage points. Finally, as the coefficient of determination of the regression without fixed effects shows, the heterogeneity of markups explains 45% of the heterogeneity of labor shares across firms. The different panels of the table show that this relationship holds statistically and quantitatively for various groups of size.

To extrapolate these firm-level results to the aggregate economy, we need to keep in mind that there is no such a thing as a representative firm in this context. Recall that Equations (7) and (8) show that at the level of the individual firm, the labor share is the product of labor intensity, returns to scale and the inverse markup:

$$\lambda_{it} = \alpha_{it}\gamma_{it}\mu_{it}^{-1},$$

but this result does not hold at the aggregate level. From Equation (9), we now decompose variations of the aggregate labor share into contributions from labor intensity, returns to scale, and markups, either by taking the "representative firm" approach and computing the contributions of the weighted averages of each component of the aggregate labor share, therefore ignoring the reallocation between firms ; or alternatively, by isolating the contribution of reallocation and computing the contributions of the unweighted averages of each component. Appendix C provides further information on the decomposition.

Figure 9 presents the results of the decomposition for the representative firm. The total variation of the aggregate labor share from 1984 to 2016 is small and positive, and ignoring the role of reallocation, aggregate markups have contributed positively to the aggregate labor share according to the non-rolling estimates, and negatively according to the rolling estimates. This is consistent with evidence above that the conclusions in terms of the variations of the aggregate markup are not the same in both sets of estimates. The sum of the contributions of labor intensity and returns to scale, in other words the contribution of weighted average output elasticity of labor, is negative according to non-rolling estimates and positive according to rolling estimates.

However, taking into account reallocation provides a better picture of underlying determinants of the dynamics of the aggregate labor share in France. Figure 10 presents the results of the decomposition isolating the contribution of reallocation. The contribution of reallocation is negative and very significant, as we have already showed in Figures 4 and 3. In both sets of estimates, firm-level markups have contributed positively to the aggregate labor share, while firm-level returns to scale and labor intensity had a slight negative contribution. Figures E.8 and E.9 show that this results hold in both the manufacturing and non-manufacturing sectors.

7 Conclusion

In this paper, we find no evidence of a rise in market power in France: firm-level markups decreased on average, and the rise in concentration is not correlated with increases in top markups. These facts are however correlated with an important reallocation of market shares towards low-labor share and high-markup firms. Because those firms tend to be larger, this reallocation translates into a rise in concentration.

This reallocation of market shares towards large firms is consistent with a wealth of evidence about the increasing differences between firms (Decker et al., 2016a,c,b; Andrews et al., 2016; Karahan et al., 2019). However, the simultaneous rise in concentration and the relative stability of top firm-level markups raises questions about the interpretation of concentration that goes beyond the French case. One channel that could possibly explain both the reallocation of market shares towards large firms and the within-firm increase in the labor share of income is an increase in winner-take-most competition level, as discussed by Autor et al. (2020): as consumers become more sensitive to firm prices, more productive and bigger firms gain market share but a given firm market power decreases. The source of this increase in competition could be international competition (Bonfiglioli et al., 2019; Panon, 2020), but our results hold across broad sectors of the French economy, including within non manufacturing firms, which suggests that other factors are at play. Technological factors, such as the rise of internet platforms and price comparison websites, may explain why firm-level market power has decreased.

The textbook explanation of a rise in competition has many predictions that are consistent with evidence provided here (Boussard and Lee, 2020). We do not take a stance on the source of market power, and in particular on why there is an increasing relationship between firm size and firm markup: the price elasticity of demand may decrease with quantity, or large firms may be large enough to influence the equilibrium price, and therefore act strategically. However, in both cases, an increase in competition will have offsetting effects on the markup of large firms: holding size constant, it will tend to decrease their markup, but because of reallocation, these firms will grow and their markup will increase. Qualitatively, it is thus possible to observe a rise in top firm markups, as De Loecker et al. (2020) find for the US, or a stability or decrease, as we find for France.

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8 Tables

Table 1: Data Representativeness

	Obs	Labor Costs		Value Added		Investment	
	(Nb)	Total (M €)	Share (%)	Total (M €)	Share (%)	Total (M €)	Share (%)
1984	532,996	283,772	82	283,772	84	47,202	70
1985	548,669	312,930	84	312,930	87	49,752	68
1986	571,885	332,184	84	332,184	84	57,344	71
1987	592,065	351,970	84	351,970	84	56,737	65
1988	601,927	379,705	83	379,705	82	63,893	65
1989	596,754	413,480	84	413,480	83	73,858	67
1990	647,678	428,452	83	428,452	81	78,487	65
1991	666,606	458,394	84	458,394	83	81,559	64
1992	702,357	471,285	85	471,285	82	81,502	65
1993	734,122	475,615	86	475,615	84	77,745	67
1994	741,347	487,676	86	487,676	84	73,961	63
1995	765,457	510,294	87	510,294	84	79,238	66
1996	796,722	515,257	86	515,257	84	79,844	65
1997	868,408	544,548	88	544,548	85	112,410	90
1998	851,193	575,456	89	575,456	85	90,792	67
1999	852,305	607,464	89	607,464	87	97,016	66
2000	913,683	651,199	89	651,199	87	120,356	74
2001	891,453	672,645	89	672,645	86	120,600	70
2002	925,390	696,835	89	696,835	86	110,329	65
2003	938,783	707,062	89	707,062	85	120,849	71
2004	976,069	739,259	89	739,259	85	121,434	68
2005	991,904	770,758	89	770,758	86	146,352	78
2006	1,040,977	809,623	89	809,623	86	128,399	63
2007	1,058,540	845,743	89	845,743	85	169,717	75
2008	1,022,553	880,096	92	880,096	86	187,424	78
2009	991,614	830,123	90	830,123	84	148,316	70
2010	984,428	864,506	89	864,506	86	150,904	68
2011	947,166	874,459	88	874,459	84	154,229	65
2012	944,272	875,717	88	875,717	83	158,964	66
2013	943,845	882,930	87	882,930	82	174,412	72
2014	937,468	888,054	86	888,054	82	148,430	60
2015	952,305	911,883	86	911,883	81	158,674	62
2016	1,061,582	940,008	87	940,008	82	146,943	55
1984 - 2016	836,137	636,042	87	636,042	84	111,142	68

Note: This table presents the share of aggregate labor costs (including employer social contributions), value-added and investment in the corporate sector in France that our sample accounts for year by year and on average over the whole period, in total and in percentage of values reported in national accounts. The sample is all firms in the corporate market sectors, excluding agriculture, finance and real estate, with non zero employment.

Table 2: Summary Statistics

	Obs. (Nb)	Mean	Median	Sd
Sales	27,543,090	2,642.620	284.620	77,556.280
Gross Output	27,517,472	1,818.489	203.735	69,157.491
Value-Added	27,517,472	730.007	111.297	32,121.450
Labor Costs	27,517,428	507.781	81.000	18,092.476
Labor Share	27,334,884	0.751	0.741	0.336
Employment	27,360,292	14.115	3.000	471.567
Intermediary Inputs	27,517,477	1,088.481	80.188	46,270.444
Investment	19,814,136	185.104	4.000	19,200.450
Capital Book Value	27,507,848	1,305.843	76.000	168,002.986

Note: This table presents the main descriptive statistics of firm level outcomes. The sample is all firms in the corporate market sectors, excluding agriculture, finance and real estate, with non zero employment. Values are in thousand euros, except employment which is the average number of full-time equivalent salaried workers.

Table 3: Correlations Between Variations in Industry-Level Concentration and Labor Shares

	Industry Labor Share		Across Labor Share Quantiles		Within Low Labor Share Quantiles	
Labor Share						
Top 1% Share	-0.0777		-0.0457		0.0097	
	(0.0123)		(0.0112)		(0.0099)	
Top 5% Share		-0.1102		-0.1288		0.0092
		(0.0167)		(0.0150)		(0.0135)
Observations	4,666	4,673	4,665	4,660	4,661	4,664
R2	0.0341	0.0347	0.0290	0.0405	0.0281	0.0292
Labor Share						
4 Largest Share	-0.0728		-0.0602		0.0772	
	(0.0147)		(0.0133)		(0.0119)	
20 Largest Share		-0.1113		-0.1196		0.0615
		(0.0168)		(0.0152)		(0.0137)
Observations	4,649	4,648	4,645	4,645	4,651	4,650
R2	0.0320	0.0388	0.0325	0.0401	0.0366	0.0340

Note: Each estimate is the result of OLS estimation at the 3-digit industry with year fixed-effects. The dependent variable in columns "Industry Labor Share" is the long-term change of the industry aggregate labor share, defined as the ratio of the sum of firm level compensation and taxes paid on labor over the sum of firm level value added in that industry. The dependant variable in columns "Across Labor Share Quantiles" and "Within Low Labor Share Quantiles" are the corresponding contributions to the industry aggregate labor share according to the decomposition described in Appendix B, where low quantiles are the bottom 5%. The independent variables are the changes of the share of sales of the top 1%, top 5 %, largest 4 and largest 20 firms.

Table 4: Firm Level Labor Share Trends

Labor Share	Unbalanced Panel			Balanced Panel		
	Firm FE	Firm x Size FE	Firm FE	Firm FE	Firm x Size FE	Firm FE
No Size Threshold						
Trend	0.0057	0.0062	0.0056	0.0025	0.0026	0.0025
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0001)	(0.0000)
Log Employment			0.0322			0.0016
			(0.0002)			(0.0011)
Observations	26,761,933	26,032,310	26,623,375	887,205	880,534	887,201
R2	0.594	0.630	0.598	0.429	0.514	0.429
More than 50 Employees						
Trend	0.0038	0.0042	0.0041	0.0029	0.0030	0.0030
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Log Employment			-0.0226			-0.0175
			(0.0014)			(0.0036)
Observations	849,448	803,590	818,020	165,843	165,013	165,843
R2	0.608	0.630	0.577	0.513	0.587	0.514
More than 100 Employees						
Trend	0.0037	0.0039	0.0040	0.0029	0.0030	0.0030
	(0.0001)	(0.0001)	(0.0001)	(0.0002)	(0.0002)	(0.0002)
Log Employment			-0.0265			-0.0220
			(0.0022)			(0.0052)
Observations	434,631	399,285	404,322	95,311	94,916	95,311
R2	0.649	0.642	0.597	0.538	0.602	0.539
More than 1000 Employees						
Trend	0.0032	0.0033	0.0033	0.0028	0.0030	0.0029
	(0.0004)	(0.0005)	(0.0004)	(0.0006)	(0.0006)	(0.0006)
Log Employment			-0.0321			-0.0312
			(0.0088)			(0.0184)
Observations	56,186	26,560	26,760	9,406	9,383	9,406
R2	0.821	0.719	0.689	0.668	0.716	0.669

Note: Each estimate is the result of OLS estimation of firm level labor share on time trends, for four samples: all firms, firms with more than 50 employees, 100 employees, and 1000 employees; and two panels: all firms or a balanced panel of firms present in the data from 1984 to 2016 (these firms account of 20 to 25 % of total value-added). All regressions include a set of firm-level fixed effect. Columns "Firm x Size FE" also include a set of size category fixed effect. Standard errors are clustered at the firm level.

Table 5: Average Output Elasticities, Non Rolling Estimation

	θ_l	θ_k	N		θ_l	θ_k	N
Mining	0.607	0.297	45,698	Gas and electricity	0.677	0.231	22,243
	(0.048)	(0.081)			(0.193)	(0.169)	
Food products	0.759	0.130	1,277,913	Water supply and waste	0.652	0.183	118,249
	(0.053)	(0.100)			(0.141)	(0.125)	
Textiles	0.588	0.111	282,598	Construction	0.649	0.057	4,969,117
	(0.136)	(0.048)			(0.145)	(0.082)	
Wood, paper and printing	0.813	0.041	552,510	Wholesale and retail trade	0.758	0.086	8,502,337
	(0.118)	(0.105)			(0.171)	(0.138)	
Coke and refined petroleum	0.736	0.323	2,472	Transportation	0.830	0.049	988,348
	(0.250)	(0.074)			(0.151)	(0.145)	
Chemicals	0.819	0.156	62,567	Accomodation and food services	0.601	0.184	3,076,031
	(0.059)	(0.073)			(0.151)	(0.128)	
Pharmaceuticals	0.901	0.050	11,657	Publishing and motion pictures	1.033	0.010	309,540
	(0.344)	(0.295)			(0.237)	(0.214)	
Rubber and plastic products	0.774	0.119	245,896	Telecommunications	1.089	-0.055	25,191
	(0.150)	(0.164)			(0.187)	(0.213)	
Basic Metals	0.729	0.108	545,742	ICT	0.938	-0.016	324,622
	(0.131)	(0.094)			(0.128)	(0.135)	
Computers and electronics	0.764	0.104	110,072	Legal, accounting and engineering	0.859	-0.025	1,499,590
	(0.071)	(0.023)			(0.150)	(0.144)	
Electrical equipments	0.750	0.135	50,476	Scientific research	0.935	0.055	30,461
	(0.026)	(0.048)			(0.242)	(0.211)	
Machinery and equipments	0.839	0.073	161,603	Advertising and market research	0.998	-0.103	406,636
	(0.071)	(0.046)			(0.091)	(0.092)	
Transport equipments	0.836	0.115	71,000	Administrative and support	0.746	0.044	1,401,753
	(0.159)	(0.139)			(0.120)	(0.157)	
Other manufacturing products	0.797	0.008	650,254	Total	0.736	0.078	25,744,576
	(0.089)	(0.073)			(0.175)	(0.137)	

Note: This table reports the output elasticities from non rolling estimation of the translog production function. Columns θ_l and θ_k report the average estimated output elasticity with respect to each factor of production for the translog production function for all firms. Column N report the number of observations in each sector. Standard deviations across firms (not standard errors) of the output elasticities are reported in brackets.

Table 6: Average Output Elasticities, Rolling Estimation

	θ_l	θ_k	N		θ_l	θ_k	N
Mining	0.611	0.289	45,698	Gas and electricity	0.697	0.236	22,243
	(0.199)	(0.162)			(0.190)	(0.174)	
Food products	0.754	0.127	1,277,913	Water supply and waste	0.630	0.204	118,249
	(0.052)	(0.104)			(0.178)	(0.146)	
Textiles	0.553	0.135	282,598	Construction	0.611	0.078	4,969,117
	(0.221)	(0.157)			(0.175)	(0.087)	
Wood, paper and printing	0.794	0.044	552,510	Wholesale and retail trade	0.762	0.093	8,502,337
	(0.110)	(0.104)			(0.175)	(0.145)	
Coke and refined petroleum	0.533	0.251	2,472	Transportation	0.840	0.045	988,348
	(0.391)	(0.258)			(0.156)	(0.148)	
Chemicals	0.806	0.163	62,567	Accomodation and food services	0.592	0.181	3,076,031
	(0.143)	(0.122)			(0.174)	(0.133)	
Pharmaceuticals	0.898	0.072	11,657	Publishing and motion pictures	1.077	-0.001	309,540
	(0.359)	(0.286)			(0.245)	(0.215)	
Rubber and plastic products	0.763	0.125	245,896	Telecommunications	1.048	-0.035	25,191
	(0.159)	(0.176)			(0.242)	(0.217)	
Basic Metals	0.719	0.111	545,742	ICT	0.921	0.002	324,622
	(0.128)	(0.095)			(0.140)	(0.140)	
Computers and electronics	0.747	0.095	110,072	Legal, accounting and engineering	0.843	-0.020	1,499,590
	(0.084)	(0.068)			(0.164)	(0.150)	
Electrical equipments	0.766	0.127	50,476	Scientific research	0.856	0.015	30,461
	(0.136)	(0.101)			(0.259)	(0.230)	
Machinery and equipments	0.808	0.094	161,603	Advertising and market research	0.867	-0.067	406,636
	(0.137)	(0.069)			(0.269)	(0.140)	
Transport equipments	0.834	0.121	71,000	Administrative and support	0.757	0.039	1,401,753
	(0.180)	(0.156)			(0.126)	(0.165)	
Other manufacturing products	0.745	0.042	650,254	Total	0.724	0.086	25,744,576
	(0.129)	(0.080)			(0.193)	(0.143)	

Note: This table reports the output elasticities from rolling estimation of the production function. Columns θ_l and θ_k report the average estimated output elasticity with respect to each factor of production for the translog production function for all firms. Column N report the number of observations in each sector. Standard deviations across firms (not standard errors) of the output elasticities are reported in brackets.

Table 7: Correlations Between Variations in Industry-Level Concentration and Markup

	Industry Markup		Across Markup Quantiles		Within High Markup Quantiles	
Markup, Non Rolling						
Top 1% Share	0.1754		0.1205		0.0143	
	(0.0157)		(0.0140)		(0.0112)	
Top 5% Share		0.2416		0.2207		0.0219
		(0.0216)		(0.0190)		(0.0153)
Observations	4,664	4,664	4,670	4,668	4,665	4,669
R2	0.0607	0.0609	0.0269	0.0389	0.0346	0.0355
Markup, Non Rolling						
4 Largest Share	0.1855		0.1653		-0.0952	
	(0.0190)		(0.0170)		(0.0135)	
20 Largest Share		0.2008		0.2288		-0.0823
		(0.0220)		(0.0193)		(0.0157)
Observations	4,649	4,649	4,650	4,650	4,655	4,655
R2	0.0544	0.0532	0.0328	0.0417	0.0451	0.0413
Markup, Rolling						
Top 1% Share	0.2640		0.0790		0.0092	
	(0.0257)		(0.0245)		(0.0145)	
Top 5% Share		0.3577		0.1460		0.0400
		(0.0353)		(0.0337)		(0.0199)
Observations	4,660	4,660	4,654	4,654	4,663	4,663
R2	0.0569	0.0586	0.0120	0.0140	0.0168	0.0177
Markup, Rolling						
4 Largest Share	0.2098		0.0995		-0.0536	
	(0.0321)		(0.0298)		(0.0175)	
20 Largest Share		0.1702		0.1101		-0.0242
		(0.0372)		(0.0346)		(0.0202)
Observations	4,647	4,646	4,644	4,644	4,650	4,650
R2	0.0482	0.0447	0.0108	0.0112	0.0172	0.0173

Note: Each estimate is the result of OLS estimation at the 3-digit industry with year fixed-effects. The dependent variable in columns "Industry Markup" is the long-term change of the industry aggregate markup. The dependant variable in columns "Across Markup Quantiles" and "Within High Markup Quantiles" are the corresponding contributions to the industry aggregate markup according to the decomposition described in Appendix B, where high quantiles are the top 5%. The independent variables are the changes of the share of sales of the top 1%, top 5 %, largest 4 and largest 20 firms.

Table 8: Firm Level Markup Trends, Non Rolling

Markup	Unbalanced Panel			Balanced Panel		
	Firm FE	Firm x Size FE	Firm FE	Firm FE	Firm x Size FE	Firm FE
No Size Threshold						
Trend	-0.0141	-0.0158	-0.0142	-0.0060	-0.0064	-0.0062
	(0.0000)	(0.0000)	(0.0000)	(0.0001)	(0.0001)	(0.0001)
Log Employment			0.0198			0.0650
			(0.0004)			(0.0025)
Observations	25,092,615	24,535,649	25,092,615	879,223	872,598	879,223
R2	0.617	0.649	0.617	0.556	0.644	0.561
More than 50 Employees						
Trend	-0.0080	-0.0088	-0.0087	-0.0069	-0.0074	-0.0075
	(0.0001)	(0.0001)	(0.0001)	(0.0003)	(0.0003)	(0.0003)
Log Employment			0.0631			0.0621
			(0.0027)			(0.0066)
Observations	789,696	775,795	789,696	163,698	162,859	163,698
R2	0.676	0.733	0.678	0.630	0.711	0.632
More than 100 Employees						
Trend	-0.0083	-0.0089	-0.0089	-0.0074	-0.0078	-0.0078
	(0.0002)	(0.0002)	(0.0002)	(0.0004)	(0.0004)	(0.0004)
Log Employment			0.0617			0.0562
			(0.0041)			(0.0099)
Observations	391,061	386,202	391,061	94,072	93,670	94,072
R2	0.694	0.743	0.696	0.652	0.725	0.654
More than 1000 Employees						
Trend	-0.0093	-0.0096	-0.0098	-0.0094	-0.0102	-0.0097
	(0.0010)	(0.0011)	(0.0010)	(0.0016)	(0.0016)	(0.0015)
Log Employment			0.0798			0.0866
			(0.0186)			(0.0373)
Observations	26,261	26,072	26,261	9,309	9,286	9,309
R2	0.781	0.815	0.782	0.785	0.829	0.787

Note: Each estimate is the result of OLS estimation of markups from non rolling estimates on time trends, for four samples: all firms, firms with more than 50 employees, 100 employees, and 1000 employees; and two panels: all firms or a balanced panel of firms present in the data from 1984 to 2016 (these firms account of 20 to 25 % of total value-added). All regressions include a set of firm-level fixed effect. Columns "Firm x Size FE" also include a set of size category fixed effect. Standard errors are clustered at the firm level.

Table 9: Firm Level Markup Trends, Rolling

Markup	Unbalanced Panel			Balanced Panel		
	Firm FE	Firm x Size FE	Firm FE	Firm FE	Firm x Size FE	Firm FE
No Size Threshold						
Trend	-0.0132	-0.0155	-0.0134	-0.0023	-0.0029	-0.0025
	(0.0000)	(0.0000)	(0.0000)	(0.0001)	(0.0001)	(0.0001)
Log Employment			0.0264			0.0641
			(0.0004)			(0.0026)
Observations	25,092,615	24,535,649	25,092,615	879,223	872,598	879,223
R2	0.616	0.650	0.616	0.514	0.613	0.519
More than 50 Employees						
Trend	-0.0010	-0.0020	-0.0018	0.0007	0.0001	0.0002
	(0.0001)	(0.0002)	(0.0002)	(0.0003)	(0.0003)	(0.0003)
Log Employment			0.0645			0.0641
			(0.0029)			(0.0071)
Observations	789,696	775,795	789,696	163,698	162,859	163,698
R2	0.661	0.723	0.663	0.594	0.688	0.597
More than 100 Employees						
Trend	-0.0006	-0.0013	-0.0012	0.0011	0.0006	0.0007
	(0.0002)	(0.0002)	(0.0002)	(0.0004)	(0.0004)	(0.0004)
Log Employment			0.0646			0.0590
			(0.0045)			(0.0110)
Observations	391,061	386,202	391,061	94,072	93,670	94,072
R2	0.675	0.730	0.677	0.615	0.702	0.617
More than 1000 Employees						
Trend	0.0023	0.0021	0.0017	0.0033	0.0028	0.0028
	(0.0011)	(0.0011)	(0.0011)	(0.0017)	(0.0017)	(0.0016)
Log Employment			0.0999			0.1296
			(0.0202)			(0.0422)
Observations	26,261	26,072	26,261	9,309	9,286	9,309
R2	0.745	0.784	0.747	0.744	0.798	0.747

Note: Each estimate is the result of OLS estimation of markups from rolling estimates on time trends, for four samples: all firms, firms with more than 50 employees, 100 employees, and 1000 employees; and two panels: all firms or a balanced panel of firms present in the data from 1984 to 2016 (these firms account of 20 to 25 % of total value-added). All regressions include a set of firm-level fixed effect. Columns "Firm x Size FE" also include a set of size category fixed effect. Standard errors are clustered at the firm level.

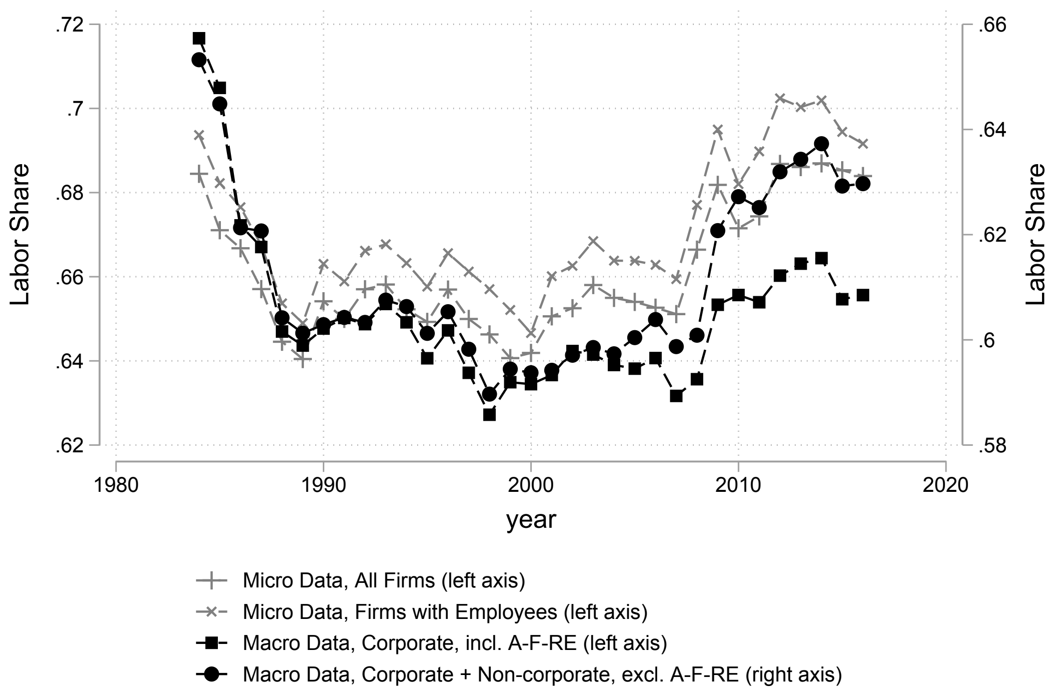
Table 10: Correlation between Labor Share and Markup

Labor Share	Non Rolling			Rolling		
	No FE	Industry FE	Firm FE	No FE	Industry FE	Firm FE
No Size Threshold						
Markup	-0.3487	-0.3713	-0.3575	-0.3173	-0.3520	-0.3370
	(0.0037)	(0.0024)	(0.0027)	(0.0041)	(0.0022)	(0.0027)
Observations	25,554,561	25,554,533	25,092,587	25,554,561	25,554,533	25,092,587
R2	0.449	0.518	0.772	0.407	0.489	0.761
More than 50 Employees						
Markup	-0.4202	-0.4460	-0.4989	-0.4070	-0.4351	-0.4797
	(0.0039)	(0.0034)	(0.0043)	(0.0054)	(0.0035)	(0.0044)
Observations	808,003	807,805	789,488	808,003	807,805	789,488
R2	0.519	0.602	0.816	0.493	0.582	0.805
More than 100 Employees						
Markup	-0.3991	-0.4268	-0.4754	-0.3842	-0.4163	-0.4554
	(0.0033)	(0.0039)	(0.0051)	(0.0053)	(0.0041)	(0.0053)
Observations	398,301	398,018	390,768	398,301	398,018	390,768
R2	0.513	0.614	0.825	0.483	0.594	0.814
More than 1000 Employees						
Markup	-0.3320	-0.3633	-0.4129	-0.3270	-0.3709	-0.3912
	(0.0079)	(0.0077)	(0.0106)	(0.0050)	(0.0077)	(0.0125)
Observations	26,684	25,305	24,839	26,684	25,305	24,839
R2	0.502	0.721	0.900	0.471	0.710	0.892

Note: Each estimate is the result of OLS estimation of firm level labor share on markups, for four samples: all firms, firms with more than 50 employees, 100 employees, and 1000 employees; and two panels: manufacturing and non manufacturing firms. All columns include year fixed effects. Columns "No FE" include no industry nor firm fixed effect. Columns "Industry FE" include 3-digit industry-level fixed effects. Columns "Firm FE" include firm-level fixed effects. Standard errors are clustered at the 3-digit x year industry level.

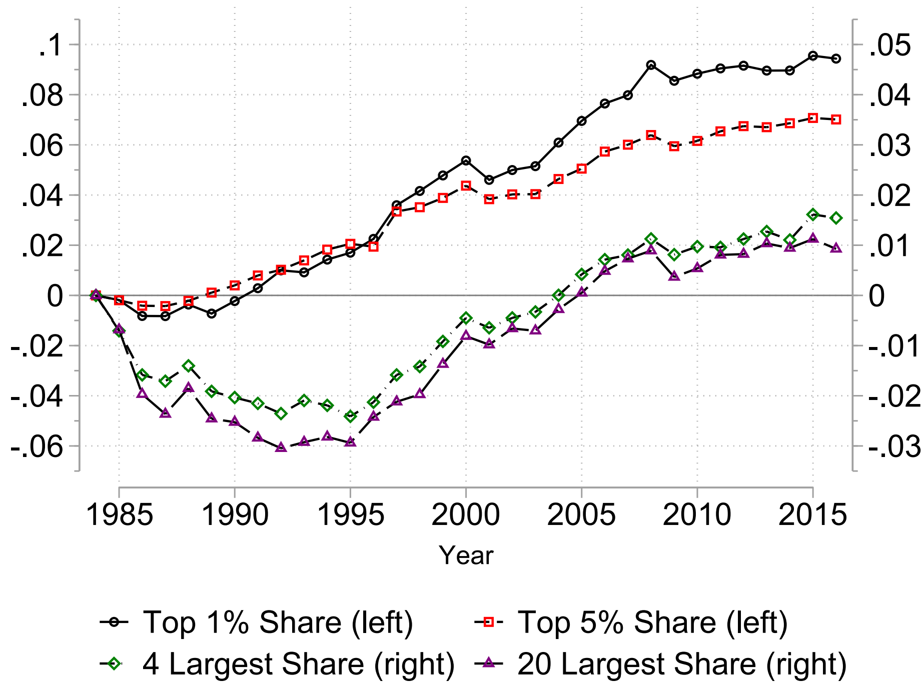
9 Figures

Figure 1: Aggregate Labor Share in France, 1984-2016.



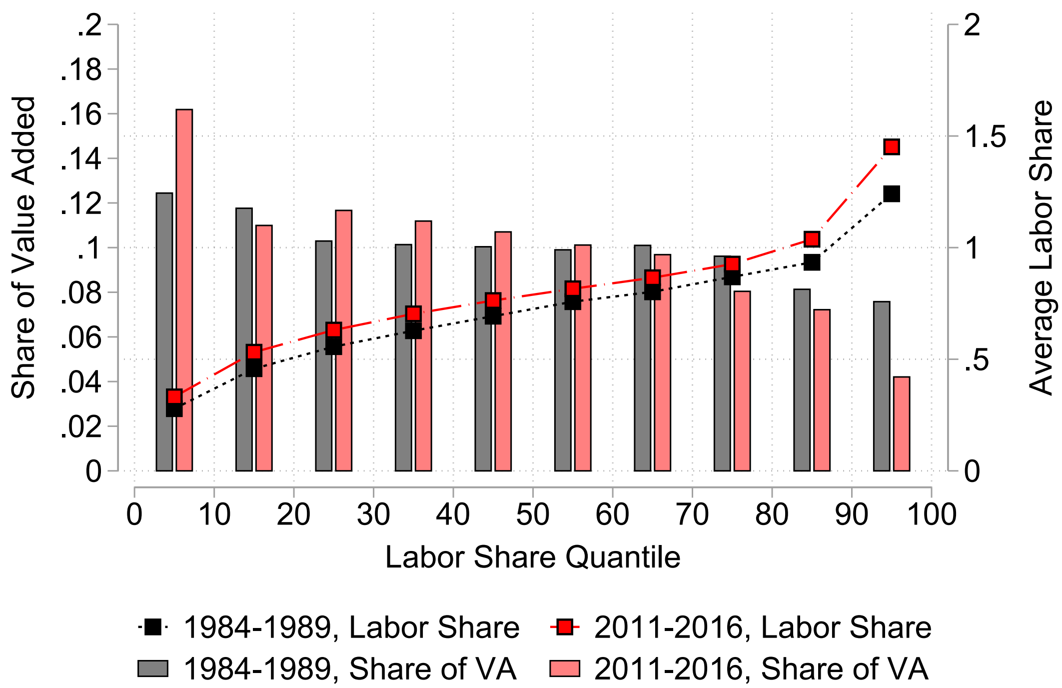
Note: This figures reports the ratio of employee compensation, including payroll taxes, to total value-added in the market sectors in France. See Section 4 for details on the different measures.

Figure 2: Cumulative Change in Concentration



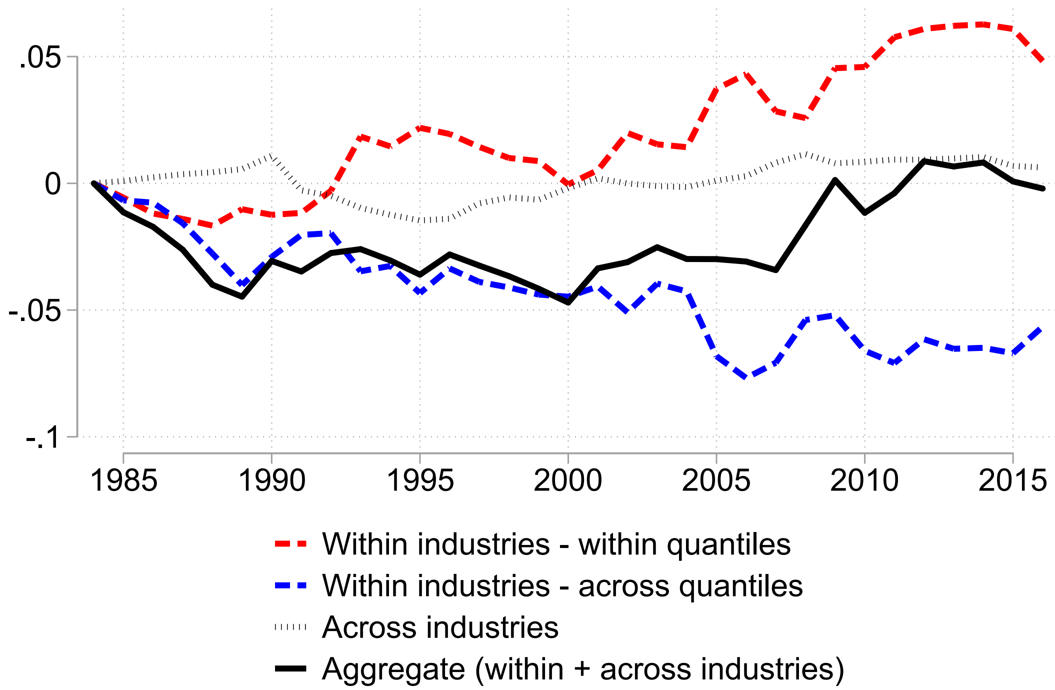
Note: This figure reports the cumulative change of concentration in sales across 3-digit industries. Sample is firms in the market sectors, excluding agriculture, finance and real estate. Industry changes in concentration are weighted by the share of each industry in total sales.

Figure 3: Distributions of Labor Shares and Value Added



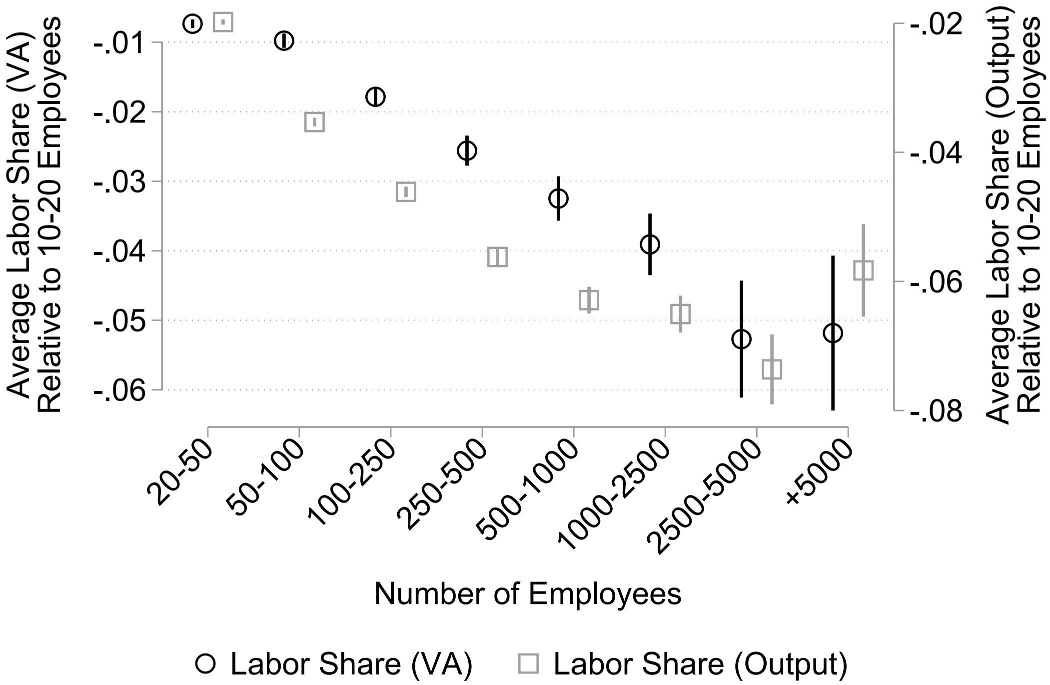
Note: The connected lines (right axis) reflect the raw cross-firm distribution of labor shares. The vertical bars (left axis) reflect the share of industry value added of firms in each unweighted decile of labor share. These distributions are averaged across 3-digit industries using value added weights in a given year, and averaged across 5 year periods.

Figure 4: Decomposition of Aggregate Labor Share



Note: This figures reports the results of decomposition of the aggregate labor share and markup described in Appendix B. Quantiles of labor share are calculated each year within 3-digit industries.

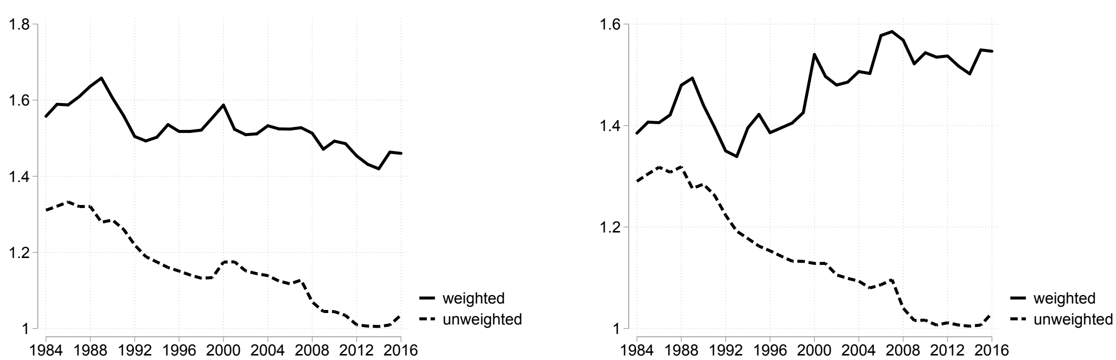
Figure 5: Labor Share and Size



Note: This figure reports the conditional average labor share by firm size, with 99% confidence interval. Averages are conditional on a set of flexible fixed effects constructed from the interaction of 3-digit industry codes and year.

Figure 6: Aggregate Markup

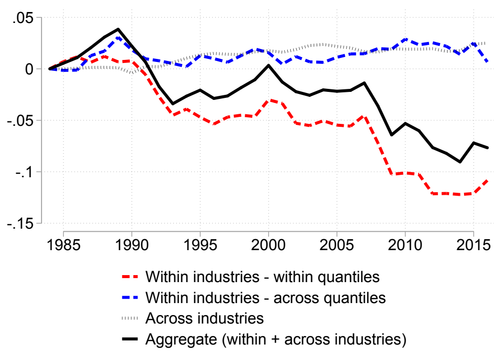
(a) Non Rolling (b) Rolling



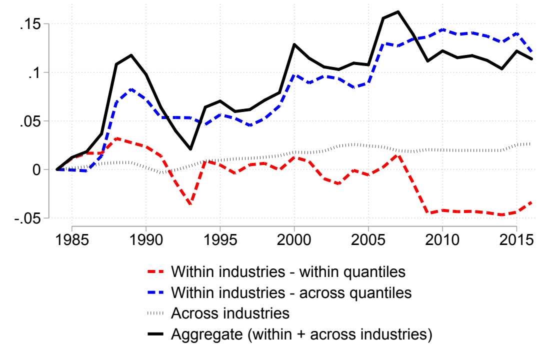
Note: This figures reports the levels of the weighted and unweighted mean markup based on non-rolling and rolling estimation of a translog value-added production function.

Figure 7: Decomposition of Aggregate Markup

(a) Non Rolling

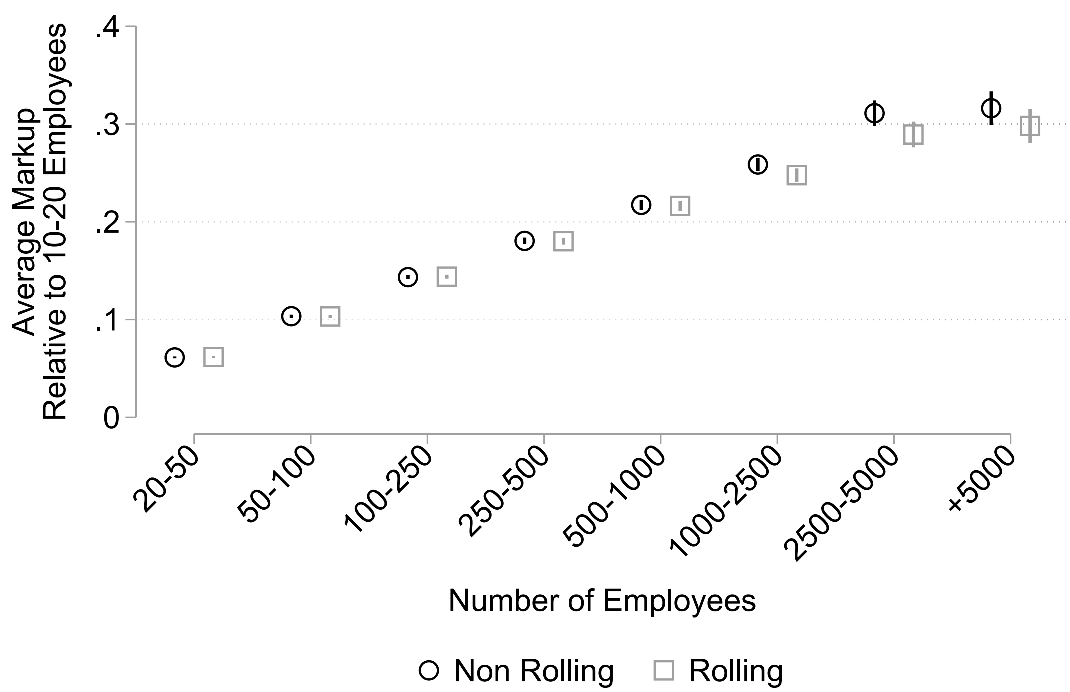


(b) Rolling



Note: This figures reports the results of decomposition of the aggregate markup described in Appendix B. Quantiles of markup are calculated each year within 3-digit industries.

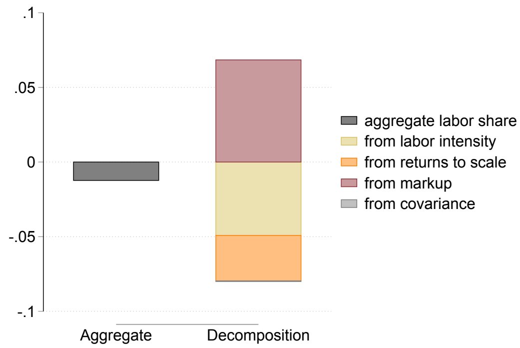
Figure 8: Markup and Size



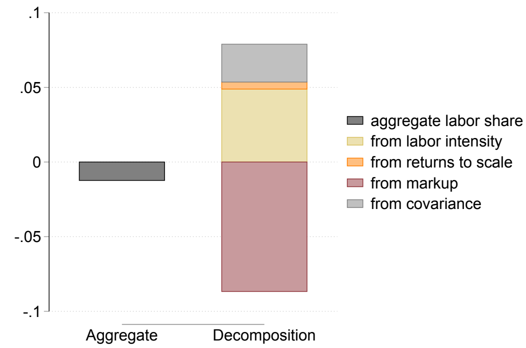
Note: This figure reports the conditional average markup by firm size, with 99% confidence interval. Averages are conditional on a set of flexible fixed effects constructed from the interaction of 3-digit industry codes and year.

Figure 9: Contributions to the Evolution of the Aggregate Labor Share, Representative Firm

(a) Non Rolling



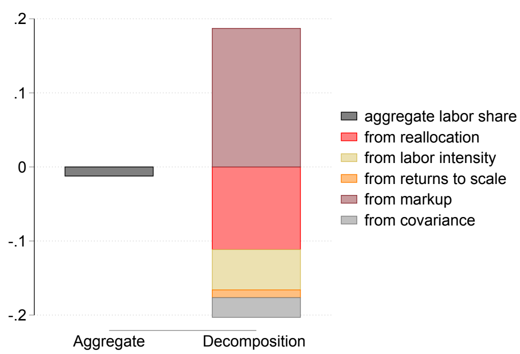
(b) Rolling



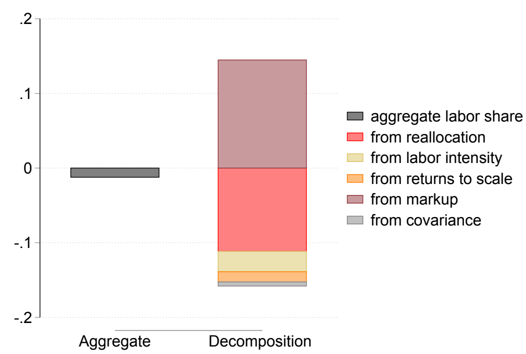
Note: This figure reports the decomposition of the variation of the labor share of the representative firm from 1984 to 2016, based on translog non-rolling and rolling value-added estimation of the production function. See section 6 for detail.

Figure 10: Contributions to the Evolution of the Aggregate Labor Share, With Reallocation

(a) Non Rolling



(b) Rolling



Note: This figure reports the decomposition of the variation of the aggregate labor share from 1984 to 2016, including the reallocation term, based on translog non-rolling and rolling value-added estimation of the production function. See section 6 for detail.

A Data

Industry codes

Industry classification has changed over the 1985-2016 period. From 1985 to 1993 the classification in vigor was the NAP. It changed to NAF in 1993, to NAF rév. 1 in 2003 and finally to NAF rév. 2 in 2008. There is no one-to-one correspondence between these classifications. As a result we make the choice to map each NAP industry code to its most often associated NAF industry code. Similarly we map each NAF industry code to its most often associated NAF rév. 1 industry code, and each NAF rév. 1 code to its most often association NAF rév. 2. As a result we are able to associate to each firm for each year its industry code in the NAF rév. 2 classification.

Variable definitions

Our data provide information on total sales of goods, services and merchandises, as well as variations in inventory and immobilized production. For inputs, they provide the book value of tangible and intangible capital, the wage bill and payroll taxes, and the cost of materials, merchandise, and other intermediary inputs. All data on sales, cost of inventory variations and cost of inputs are recorded separately for merchandise and other inputs. We follow definitions from the National Accounts and define output as the sum of immobilized production, variations in inventory, and sales excluding the cost of merchandise; and we define intermediary inputs use as the sum of material expenditures minus inventory variations, and other external inputs. These definitions mean that gross output includes the net margin on merchandise sold, not gross sales of merchandise. Importantly, our data also includes in intermediary inputs the cost of purchased external services. Except for employment, our micro data is denominated in current prices, and we do not observe firm-level prices of intermediary and capital inputs, nor output prices. We deflate nominal values of gross output, intermediary inputs, and capital stock at the NA38 sectors level using price indexes for investment and outputs from the September 2018 release of the INSEE Annual National Accounts.

Data cleaning

We exclude micro-firms and profiled enterprises from the 2008-2016 data. Very high or negative observations of labor share that stem from very low or negative value-added observations relative to the firm average across years are replaced with the average labor share of the firm across years. Concentration measures are computed using sales on the entire sample of firms, labor share decomposition and all subsequent analysis are conducted on the sample of firms with at least one salaried employee. The parameters of the translog production function are estimated using a smaller sample of firms with sales above 1M€, positive value-added, intermediary inputs, and capital. We also exclude from the estimation sample firms with wage, labor productivity, or capital per employee in the top or bottom 0.1%.

B Decomposition

This section details the decomposition method we apply to aggregate labor share and aggregate inverse markups.

Industry level decomposition

Let $k \in \{1, \cdots, K\}$ be some industry classification (e.g., 3 digits in micro data), M stands for an aggregate measure (labor share or markup). Also, let S_k and M_k stand respectively for the weight of the industry in total value-added or total sales, and the industry average measure. Define for any variable X:

$$\Delta X_t \equiv X_t - X_{t-1},\ \overline{X}_t \equiv \frac{1}{2}\left(X_t + X_{t-1}\right),$$
$$\Delta_T X \equiv X_T - X_0,$$

where T is the last period and 0 is the first period. Our first decomposition is:[16]

$$\Delta_T M \equiv \underbrace{\sum_{t=1}^{T}\sum_{k} \overline{S}_{kt}\, \Delta M_{kt}}_{\text{within industry}} + \underbrace{\sum_{t=1}^{T}\sum_{k} \Delta S_{kt}\, \overline{M}_{kt}}_{\text{across industries}}. \tag{23}$$

This allows us to distinguish the extent to which the aggregate variation in markup or labor is due to a change of industry shares or a within industry variation, irrespective of the sectoral composition of the economy.

Within Industry Decomposition

Next, we focus on changes in the indusry-level measure Our aim is to decompose the changes at the industry level to the changes in the distribution of firm level markup o labor share and the changes in the markup or labor share for the firms of a given quantile. Let y denote firm quantile. We can write the industry-level measure as

$$M_{kt} \equiv \int_{\underline{y}}^{\overline{y}} S_{kt}\left(y\right)\ M_{kt}\left(y\right) dy, \tag{24}$$

[16] This is simply because:

$$\Delta\left(S_t M_t\right) = \overline{S}_t \Delta M_t + \Delta S_t \overline{M}_t$$
$$\Delta_T\left(SM\right) = \sum_{t=1}^{T} \Delta\left(S_t M_t\right).$$

where $S_{kt}(y)$ denotes the share of industry-k value added or sales that is in firms of quantile y at time t and $M_{kt}(y)$ denotes the weighted average outcome (labor share or markup) of firms of quantile y in industry k at time t. We can now decompose[17]

$$\Delta M_{kt} = \underbrace{\int_{\underline{y}}^{\overline{y}} \overline{S}_{kt}(y)\ \Delta M_{kt}(y)\, dy}_{\text{Within quantile}} + \underbrace{\int_{\underline{y}}^{\overline{y}} \Delta S_{kt}(y)\ \overline{M}_{kt}(y)\, dy}_{\text{Cross quantile}}. \tag{26}$$

Top firms are defined as low-labor-share firms or high-markup firms. We further decompose the within quantile component into three components: top firms component (for firms with y in the top/bottom 5%), above/below median component (for firms with y above/below the median but not top firms) and the rest. Let y^* be the threshold of size for being among the top firms, and $y^{'}$ the median size. We can write

$$\int_{\underline{y}}^{\overline{y}} \overline{S}_{kt}(y)\ \Delta M_{kt}(y)\, dy = \underbrace{\int_{\underline{y}}^{y^{'}} \overline{S}_{kt}(y)\ \Delta M_{kt}(y)\, dy}_{\text{Within Below Median}} + \underbrace{\int_{y^{'}}^{y^*} \overline{S}_{kt}(y)\ \Delta M_{kt}(y)\, dy}_{\text{Within Above Median}} + \underbrace{\int_{y^*}^{\overline{y}} \overline{S}_{kt}(y)\ \Delta M_{kt}(y)\, dy}_{\text{Within Top Firms}}. \tag{27}$$

We now summarize the within-industry component change in aggregate measure into the following components:

1. The cross quantile component:

$$\sum_{t=1}^{T} \sum_{k} \overline{S}_{kt} \int_{\underline{y}}^{\overline{y}} \Delta S_{kt}(y)\ \overline{M}_{kt}(y)\, dy.$$

2. The within quantile component:

$$\sum_{t=1}^{T} \sum_{k} \overline{S}_{kt} \int_{\underline{y}}^{\overline{y}} \overline{S}_{kt}(y)\ \Delta M_{kt}(y)\, dy,$$

   which can then be further decomposed to

[17] As emphasized by Kehrig and Vincent (2018), this decomposition is conceptually distinct from standard within and cross firm decompositions. Let Ω_{kt} be the set of firms active in time t, and $\overline{\Omega}_{kt}$ be the set of firms common between time t and $t-1$, Ω^{+}_{kt} the set of *new* firms at time t, and Ω^{-}_{kt} the set of firms exiting between time t and $t+1$. We can then write:

$$\Delta M_{kt} \equiv \underbrace{\sum_{i \in \Omega^{-}_{t}} \overline{S}_{it}\, \Delta M_{it}}_{\text{within firm}} + \underbrace{\sum_{i \in \Omega^{-}_{kt}} \Delta S_{it}\, \overline{M}_{it}}_{\text{cross firm}} + \underbrace{\left(\sum_{i \in \Omega^{+}_{kt}} S_{it} M_{it} - \sum_{i \in \Omega^{-}_{kt-1}} S_{it-1} M_{it-1} \right)}_{\text{net entry}}, \tag{25}$$

where again shares are computed within the industry.

(a) Within top firms component:

$$\sum_{t=1}^{T}\sum_{k}\overline{S}_{kt}\int_{y^*}^{\overline{y}}\overline{S}_{kt}\left(y\right)\,\Delta M_{kt}\left(y\right)dy,$$

(b) Within middle firms component:

$$\sum_{t=1}^{T}\sum_{k}\overline{S}_{kt}\int_{y'}^{y^*}\overline{S}_{kt}\left(y\right)\,\Delta M_{kt}\left(y\right)dy,$$

(c) Within bottom firms component:

$$\sum_{t=1}^{T}\sum_{k}\overline{S}_{kt}\int_{\underline{y}}^{y'}\overline{S}_{kt}\left(y\right)\,\Delta M_{kt}\left(y\right)dy.$$

We can also write the average variations in those three components across all industries, without weighing them to their industry level contributions :

(a) Average top firms component:

$$\sum_{t=1}^{T}\sum_{k}\overline{S}_{kt}\frac{\int_{y^*}^{\overline{y}}\overline{S}_{kt}\left(y\right)\,\Delta M_{kt}\left(y\right)dy,}{\int_{y^*}^{\overline{y}}\overline{S}_{kt}\left(y\right)dy}$$

(b) Average middle firms component:

$$\sum_{t=1}^{T}\sum_{k}\overline{S}_{kt}\frac{\int_{y'}^{y^*}\overline{S}_{kt}\left(y\right)\,\Delta M_{kt}\left(y\right)dy,}{\int_{y'}^{y^*}\overline{S}_{kt}\left(y\right)dy}$$

(c) Average bottom firms component:

$$\sum_{t=1}^{T}\sum_{k}\overline{S}_{kt}\frac{\int_{\underline{y}}^{y'}\overline{S}_{kt}\left(y\right)\,\Delta M_{kt}\left(y\right)dy.}{\int_{\underline{y}}^{y'}\overline{S}_{kt}\left(y\right)dy}$$

C Labor Share, Markup, and Technology

In a first exercise, we do not isolate the contribution of reallocation to the aggregate labor share and write the weighted average mean for a given variable Z:

$$\mathbb{E}_t^{\text{RF}}[Z]\equiv\sum_i S_{it}Z_{it},\tag{28}$$

where RF stands for "representative firm". In a second exercise, we take into account the contribution of reallocation and write the unweighted average mean for a given variable Z :

$$\mathbb{E}_t^{\mathrm{WR}}[Z] \equiv \frac{1}{N_t} \sum_i Z_{it}, \tag{29}$$

where N_t is the total number of firms and WR stands for "with reallocation". Equation (9) can be rewritten using the definition in Equation (28), which gives a decomposition of the aggregate labor share into the markup, labor intensity and returns to scale of the representative firm:

$$\Lambda_t = \mathbb{E}_t^{\mathrm{RF}}[\alpha\gamma\mu^{-1}] = \mathbb{E}_t^{\mathrm{RF}}[\alpha] \times \mathbb{E}_t^{\mathrm{RF}}[\gamma] \times \mathbb{E}_t^{\mathrm{RF}}[\mu^{-1}] + \mathrm{COV}_t^{\mathrm{RF}}, \tag{30}$$

or using the definition in Equation (29), which gives a decomposition of the aggregate labor share into a reallocation term, defined by the gap between weighted and unweighted average labor share, and firm-level unweighted average markups, labor intensity and returns to scale:

$$\Lambda_t = \left(\mathbb{E}_t^{\mathrm{RF}}[\alpha\gamma\mu^{-1}] - \mathbb{E}_t^{\mathrm{WR}}[\alpha\gamma\mu^{-1}]\right) + \mathbb{E}_t^{\mathrm{WR}}[\alpha] \times \mathbb{E}_t^{\mathrm{WR}}[\gamma] \times \mathbb{E}_t^{\mathrm{WR}}[\mu^{-1}] + \mathrm{COV}_t^{\mathrm{WR}}, \tag{31}$$

where in both cases $\mathrm{COV}_t^{\mathrm{R}}$, $\mathrm{R} \in (\mathrm{RF}, \mathrm{WR})$ gathers all of the covariance terms. This term is positive when firms that have high levels of labor intensity also have high returns to scale and low markups. For each $\mathrm{R} \in (\mathrm{RF}, \mathrm{WR})$, this quantity is defined by:

$$\begin{aligned}\mathrm{COV}_t^{\mathrm{R}} &= \mathrm{cov}_t^{\mathrm{R}}(\alpha, \gamma, \mu^{-1}) + \mathbb{E}_t^{\mathrm{R}}[\alpha]\mathrm{cov}_t^{\mathrm{R}}(\gamma, \mu^{-1}) \\ &\quad + \mathbb{E}_t^{\mathrm{R}}[\gamma]\mathrm{cov}_t^{\mathrm{R}}(\alpha, \mu^{-1}) + \mathbb{E}_t^{\mathrm{R}}[\mu^{-1}]\mathrm{cov}_t^{\mathrm{RF}}(\alpha, \gamma),\end{aligned}$$

where for all set of variables $(X^s)_{s\in S}$:

$$\mathrm{cov}_t^{\mathrm{RF}}\left((X^s)_{s\in S}\right) = \mathbb{E}_t^{\mathrm{RF}}\left[\prod_{s\in S}(X_t^s - \mathbb{E}_t^{\mathrm{RF}}[X^s])\right].$$

Defining $\overline{X_t}$ and $\Delta X_t = (X_t - X_{t-1})$ as:

$$\overline{X_t} = \frac{1}{2}(X_t + X_{t-1}) \qquad , \qquad \Delta X_t = (X_t - X_{t-1}),$$

we can decompose the variation of the product of expectations in Equations (30) and (31) into contributions of the variation in automation, returns to scale and markups:

$$\Delta\mathbb{E}_t^{\mathrm{R}}[\alpha] \times \mathbb{E}_t^{\mathrm{R}}[\gamma] \times \mathbb{E}_t^{\mathrm{R}}[\mu^{-1}] = \underbrace{\frac{\Delta\mathbb{E}_t^{\mathrm{R}}[\alpha]}{3}\left(\overline{\mathbb{E}_t^{\mathrm{R}}[\gamma] \times \mathbb{E}_t[\mu^{-1}]} + 2\overline{\mathbb{E}_t^{\mathrm{R}}[\gamma]} \times \overline{\mathbb{E}_t^{\mathrm{R}}[\mu^{-1}]}\right)}_{\text{Contribution of Labor Intensity}}$$

$$+ \underbrace{\frac{\Delta \mathbb{E}_t^{\mathrm{R}}[\gamma]}{3} \left(\overline{\mathbb{E}_t^{\mathrm{R}}[\alpha] \times \mathbb{E}_t^{\mathrm{R}}[\mu^{-1}]} + 2\overline{\mathbb{E}_t^{\mathrm{R}}[\alpha]} \times \overline{\mathbb{E}_t^{\mathrm{R}}[\mu^{-1}]} \right)}_{\text{Contribution of Returns to Scale}}$$

$$+ \underbrace{\frac{\Delta \mathbb{E}_t^{\mathrm{R}}[\mu^{-1}]}{3} \left(\overline{\mathbb{E}_t^{\mathrm{R}}[\alpha] \times \mathbb{E}_t^{\mathrm{R}}[\gamma]} + 2\overline{\mathbb{E}_t^{\mathrm{R}}[\alpha]} \times \overline{\mathbb{E}_t^{\mathrm{R}}[\gamma]} \right)}_{\text{Contribution of Markups}}, \tag{32}$$

for both $\mathrm{R} \in (\mathrm{NR}, \mathrm{WR})$. By adding to the decomposition in Equation (32) the variation of the covariance term and of the reallocation term if $\mathrm{R} = \mathrm{WR}$, we obtain the decomposition of the variation of the aggregate labor share $\Delta\Lambda_t$.

D Tables

Table D.1: Correlations Between Variations in Industry-Level Concentration and Labor Shares

	Industry Labor Share		Across Labor Share Quantiles		Within Low Labor Share Quantiles	
Manufacturing						
Top 1% Share	-0.0694		-0.0793		0.0387	
	(0.0188)		(0.0156)		(0.0139)	
Top 5% Share		-0.1178		-0.1355		0.0663
		(0.0254)		(0.0214)		(0.0190)
Observations	2,131	2,143	2,135	2,143	2,130	2,142
R2	0.0805	0.0828	0.0553	0.0641	0.0622	0.0647
Manufacturing						
4 Largest Share	-0.0955		-0.0852		0.0424	
	(0.0232)		(0.0196)		(0.0177)	
20 Largest Share		-0.1764		-0.1796		0.0008
		(0.0285)		(0.0239)		(0.0215)
Observations	2,121	2,147	2,122	2,148	2,119	2,144
R2	0.0816	0.0879	0.0580	0.0705	0.0618	0.0588
Non Manufacturing						
Top 1% Share	-0.0943		-0.0458		-0.0014	
	(0.0171)		(0.0161)		(0.0139)	
Top 5% Share		-0.1054		-0.1448		-0.0310
		(0.0238)		(0.0223)		(0.0189)
Observations	2,202	2,201	2,202	2,196	2,192	2,190
R2	0.0234	0.0192	0.0298	0.0419	0.0354	0.0422
Non Manufacturing						
4 Largest Share	-0.0601		-0.0629		0.0690	
	(0.0194)		(0.0181)		(0.0156)	
20 Largest Share		-0.1102		-0.1196		0.0597
		(0.0208)		(0.0198)		(0.0171)
Observations	2,172	2,145	2,176	2,150	2,163	2,137
R2	0.0146	0.0272	0.0355	0.0454	0.0448	0.0455

Note: Each estimate is the result of OLS estimation at the 3-digit industry with year fixed-effects. The dependent variable in columns "Industry Labor Share" is the long-term change of the industry aggregate labor share, defined as the ratio of the sum of firm level compensation and taxes paid on labor over the sum of firm level value added in that industry. The dependant variable in columns "Across Labor Share Quantiles" and "Within Low Labor Share Quantiles" are the corresponding contributions to the industry aggregate labor share according to the decomposition described in Appendix B, where low quantiles are the bottom 5%. The independent variables are the changes of the share of sales of the top 1%, top 5 %, largest 4 and largest 20 firms.

Table D.2: Median Output Elasticities, Non Rolling Estimation

	θ_l	θ_k	N		θ_l	θ_k	N
Mining	0.606	0.308	45,698	Gas and electricity	0.648	0.276	22,243
	(0.048)	(0.081)			(0.193)	(0.169)	
Food products	0.754	0.138	1,277,913	Water supply and waste	0.665	0.182	118,249
	(0.053)	(0.100)			(0.141)	(0.125)	
Textiles	0.569	0.110	282,598	Construction	0.643	0.063	4,969,117
	(0.136)	(0.048)			(0.145)	(0.082)	
Wood, paper and printing	0.813	0.048	552,510	Wholesale and retail trade	0.752	0.098	8,502,337
	(0.118)	(0.105)			(0.171)	(0.138)	
Coke and refined petroleum	0.720	0.341	2,472	Transportation	0.822	0.063	988,348
	(0.250)	(0.074)			(0.151)	(0.145)	
Chemicals	0.821	0.156	62,567	Accomodation and food services	0.590	0.197	3,076,031
	(0.059)	(0.073)			(0.151)	(0.128)	
Pharmaceuticals	1.013	0.067	11,657	Publishing and motion pictures	1.118	-0.005	309,540
	(0.344)	(0.295)			(0.237)	(0.214)	
Rubber and plastic products	0.772	0.127	245,896	Telecommunications	1.160	-0.083	25,191
	(0.150)	(0.164)			(0.187)	(0.213)	
Basic Metals	0.734	0.115	545,742	ICT	0.937	-0.015	324,622
	(0.131)	(0.094)			(0.128)	(0.135)	
Computers and electronics	0.757	0.104	110,072	Legal, accounting and engineering	0.857	-0.017	1,499,590
	(0.071)	(0.023)			(0.150)	(0.144)	
Electrical equipments	0.749	0.130	50,476	Scientific research	0.956	0.067	30,461
	(0.026)	(0.048)			(0.242)	(0.211)	
Machinery and equipments	0.842	0.076	161,603	Advertising and market research	1.006	-0.109	406,636
	(0.071)	(0.046)			(0.091)	(0.092)	
Transport equipments	0.840	0.122	71,000	Administrative and support	0.737	0.052	1,401,753
	(0.159)	(0.139)			(0.120)	(0.157)	
Other manufacturing products	0.795	0.015	650,254	Total	0.734	0.086	25,744,576
	(0.089)	(0.073)			(0.175)	(0.137)	

Note: This table reports the output elasticities from non rolling estimation of the translog production function. Columns θ_l and θ_k report the median estimated output elasticity with respect to each factor of production for the translog production function for all firms. Column N report the number of observations in each sector. Standard deviations (not standard errors) of the output elasticities are reported in brackets.

Table D.3: Median Output Elasticities, Rolling Estimation

	θ_l	θ_k	N		θ_l	θ_k	N
Mining	0.612	0.334	45,698	Gas and electricity	0.688	0.265	22,243
	(0.199)	(0.162)			(0.190)	(0.174)	
Food products	0.750	0.134	1,277,913	Water supply and waste	0.639	0.211	118,249
	(0.052)	(0.104)			(0.178)	(0.146)	
Textiles	0.540	0.118	282,598	Construction	0.605	0.084	4,969,117
	(0.221)	(0.157)			(0.175)	(0.087)	
Wood, paper and printing	0.803	0.050	552,510	Wholesale and retail trade	0.762	0.105	8,502,337
	(0.110)	(0.104)			(0.175)	(0.145)	
Coke and refined petroleum	0.258	0.433	2,472	Transportation	0.835	0.060	988,348
	(0.391)	(0.258)			(0.156)	(0.148)	
Chemicals	0.808	0.179	62,567	Accomodation and food services	0.585	0.192	3,076,031
	(0.143)	(0.122)			(0.174)	(0.133)	
Pharmaceuticals	0.981	0.106	11,657	Publishing and motion pictures	1.163	-0.023	309,540
	(0.359)	(0.286)			(0.245)	(0.215)	
Rubber and plastic products	0.759	0.136	245,896	Telecommunications	1.111	-0.056	25,191
	(0.159)	(0.176)			(0.242)	(0.217)	
Basic Metals	0.726	0.117	545,742	ICT	0.921	0.008	324,622
	(0.128)	(0.095)			(0.140)	(0.140)	
Computers and electronics	0.756	0.091	110,072	Legal, accounting and engineering	0.843	-0.012	1,499,590
	(0.084)	(0.068)			(0.164)	(0.150)	
Electrical equipments	0.774	0.142	50,476	Scientific research	0.881	0.017	30,461
	(0.136)	(0.101)			(0.259)	(0.230)	
Machinery and equipments	0.823	0.093	161,603	Advertising and market research	0.887	-0.056	406,636
	(0.137)	(0.069)			(0.269)	(0.140)	
Transport equipments	0.837	0.131	71,000	Administrative and support	0.753	0.047	1,401,753
	(0.180)	(0.156)			(0.126)	(0.165)	
Other manufacturing products	0.748	0.051	650,254	Total	0.733	0.096	25,744,576
	(0.129)	(0.080)			(0.193)	(0.143)	

Note: This table reports the output elasticities from rolling estimation of the production function. Columns θ_l and θ_k report the median estimated output elasticity with respect to each factor of production for the translog production function for all firms. Column N report the number of observations in each sector.Standard deviations (not standard errors) of the output elasticities are reported in brackets.

Table D.4: Correlations Between Variations in Industry-Level Concentration and Markup, Non Rolling

	Industry Markup		Across Markup Quantiles		Within High Markup Quantiles	
Manufacturing						
Top 1% Share	0.1759		0.1480		-0.0111	
	(0.0242)		(0.0202)		(0.0174)	
Top 5% Share		0.3109		0.2818		-0.0177
		(0.0329)		(0.0274)		(0.0237)
Observations	2,122	2,131	2,129	2,138	2,125	2,136
R2	0.0893	0.0985	0.0543	0.0768	0.0536	0.0573
Manufacturing						
4 Largest Share	0.2511		0.2081		-0.0788	
	(0.0303)		(0.0258)		(0.0219)	
20 Largest Share		0.3305		0.3267		-0.0433
		(0.0371)		(0.0314)		(0.0268)
Observations	2,112	2,138	2,118	2,144	2,113	2,139
R2	0.0918	0.0944	0.0628	0.0787	0.0580	0.0546
Non Manufacturing						
Top 1% Share	0.2438		0.1465		0.0534	
	(0.0207)		(0.0201)		(0.0152)	
Top 5% Share		0.2679		0.2296		0.0782
		(0.0294)		(0.0281)		(0.0210)
Observations	2,218	2,213	2,211	2,205	2,215	2,212
R2	0.0809	0.0628	0.0311	0.0367	0.0490	0.0499
Non Manufacturing						
4 Largest Share	0.1671		0.1565		-0.0541	
	(0.0241)		(0.0230)		(0.0175)	
20 Largest Share		0.1891		0.2202		-0.0643
		(0.0267)		(0.0251)		(0.0194)
Observations	2,191	2,165	2,185	2,159	2,191	2,165
R2	0.0443	0.0482	0.0286	0.0424	0.0495	0.0507

Note: Each estimate is the result of OLS estimation at the 3-digit industry with year fixed-effects. The dependent variable in columns "Industry Markup" is the long-term change of the industry aggregate markup. The dependant variable in columns "Across Markup Quantiles" and "Within High Markup Quantiles" are the corresponding contributions to the industry aggregate markup according to the decomposition described in Appendix B, where high quantiles are the top 5%. The independent variables are the changes of the share of sales of the top 1%, top 5 %, largest 4 and largest 20 firms.

Table D.5: Correlations Between Variations in Industry-Level Concentration and Markup, Rolling

	Industry Markup		Across Markup Quantiles		Within High Markup Quantiles	
Manufacturing						
Top 1% Share	0.2142		0.1339		-0.0136	
	(0.0340)		(0.0299)		(0.0217)	
Top 5% Share		0.3852		0.2882		0.0279
		(0.0471)		(0.0417)		(0.0297)
Observations	2,135	2,146	2,135	2,145	2,131	2,142
R2	0.0959	0.1068	0.0697	0.0755	0.0704	0.0675
Manufacturing						
4 Largest Share	0.2977		0.1667		-0.0237	
	(0.0435)		(0.0390)		(0.0274)	
20 Largest Share		0.4232		0.2449		0.0518
		(0.0531)		(0.0476)		(0.0334)
Observations	2,126	2,152	2,126	2,152	2,117	2,143
R2	0.1004	0.1067	0.0636	0.0672	0.0632	0.0665
Non Manufacturing						
Top 1% Share	0.3458		0.0906		0.0804	
	(0.0403)		(0.0381)		(0.0192)	
Top 5% Share		0.3685		0.0591		0.0729
		(0.0570)		(0.0535)		(0.0270)
Observations	2,199	2,194	2,183	2,178	2,198	2,193
R2	0.0515	0.0393	0.0406	0.0370	0.0267	0.0216
Non Manufacturing						
4 Largest Share	0.1344		0.1047		-0.0756	
	(0.0475)		(0.0432)		(0.0223)	
20 Largest Share		0.0327		0.0968		-0.1055
		(0.0533)		(0.0484)		(0.0248)
Observations	2,174	2,147	2,156	2,130	2,175	2,149
R2	0.0248	0.0222	0.0422	0.0411	0.0259	0.0278

Note: Each estimate is the result of OLS estimation at the 3-digit industry with year fixed-effects. The dependent variable in columns "Industry Markup" is the long-term change of the industry aggregate markup. The dependant variable in columns "Across Markup Quantiles" and "Within High Markup Quantiles" are the corresponding contributions to the industry aggregate markup according to the decomposition described in Appendix B, where high quantiles are the top 5%. The independent variables are the changes of the share of sales of the top 1%, top 5 %, largest 4 and largest 20 firms.

Table D.6: Correlation between Labor Share and Markup, Non Rolling

Labor Share	Manufacturing			Non Manufacturing		
	No FE	Industry FE	Firm FE	No FE	Industry FE	Firm FE
No Size Threshold						
Markup	-0.3766	-0.3768	-0.3614	-0.3435	-0.3703	-0.3567
	(0.0099)	(0.0066)	(0.0087)	(0.0031)	(0.0025)	(0.0028)
Observations	4,189,494	4,189,478	4,133,837	21,365,067	21,365,055	20,958,750
R2	0.568	0.590	0.774	0.429	0.506	0.772
More than 50 Employees						
Markup	-0.4789	-0.5017	-0.5483	-0.4019	-0.4180	-0.4678
	(0.0045)	(0.0051)	(0.0060)	(0.0041)	(0.0039)	(0.0054)
Observations	296,014	295,922	291,562	511,989	511,883	497,926
R2	0.566	0.640	0.806	0.523	0.578	0.822
More than 100 Employees						
Markup	-0.4490	-0.4765	-0.5204	-0.3823	-0.3988	-0.4420
	(0.0040)	(0.0058)	(0.0071)	(0.0037)	(0.0047)	(0.0066)
Observations	157,602	157,514	155,793	240,699	240,504	234,975
R2	0.551	0.644	0.809	0.527	0.587	0.833
More than 1000 Employees						
Markup	-0.3782	-0.4376	-0.4396	-0.3241	-0.3387	-0.3949
	(0.0125)	(0.0148)	(0.0168)	(0.0122)	(0.0084)	(0.0135)
Observations	10,154	9,347	9,238	16,530	15,958	15,601
R2	0.504	0.739	0.871	0.556	0.706	0.911

Note: Each estimate is the result of OLS estimation of firm level labor share on markups, for four samples: all firms, firms with more than 50 employees, 100 employees, and 1000 employees; and two panels: manufacturing and non manufacturing firms. All columns include year fixed effects. Columns "No FE" include no industry nor firm fixed effect. Columns "Industry FE" include 3-digit industry-level fixed effects. Columns "Firm FE" include firm-level fixed effects. Standard errors are clustered at the 3-digit x year industry level.

Table D.7: Correlation between Labor Share and Markup, Rolling

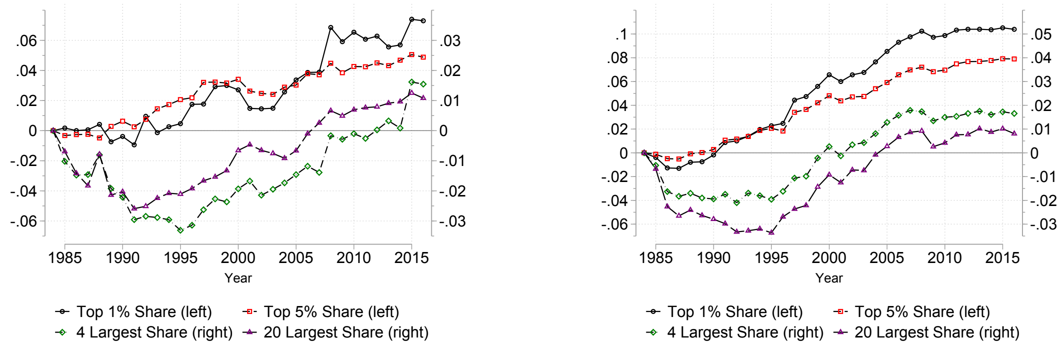
Labor Share	Manufacturing			Non Manufacturing		
	No FE	Industry FE	Firm FE	No FE	Industry FE	Firm FE
No Size Threshold						
Markup	-0.3625	-0.3719	-0.3566	-0.3100	-0.3485	-0.3338
	(0.0090)	(0.0061)	(0.0081)	(0.0035)	(0.0024)	(0.0029)
Observations	4,189,494	4,189,478	4,133,837	21,365,067	21,365,055	20,958,750
R2	0.532	0.567	0.767	0.387	0.475	0.760
More than 50 Employees						
Markup	-0.4354	-0.4727	-0.5062	-0.4013	-0.4153	-0.4617
	(0.0102)	(0.0061)	(0.0071)	(0.0038)	(0.0041)	(0.0054)
Observations	296,014	295,922	291,562	511,989	511,883	497,926
R2	0.506	0.600	0.783	0.511	0.567	0.817
More than 100 Employees						
Markup	-0.4004	-0.4463	-0.4754	-0.3818	-0.3981	-0.4390
	(0.0074)	(0.0067)	(0.0083)	(0.0047)	(0.0050)	(0.0067)
Observations	157,602	157,514	155,793	240,699	240,504	234,975
R2	0.486	0.604	0.786	0.511	0.577	0.829
More than 1000 Employees						
Markup	-0.3053	-0.3912	-0.3805	-0.3439	-0.3624	-0.4000
	(0.0138)	(0.0188)	(0.0214)	(0.0065)	(0.0077)	(0.0141)
Observations	10,154	9,347	9,238	16,530	15,958	15,601
R2	0.409	0.691	0.852	0.543	0.707	0.909

Note: Each estimate is the result of OLS estimation of firm level labor share on markups, for four samples: all firms, firms with more than 50 employees, 100 employees, and 1000 employees; and two panels: manufacturing and non manufacturing firms. All columns include year fixed effects. Columns "No FE" include no industry nor firm fixed effect. Columns "Industry FE" include 3-digit industry-level fixed effects. Columns "Firm FE" include firm-level fixed effects. Standard errors are clustered at the 3-digit x year industry level.

E Figures

Figure E.1: Cumulative Change in Concentration

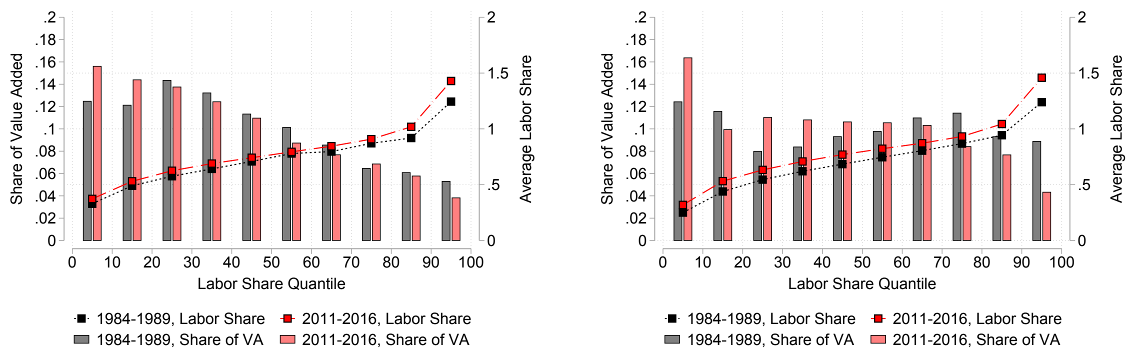
(a) Manufacturing Industries (b) Non Manufacturing Industries



Note: This figure reports the cumulative change of concentration in sales across each 3-digit industry. Sample is firms in the market sectors, excluding agriculture, finance and real estate. Industry changes in concentration are weighted by the share of each industry in total sales the previous year.

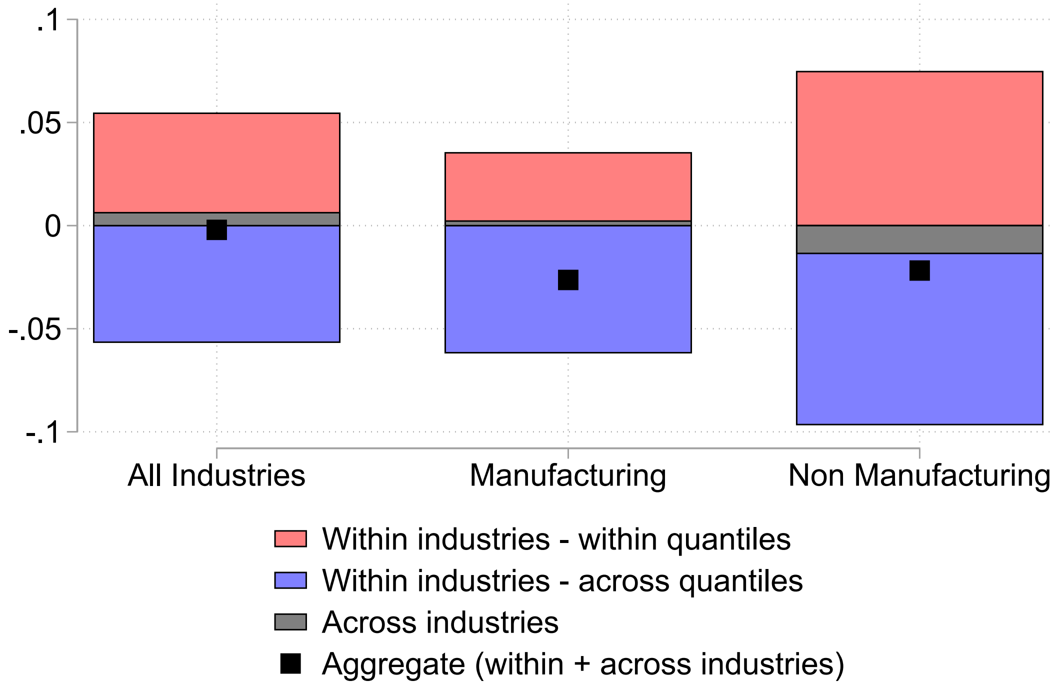
Figure E.2: Distributions of Labor Shares and Value Added

(a) Manufacturing Industries (b) Non Manufacturing Industries



Note: The connected lines (right axis) reflect the raw cross-firm distribution of labor shares. The vertical bars (left axis) reflect the share of industry value added of firms in each unweighted decide of labor share. These distributions are averaged across 3-digit industries using value added weights in a given year, and then average across 5 year periods.

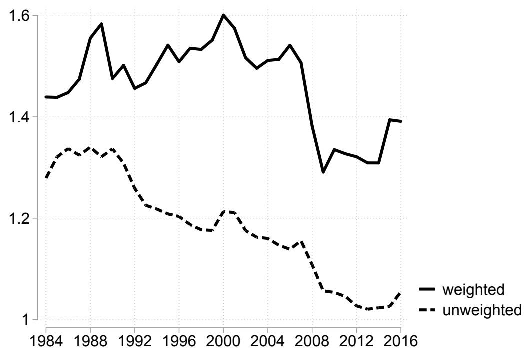
Figure E.3: Decomposition of the Cumulative Change in Aggregate Labor Share



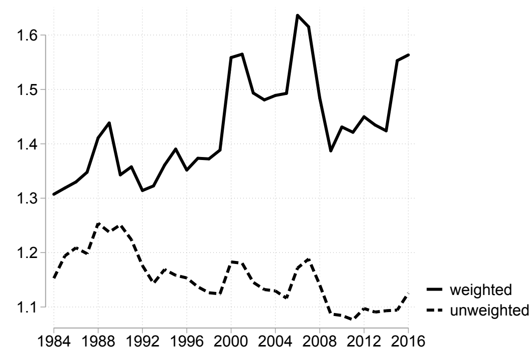
Note: This figures reports the results of decomposition of the aggregate labor share described in Appendix B. Quantiles of labor share are calculated each year within 3-digit industries.

Figure E.4: Aggregate Markup

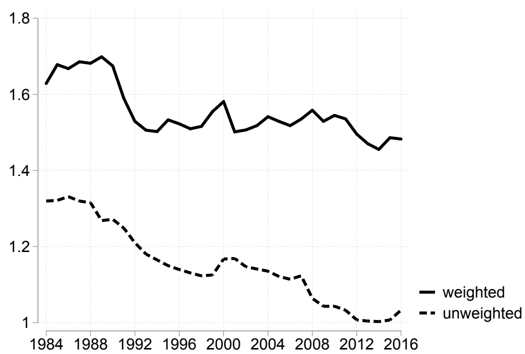
(a) Manufacturing, Non Rolling



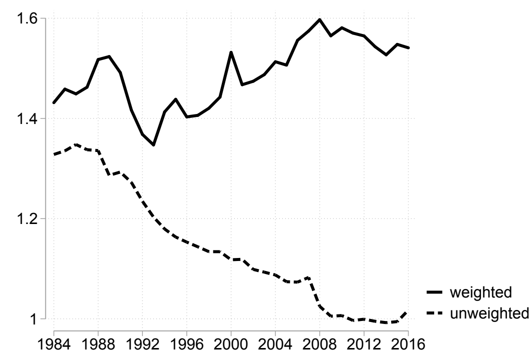
(b) Manufacturing, Rolling



(c) Non Manufacturing, Non Rolling



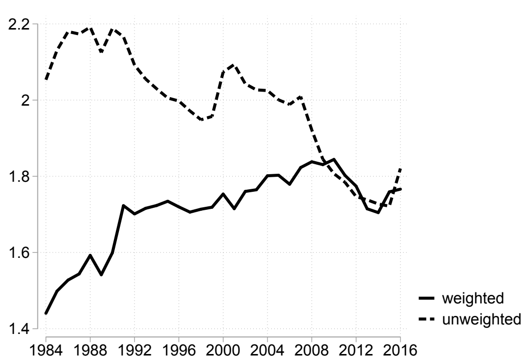
(d) Non Manufacturing, Rolling



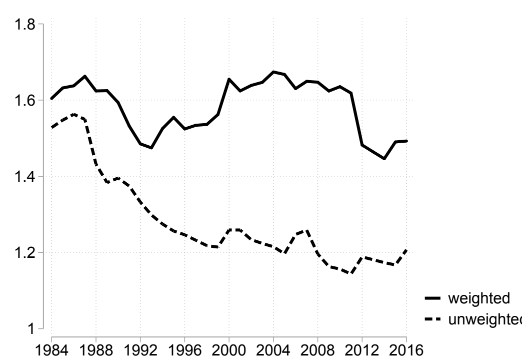
Note: This figures reports the levels of the weighted and unweighted mean markup based on non-rolling and rolling estimation of a translog value-added production function.

Figure E.5: Aggregate Markup - ACF

(a) ACF - Non Rolling



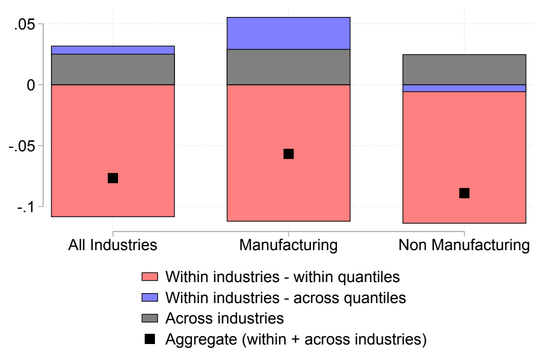
(b) ACF - Rolling



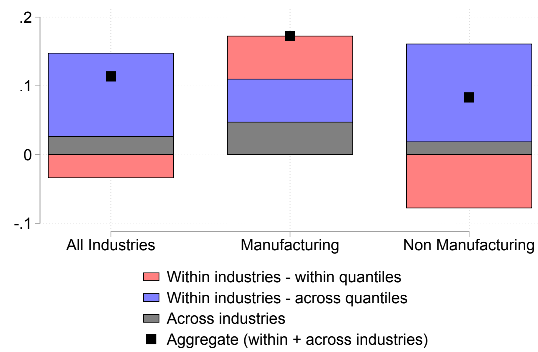
Note: This figures reports the levels of the weighted and unweighted mean markup based on non-rolling and rolling estimation of a translog value-added production function following the ACF procedure.

Figure E.6: Decomposition of Aggregate Markup

(a) Non Rolling



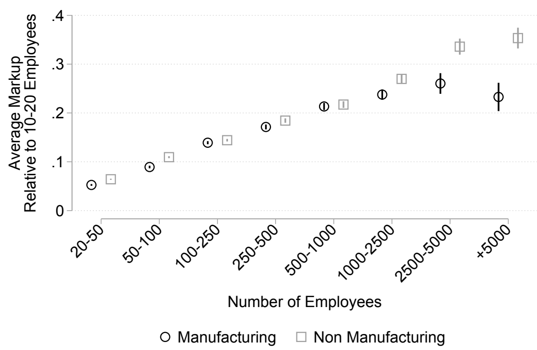
(b) Rolling



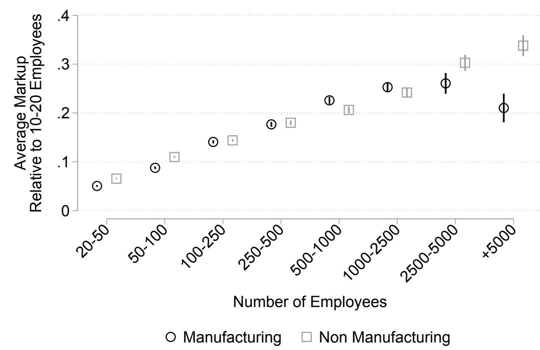
Note: This figures reports the results of decomposition of the aggregate markup described in Appendix B. Quantiles of markup are calculated each year within 3-digit industries.

Figure E.7: Correlations with Size

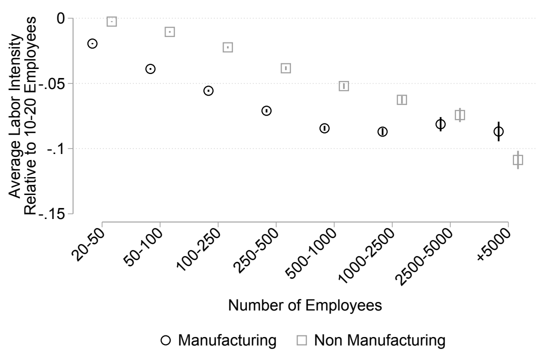
(a) Markup, Non Rolling



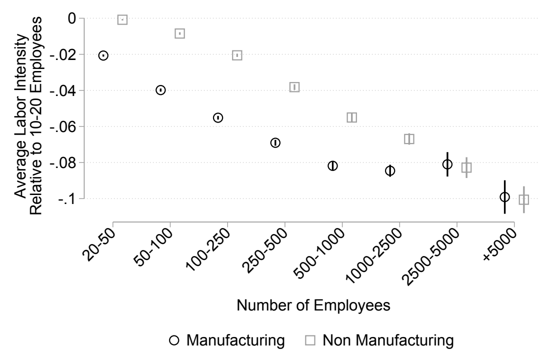
(b) Markup, Rolling



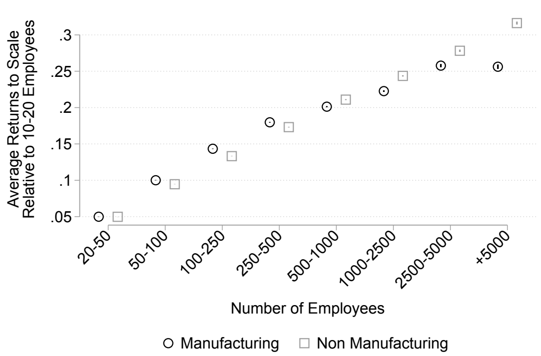
(c) Labor Intensity, Non Rolling



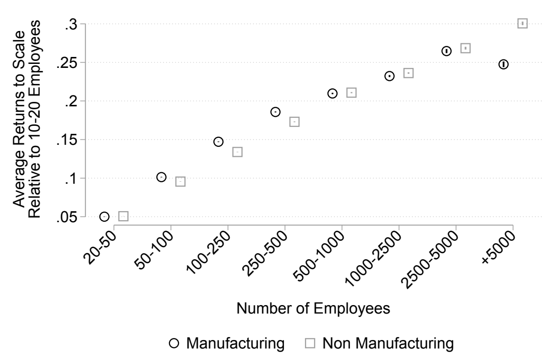
(d) Labor Intensity, Rolling



(e) Returns to Scale, Non Rolling



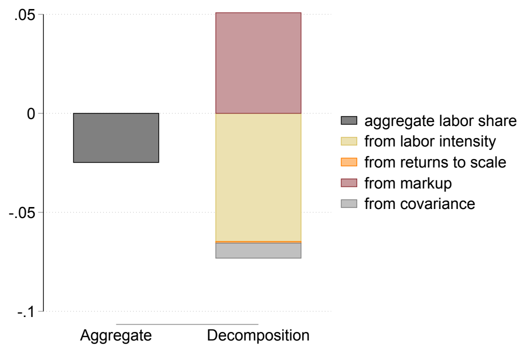
(f) Returns to Scale, Rolling



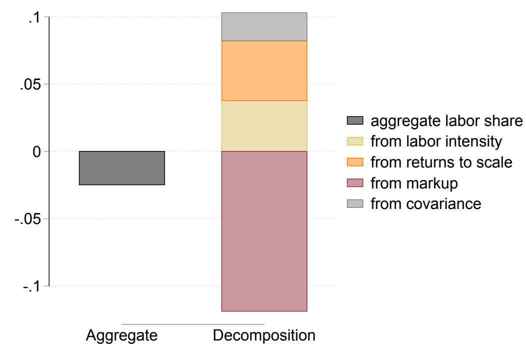
Note: This figure reports the conditional average markup, labor intensity and returns to scale by firm size, with 99% confidence interval. Averages are conditional on a set of flexible fixed effects constructed from the interaction of 3-digit industry codes and year.

Figure E.8: Contributions to the Evolution of the Aggregate Labor Share, Representative Firm

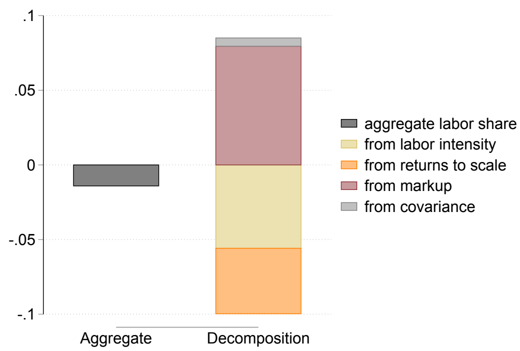
(a) Manufacturing, Non Rolling



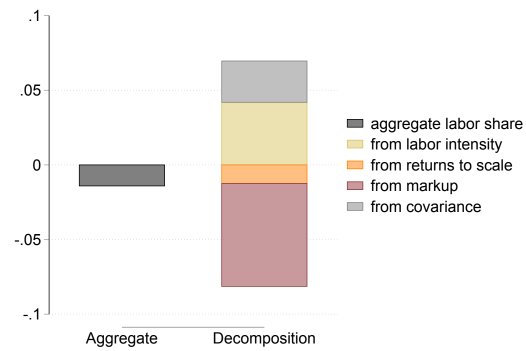
(b) Manufacturing, Rolling



(c) Non Manufacturing, Non Rolling



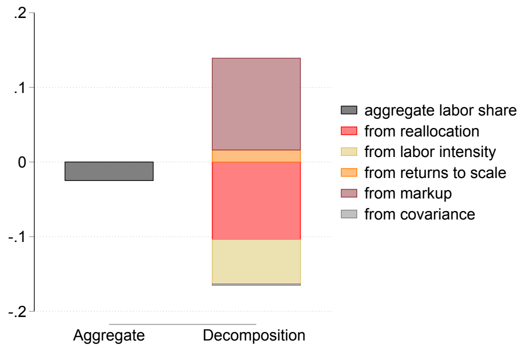
(d) Non Manufacturing, Rolling



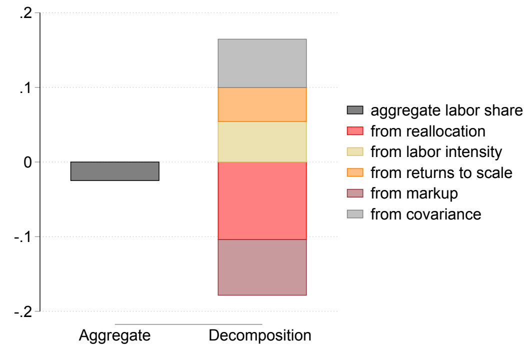
Note: This figure reports the decomposition of the variation of the aggregate labor share of the representative firm from 1984 to 2016, based on translog non-rolling and rolling value-added estimation of the production function. See section 6 for detail.

Figure E.9: Contributions to the Evolution of the Aggregate Labor Share, With Reallocation

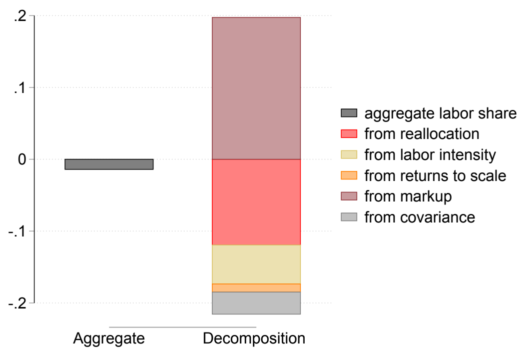
(a) Manufacturing, Non Rolling



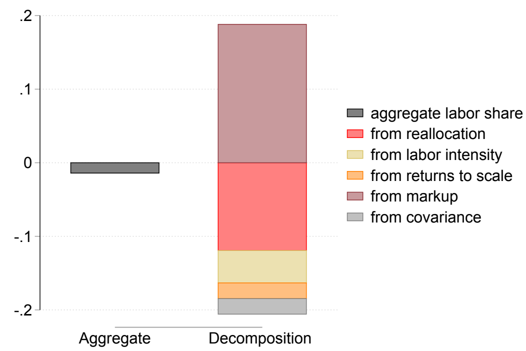
(b) Manufacturing, Rolling



(c) Non Manufacturing, Non Rolling



(d) Non Manufacturing, Rolling



Note: This figure reports the decomposition of the variation of the aggregate labor share from 1984 to 2016, including the reallocation term, based on translog non-rolling and rolling value-added estimation of the production function. See section 6 for detail.

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