The Firms behind the Labor Share: Evidence from Danish Micro data

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Abstract

We establish a sizable shift in the individual labor shares of Danish firms since 1999. Whereas the mean and median labor shares have increased by around 5 points, the labor share of the largest firms is much lower today, in particular the labor share of manual workers. A substantial part of this is driven by the top 1 per cent of firms that have grown substantially bigger. The main driver of this is an increase in markups, though large firms have become more capital intensive during the period. We show that investments in capital and R&D predict declines in the labor share. Though offshoring activities have impacted the labor share it is not a strong quantitative driver of the results. We show that these changes tie strongly to the firms' export behavior: Large firms with lower labor share scale up value of exports, though not number of destinations nor product category. The increase in value comes predominantly from increases in quantity.

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1 Introduction

A number of recent studies have documented a decline of the aggregate labor share, the share of total GDP that is paid out to labor. This trend is present in a number of different countries (Karabarbounis and Neiman, 2014). This is interesting both for theoretical reasons, since it undermines one of the well-established Kaldor facts (Kaldor, 1961), and because it hones in on one of the central elements of inequality: the distinction between payments to labor and payments to capital. We establish that the labor share has indeed declined, particularly in the manufacturing sector, but that the most striking feature is a substantial shift of value added to low labor share firms.

A number of different explanations for the decline in the aggregate labor share have been proposed, ranging from automation (Hemous and Olsen, 2022a), declining prices of equipment (Karabarbounis and Neiman, 2014), changes in markups (de Loecker, Eeckhout and Unger, 2020), and imputation of labor income for proprietors (Elsby, Hobijn and Sahin, 2013). In a significant contribution, Kehrig and Vincent (2021) make clear that understanding the underlining micro dynamics of the labor share of individual firms is important. In particular, they establish that the aggregate decline in the labor share in US manufacturing is the result of two opposite trends: the increase in the labor share of the average firm (defined as total labor payments over value added) and a substantial decline in the labor share of the biggest firms. We recover similar dynamics in the Danish economy but move a step further. In particular we establish that i) this shift holds for the broad economy, ii) that it is dominated by the very biggest firms, iii) that it is not due to disproportionate growth of low labor share firms but instead to an increase in the size of firms who become low labor share, and iv) The effect is substantially driven by the export behavior of firms: Finally, we show that more than half of such increases in exports are driven by increases in quantity and not prices.

The paper begins by establishing several patterns on the distribution of labor shares. In particular, we show that whereas the past 20 years have seen an increase in the (unweighted) median and mean of the labor share across firms, this has been countered by a substantial decline in the covariance between the size of the firm and its labor share. This trend has happened in all major sectors of the economy, but most strongly in the manufacturing sector. The covariance is mainly driven by the share of value added accounted for by the bottom quintile of firms by labor share. Whereas 20 years ago they accounted for a little more than 20 per cent of value added in manufacturing, the share is now around 60 percent. Splitting the labor share based on occupations shows a stark difference: The share of knowledge and management workers employed by low labor share firms has closely tracked that of value added and in 2019 account for around 45 per cent of total employment of knowledge and management workers. In contrast, low labor share firms have employed around 20 per cent of the manual workers throughout the period.

We establish that the top 1 per cent of the size distribution are essential: The shift in correlation between the labor share and the size of firms within the bottom 99 per cent of firms is smaller. We further establish that there has been an increase in the dispersion of size, especially within the very largest firms. This is true both for domestic sales and exports. Exports have been an important driver of the overall dynamics. First, the trends are more pronounced in export-oriented industries. Second, large firms with low labor share have grown more export-oriented. We calculate markups for firms and show that the primary driver of the decline in the labor share is not an increase in the capital share, but an increase in markups, particularly for the largest firms.

We move on to establish a series of results using the dynamic dimension of the data: First, being in the bottom 20 per cent of low labor share firms is surprisingly transitory: Only 50 per cent of firms with low labor share were low labor share firms 5 years earlier or will be 5 years from now. Second, consistent with the findings in Kehrig and Vincent (2021) most of the adjustment in the labor share occurs through movements in value added of a firm. That is, the effect is not primarily driven by low labor share firms growing bigger, or large firms getting a smaller labor share, but by the *simultaneous* move in both. We go one step further and show that the transition to low labor share firms now happens disproportionately for large firms. This gradual accumulation of large firms into low labor share status is the primary driver behind the growing role of low labor share firms.

We use the panel dimension of the data to demonstrate that both capital investments and R&D expenditure predict declines in the labor share. Turning to offshoring we are able to utilize the methodology of Hummels et. al. to establish a causal effect. We show that although offshoring plausibly has a negative influence on the labor share of individual firms it does not contribute significantly to the increased share of low labor share firms.[1]

[1] A number of other forms of international production have grown exponentially over the past decades, notably factoryless (foreign) production and merchanting. We discuss these more explicitly and show that they might be able to account for some 20 per cent of the overall decline in the labor share in manufacturing. We also discuss the use of foreign subsidiaries.

Though we draw no strong conclusions regarding the driving force behind these trends, the results are consistent with positive demand shocks, notably from abroad (possibly from own R&D) coupled with increasing returns to scale in production. The facts seem inconsistent with an explanation of monopsony power in labor markets, or the offshoring of production capacity.

There is relatively recent but rapidly growing literature examining the shifts in the labor share. In a seminal paper, Karabarbounis and Neiman (2014) documented a decline in the labor share in most major economies. Globally, they found that the corporate labor share has declined by 5 p.p. from around 64% in 1975 to 59% in 2012. Piketty and Zucman (2014) also provide evidence of a decline in the aggregate labor share in most developed economies (US, Japan, Germany, France, Italy, UK) between 1975 and 2010. A large literature has since emerged which tries to explain this new trend.

The first set of theories focus on the aggregate data. Karabarbounis and Neiman (2014) themselves find in cross-country regressions that half of the decline in the labor share can be attributed to a decline in the price of equipment goods (as they find capital and labor to be gross substitute) and the other half to an increase in markups. Eden and Gaggl (2018) argue specifically that the decline in the cost of IT equipment is responsible. Hubmer (2020) shows that investment specific technical change can account quantitatively for the decline in the labor share in the US in a neoclassical model with non-homothetic preferences (as richer households prefer more labor-intensive goods). Relatedly, Hémous and Olsen (2022a) and Acemoglu and Restrepo (2018) build endogenous growth models where automation allows the replacement of workers in certain tasks with machines leading to a decline in the labor share. Martinez (2019) brings a similar model to cross-sectoral data and shows that automation plays a large role in explaining industry trends in the labor share.

An alternative theory highlights the role of markups. Barkai (2020) estimates that the physical capital share has also declined, so that the decline in the labor share comes from a rise in profits. De Loecker, Eeckhout and Unger (2020) and De Loecker and Eeckhout (2020) show that markups have increased considerably both in the United States and globally and that this increase can explain the decline in the labor share.[2] Eggerstsson, Robins and Wold (2018) build a DSGE model with market power and show that an increase in market power can quantitatively account for the decline in the labor share (as well as other recent features of the economy). Our (and others') move to micro

[2]Relatedly, Guttierez and Philippon (2017) provide some evidence that an increase in regulation caused an increase in concentration in the US.

data is motivated by the desire to distinguish between these two competing theories. We find strong support for increasing markups for large firms, though these firms have also become more capital-intensive.

Others dispute or bring some nuance to the notion that the decline in the labor share is an economy-wide phenomenon: Rognlie (2015) emphasizes the role of housing in driving aggregate trends. Elsby, Hobijn, and Sahin (2013) argue that 1/3 of the aggregate decline in the US labor share is a statistical artifact related to how the labor income of self-employed individuals is counted (they also highlight offshoring as a possible explanation for the decline in the labor share). Koh, Santaeulalia-Llopis, and Zheng (2020) find that the entire decline in the aggregate labor share results from the capitalization of intellectual property products (IPP): if, following the previous convention, IPPs were counted as intermediates instead of investment, the aggregate labor share would be trendless. These elements do play a part in the movements of the aggregate labor share in Denmark. However, our focus is on the within sector trend in labor share and notably the reallocation of value added across firms instead of the evolution of the economy-wide labor share.

Two papers describe striking changes in the firm-level distribution of labor shares. Kehrig and Vincent (2021) study firms in the US manufacturing sector and find that a larger share of value added has been performed by low labor share firms over time. This reallocation effect explains the decline in the aggregate labor share. Meanwhile the median firm has even seen an increase in its labor share and low labor share firms a further decline. We find similar for the whole Danish economy. In addition, they find that low labor share firms seem to increase their value. We replicate these data for Danish firms. Our analysis brings additional light to their analysis by splitting the labor share based on occupation. In addition, we utilize much more comprehensive data on price and quantity for exports and other international activities. Whereas Kehrig and Vincent (2021) find that the increases in value added comes primarily through prices and not quantity, this is not our finding for the Danish economy (based on export data). We cannot distinguish whether our results for the Danish economy contrast with because Denmark and the US follow different patterns, whether it's a distinction between export and total sales or because we have access to higher quality data. Autor, Dorn, Katz, Patterson and Van Reenen (2020) conduct a related analysis for the whole US economy. They find that the reallocation effect accounts for the decline in the aggregate labor share and they relate it to a rise in concentration at the sectoral level. They also find weaker evidence of a correlation between the decline in the labor share (through a reallocation effect) and a rise in concentration in Europe across sectors. One limit of their study is that, contrary to us, they cannot compute value added outside manufacturing and instead use the payroll to sales ratio as a proxy for the labor share. De Loecker, Eeckhout and Unger (2020), De Loecker and Eeckhout (2020) and van Vlokhoven (2021) also provide evidence consistent with a reallocation of value-added toward low labor share / high markup firms. Further, Bockerman and Maliranta (2012) also find a major role for reallocation in explaining the decline in the labor share in manufacturing in Finland and correlate this decline at the industry-region level with trade intensity. We build on this literature by having more detailed data, which allows us to analyze the likely sources (automation, trade, offshoring, etc.) of changes in the labor share distribution and we expand on the dynamic aspect of the labor share.

A few recent theoretical papers aim at explaining these micro evidence. Akcigit and Ates (2021) build an endogenous growth model where a decline in knowledge diffusion between leaders and laggards lead to a decline in business dynamism, a rise in concentration and therefore a drop in the labor share. Aghion, Bergeaud, Boppart, Klenow and Li (2019), De Ridder (2020) and Lashkari, Bauer and Boussard (2020) emphasize the role of the IT revolution which allows certain firms to reduce span of control costs, to decrease marginal costs or simply benefit larger firms more due to a non-homotheticity in production (Bessen, 2017, provide related empirical evidence on the role of IT in increasing concentration). Importantly, Hubmer and Restrepo (2021) show that a model with heterogeneous adoption of automation technologies can also account for a decline in the aggregate labor share driven by a few firms while the median firm sees a rise in its labor share (as capital and labor are complement across tasks). Other explanations include an increase in productivity dispersion combined with labor market frictions (Gouin-Bonenfant, 2020) and demographic changes associated with a decline in entry (Hopenhayn, Neira and Singhania, 2018, and Peters and Walsh, 2019). Our data allow us to account for these explanations but will also push us to look at the role of international trade and selection along the lines of Melitz (2003).

The paper proceeds in the following manner. In Section 2 we briefly introduce the data we employ before proceeding to the cross-sectional trends in the aggregate and mean labor shares in Section 3. We supplement this by showing the importance of very large firms in Section 4. In Section 5 we anlyze the role of capital and R&D investments. Section 6 delves into the import roles played by imports and exports. We then proceed to employ the dynamic aspects of our data in Section 7 before decomposing export growth in Section 8. Section 9 concludes. Throughout we relegate a substantial amount of the detailed analysis to the Appendix which also contains various robustness checks.

2 The data

In this section, we describe the firm and worker datasets that we will employ as well as a number of survey data of firm activity. We keep the discussion limited and refer the reader to more extensive information in the Appendix

The firm data

We use the Firm Statistics Register (FirmStat) administrative data, to gather information on firm sales, value-added, full-time equivalent employment, capital, export and imports as well as industry at the 6-digit NACE level.[3] This data is available for the population of Danish firms (excluding agriculture) from 1999 until 2017 and for certain industries, including manufacturing back to 1995. Our focus will be partly on the manufacturing industry and partly on the whole private economy though we subtract agriculture, finance, health and education.[4] In what follows references to the whole private economy will exclude these four sectors. This captures between 70 and 75 per cent of private employment each year. Throughout we focus on firms with at least 5 employees. We winsorize labor shares at the -1 and 3 year which generally binds at the 0.4 percentile and the 99.5 percentile and doesn't vary much throughout the sample. In addition, we perform certain adjustments for what seem completely legal and not economic changes to firm structure.[5]

[3]We employ the official definition of value added used by Statistics Denmark, although it subtracts some form of rents and expenses for temp agencies. We conduct robustness checks where we use the more traditional measures of value added without subtracting rent. These items are sufficiently small and it does not alter the overall analysis.

[4]For historical reasons the agricultural sector is collected separately from the remaining industries. We further exclude the financial sector since value added is less clearly defined for financial services. Finally, health and education are largely run by the government and private entities in these sectors are typically highly restricted in their activity. We include all private entities in other industries, including corporations wholly owned by the government. To avoid effects from changing ownership or changes of industries all firms' status as private and industry-classification are determined by the year they have the most employees.

[5]Specifically, it often happens that a firm shuts down, another opens of similar size with the same employees (not just same number of employees). In these cases we join these two firms into one. See Appendix 10 for details.

(1000s)	Manufacturing		Private Sector	
	1995	2017	1999	2017
Firms (at least one employee)	13	9	84	82
Firm (at least 5 employees)	7	5	34	30
Total Employment	370	279	1,098	1,107
(Per cent)				
Share of firms with >= 50 employees	9.2	10	3.6	3.6
Share of firms with positive exports	45	55	24	28

Note: Total Corporate Sector excludes government, agriculture, finance, education and health

Table 1: Summary Statistics

Our focus on the manufacturing sector is guided by four facts: i) The dominant role of large firms is more pronounced in the manufacturing sector, ii) the most prominent explanations for the decline in the labor share — such as automation, offshoring, competitive pressure by offshoring — are most easily identified with the manufacturing sector, iii) our data extends back to 1995 for the manufacturing sector, but only 1999 for the overall economy and the export data is more comprehensive for goods than services, iv) to facilitate comparison to other papers such as Kehrig and Vincent (2020) which focus on the manufacturing sector. Table 1 demonstrates the manufacturing sector constitutes around 25 per cent of employment in the private sectors we consider. In 1995 the Danish population in 5,7 million in 2017.

The employee data

We augment the firm data with detailed employee information through the Integrated Database for Labor Market Research (IDA) which covers the universe of Danes between 15-74. These data include information on age, educational attainment. This dataset includes occupational categories which we convert into 2-digit ISCO codes. The employee data allows us to look at occupation-group specific labor shares.

R&D Survey

All firms with more than 50 employees are surveyed as well as firms with 20-50 in industries deemed of specific interest. We combine this with a survey of research and development activity. This includes a large amount of information but we rely on employment of people in R&D related activities.

3 The Labor Share

In this section, we describe the trends in our primary object of interest: the individual labor shares of the firm. We produce a number of results which demonstrate the important role of the micro-level data for the aggregate trends. We demonstrate a declining covariance between the labor share and the size of the firm as measured by value added.

3.1 The labor share: Aggregate Decline, Micro-level Increase

3.1.1 Labor share and size have become negatively correlated.

We initially present the labor share of individual firms in the manufacturing industry as well as the the private sector as a whole. We take the same approach as Kehrig and Vincent (2021) and produce an unweighted histogram of all firms (with weakly more than 5 employees) as well as the labor share weighted by value added. This figure only uses firms with positive value added. Figure 1 shows the results restricted to firms with a labor share between 0 and 1.4. The top row shows the labor share for the manufacturing sector for 1995, 2007 and 2017, respectively. In addition we add a curve with the weighted labor shares using locally linear regressions where the weights are the value added of the firm (using only firms with positive value added). The median and (unweighted) mean are both 72 per cent in 1995 and increase to 78 and 77 per cent, respectively in 2017. Whereas in 1995, the weighted and unweighted histograms overlap closely, in 2017 there is a substantial shift to the left. The bottom quintile of the labor share distribution accounted for 23 per cent of value added in 1995, but 50 per cent in 2017.

The second row shows the results for the private economy. Though less dramatic, the overall trends are the same. Median labor share has increased from 75 per cent to 79 per cent and the share of labor share captured by the bottom quintile has increased from 23 to 38 per cent. As we will show below this is not just a feature of the private economy including manufacturing. Though less strong, similar trends have happened across all major sectors.

The figure demonstrates that a trend qualitatively similar to that of the manufacturing sector of the United States in Kehrig and Vincent (2021) with two exceptions: i) The shift started in the 1980s for the United States and not until the 1990s in Denmark, ii) for manufacturing, the shift is more pronounced in the United States than in Denmark.[6]

[6] A natural concern is measurement error. Since value added features in the denominator of the labor share any measurement error in value added would imply a negative correlation between the two.

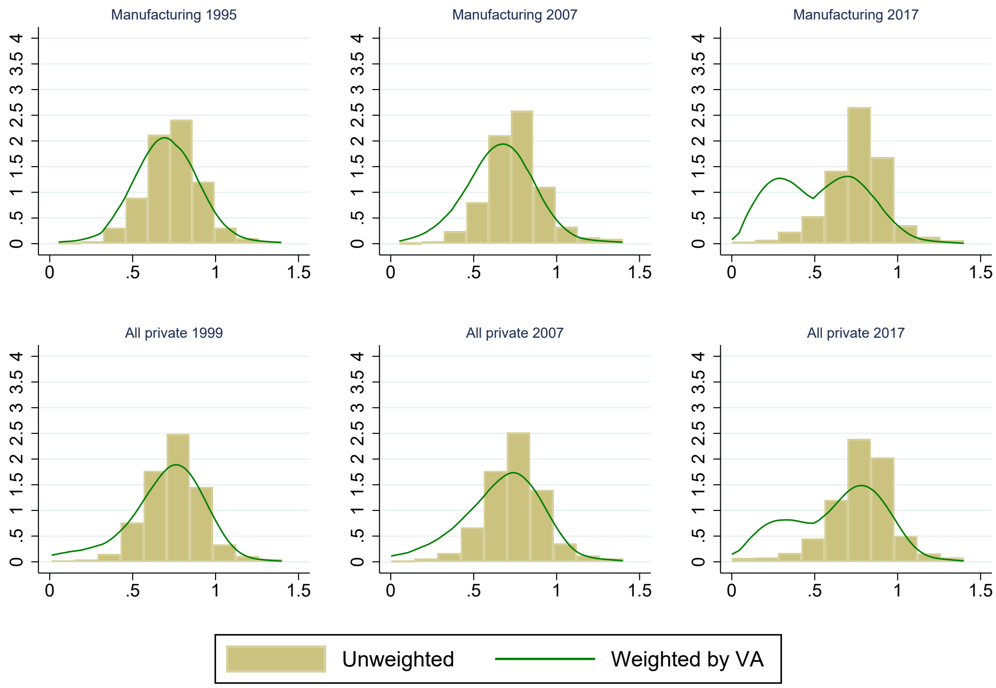


Figure 1: The Changing distribution of Labor Shares

We proceed by defining the aggregate labor share at time t as Θ_t and write:

$$\Theta_t = \frac{\sum_{i \in N_t} W_{i,t} L_{i,t}}{\sum_{i \in N_t} VA_{i,t}} = \sum_{i \in N_t} \lambda_{i,t} \theta_{i,t},$$

where $W_{i,t}$ is the average wages of firm i at time t (including various benefits and pension), $L_{i,t}$ its full-time equivalent workers, $VA_{i,t}$ its value added and N_t is the set of active firms at time t. We let $\theta_{i,t}$ be the labor share of the individual firm and $\lambda_{i,t} \equiv VA_{i,t}/\left(\sum_i VA_{i,t}\right)$ the value-added weight of a given firm in year t.

We decompose the aggregate labor share into:

$$\Theta_t = \bar{\theta}_{i,t} + \tilde{Cov}(\lambda_{i,t}, \theta_{i,t}), \tag{1}$$

where $\bar{\theta}_{i,t}$ is the unweighted labor share and $\tilde{Cov}(\lambda_{i,t}, \theta_{i,t})$ is a covariance term between the size of firms and their labor share (the covariance between $\lambda_{i,t}$ and $\theta_{i,t}$ times the number of firms N_t). Panels A and B of Figure 2 show the (unweighted) average labor

Measurement error would have to have increased during this period to account for the shift in Figure 1. In Appendix 11 we aggregate years two-by-two and show that little changes in the figure.

share for the manufacturing and whole economy as well as bottom and top quartile and the median.[7] The figure replicates the fact that over the whole period there has been a rightward shift of the median and mean labor shares for both the manufacturing sector and the economy as a whole. There is a notable break in trend in 2009, since when, if anything, the distribution has shifted somewhat to the left. The aggregate labor share has declined.

Panels C and D demonstrate the shift in the covariance term which declined from around 0 in both the manufacturing sector and for the whole economy to around -0.12 for both. From equation (1), this is to be interpreted as a contribution to the aggregate labor share: the shift in the importance of low labor share firms has — all else equal — lowered the labor share by more than 10 per cent. Panels C and D illustrate the same trend by showing the share in overall value added which comes from firms with the lowest 20, 25 or 30 percent of the labor share distribution. That is, we define $LL_{i,t}$ as an indicator for whether the firm is in the bottom of the distribution of labor shares and calculate:

$$\Lambda_t^{VA} = \frac{\sum_{i \in N_t} LL_{i,t} \times VA_{i,t}}{\sum_{i \in N_t} VA_{i,t}}. \tag{2}$$

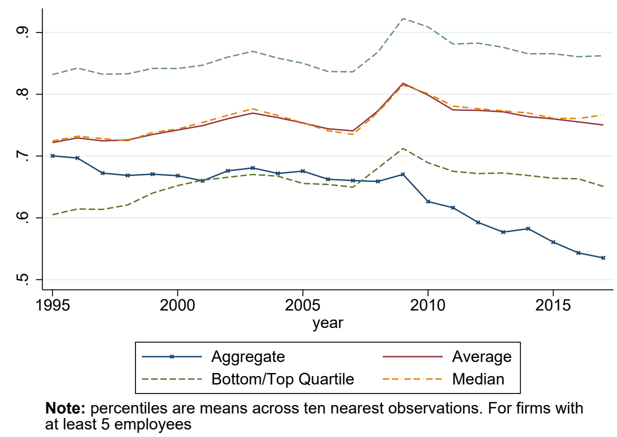
This has increased substantially during the period, with most of the role coming from the bottom 20 per cent. In section 4 below we demonstrate that this tendency is primarily a function of the very biggest firms.

3.1.2 Reallocation of market share through allocation between existing firms, not through entry

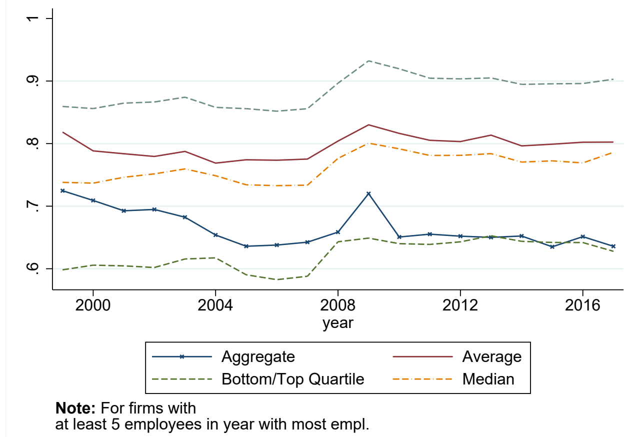
Equation (1) takes a static view of the reallocation and is silent on whether the changes have happened through the entry of new firms or through a reallocation among existing firms. In the literature on productivity, a core focus is on whether aggregate productivity changes happens through the entry of new more productive firms or through changes among existing firms. We use the productivity decomposition of Melitz and Polanec (2015) for the purposes in the change of the aggregate labor share between period $t - s$ and t to write:

$$\Delta\Theta_t \equiv \Theta_t - \Theta_{t-s}$$

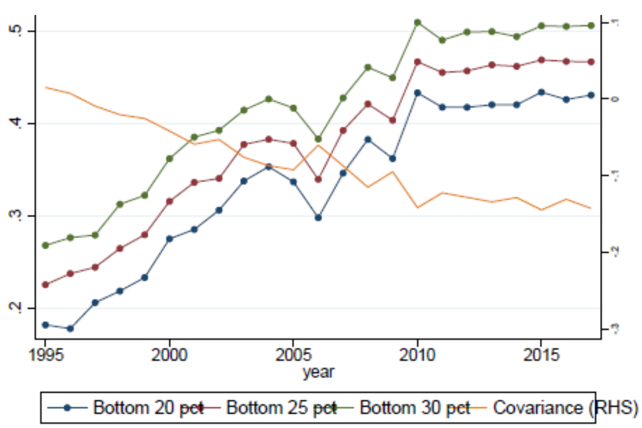
[7] Throughout this paper, we calculate all percentiles as averages of nearest 10 observations. This is done for confidentiality reasons. There is no meaningful difference difference from doing this.



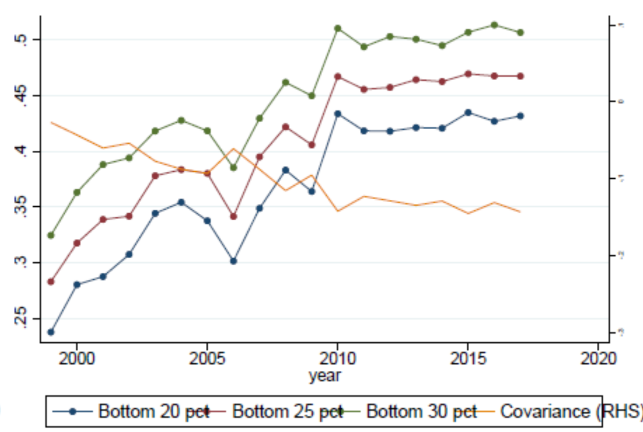
(a) Man: Aggregate and average labor share and various percentiles



(b) Private: Aggregate and average labor share and various percentiles



(c) Man: Aggregate value added share for firms with lowest 20, 25, 30 per cent labor share as well as covariance term (see details in text)



(d) Private: Aggregate value added share for firms with lowest 20, 25, 30 per cent labor share as well as covariance term (see details in text)

Figure 2: Trend in labor share for manufacturing and whole economy

$$= \underbrace{\Delta\theta_t^S}_{\substack{\text{Survivor change in}\\ \text{ind. labor share}}} + \underbrace{\Delta \tilde{Cov}_t^S}_{\substack{\text{Survivor Change}\\ \text{in covariance}}} + \underbrace{s_{E,t}(\Theta_t^E - \Theta_t^S)}_{\text{Contr. from entry}} + \underbrace{s_{X,t-s}\left(\Theta_{t-s}^S - \Theta_{,t-s}^X\right)}_{\text{Contr. from exit}},$$

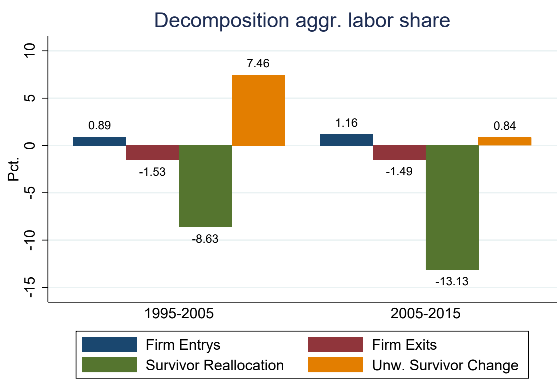
where $\Delta\theta_t^S$ is the change of the (unweighted) average labor share among firms that are alive at both s and t (survivors), ΔCov_t^S is the change in the covariance term among survivors, Θ_t^S, Θ_t^E and Θ_t^X the aggregate labor share among survivors, entrants and leavers, respectively. $s_{E,t}$ and $s_{X,t}$ are the share of value added from entrants and leavers in period t. We take ten year differences for the manufacturing sector and eight year differences for the whole private sector. Figure 3 shows that for both the manufacturing sector and the private economy the contributions from entry and exit have been minor. For the manufacturing sector, the shift has consistently come from a substantial reallocation among survivors. For the private sector as a whole, there is a distinction between the period before and after 2007: Only from 2007 onward is there a substantial redistribution from high to low labor share firms. On the other hand, increases in the average labor share among surviving firms contributed positively to the labor share from 1999-2006, but had almost no effect in the second half of the period.

Overall, we conclude that changes that the increasing negative correlation between size and labor share of a firm is due to reallocations among existing firms and not the birth and death of firms. Below in Section 7.3, we demonstrate that this change has come about predominantly because firms that transition from high labor share to low labor share have become relatively larger. Before we do so, we show that although low labor share firms account for a much higher share of value added they do not account equally for all types of employment.

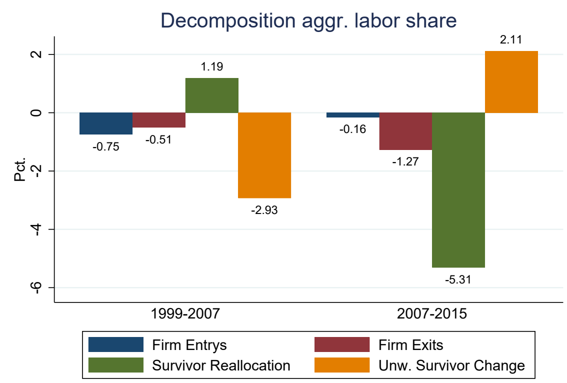
3.2 The reallocation of factors of production

3.2.1 The Reallocation of manual labor is much less pronounced than the reallocation of other forms of labor

Today, a larger share of value added is captured by low labor share firms than previously. What about the factors of production? In the following we focus on labor, and address capital below. We split the workforce into three: manual labor, knowledge/management and office and service workers. The firm data includes total employment of full-time equivalent employees. We link the data on employees with the firm data and aggregate



(a) Manufacturing Sector



(b) Whole Economy

Figure 3: Decomposition of aggregate labor share. See details in text

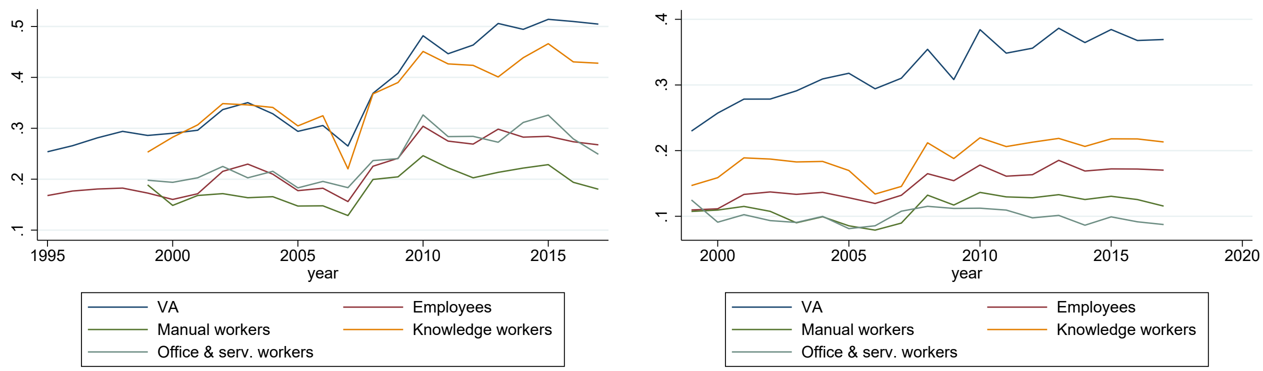
individuals based on their occupation. This is possible from 1999 onward.[8]

Figure 4 shows share of total employment, each of the three subgroups and value added that accrue to the bottom 20 per cent of the labor share distribution. Panel A refers to the manufacturing sector. The line marked "VA" captures the fact that the share of value added going to low labor share firms has increased from around 25 to more than 50 per cent over this period. The line marked "employees" performs the same calculation for full-time equivalent employees. This increase has been much more modest: from 17 per cent to 27 per cent.[9] The figure further disaggregates employment into the three categories starting in 1999 from which we have data. The figure shows a striking pattern: Whereas the reallocation of management and knowledge workers has mirrored that of value added almost exactly, there has been next to no trend for manual workers. Office and service workers have shown a trend in between.

Panel B shows the corresponding figure for the whole private sector. Though the share of employment for low labor share firms is considerably lower for the overall economy than for manufacturing, we continue to find that the share of manual employment captured by low labor share firms remains constant throughout the period. We perform a more detailed analysis of the individual data in an accompanying paper (Hémous and

[8]These two approaches are not identical: If employees have more than one job spell during a year we use the one with the highest pay. We only use workers with more than 1200 hours a year. In practice the employment for each firm matches closely with those reported by the firm and their are no systematic differences between the discrepancies and other firm characteristics.

[9]It might seem puzzling that less than 20 per cent of employees were employed in firms with the lowest 20 per cent of the labor share. But with little correlation between the size of a firm (measured by value added) and the labor share, there will be tendency for low labor share firms to have fewer employees and correspondingly a lower share of employment.



(a) Manufacturing Firms

(b) Private Sector

Figure 4: The share of total factors going to the bottom 20 per cent of the labor share distribution

Olsen, 2022b).

In total large firms have managed to scale up without corresponding increases in the use of labor, in particular, manual labor. This suggests either increased reliance on capital or increases in markups. In the following we demonstrate that increasing markups is an important contributor.

3.2.2 Large firms have increasingly high markups but constant capital share

A plausible explanation for the reduction in the labor share is the existence of a fixed-cost technologies which reduces marginal costs (Hsieh and Rossi-Hansberg, 2019). In such a case only some firms will find it profitable to invest and they will see declining labor shares. To examine this, first consider a firm with three types of inputs, labor, capital and intermediate inputs. Let μ be the gross value added markup such that:

$$VA_i = \mu_i(w_i L_i + r_i K_i),$$

where $w_i L_i + r_i K_i$ are total costs of labor and capital. Let the share of value of labor be θ_L, that of capital θ_K and that of profits θ_π such that:

$$\theta_L = \frac{w_i L_i}{VA_i} = \frac{1}{\mu_i}(1-\alpha_i), \;\; \theta_K = \frac{1}{\mu}\alpha_i, \;\; \theta_\pi = \frac{\mu_i - 1}{\mu_i}, \tag{3}$$

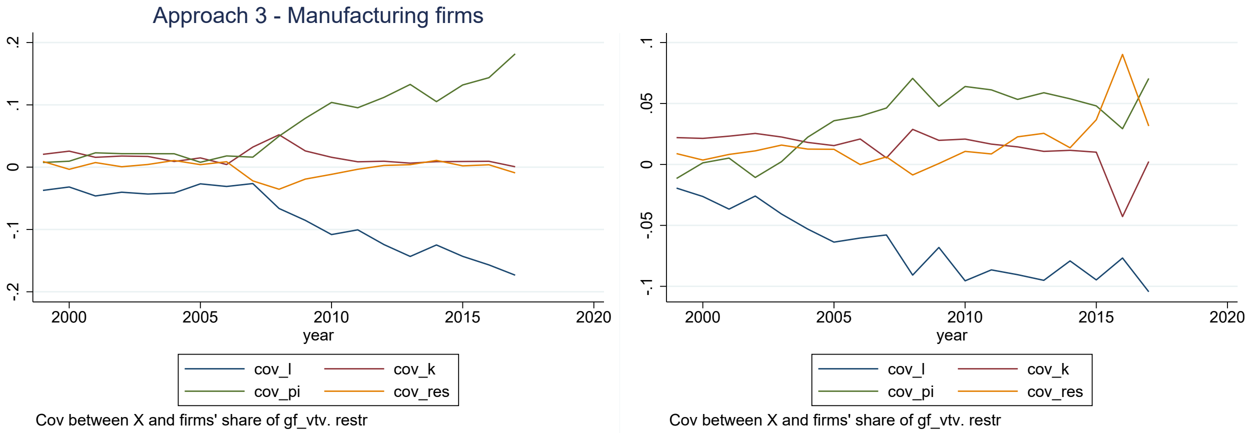
where $\alpha_i \in [0,1]$ is the the share of capital out of total cost on labor and capital and $\theta_L + \theta_K + \theta_\pi = 1$.[10] A change in the markup will increase the profit share and decrease both labor and capital share, whereas a change in the weight in production between capital and labor will not alter the profit share θ_π but shift the allocation between capital and labor share. We note that :

$$0 = N \times Cov(\lambda, 1) = N \times Cov(\lambda, \theta_L) + N \times Cov(\lambda, \theta_K) + N \times Cov(\lambda, \theta_\pi), \quad (4)$$

where N is the number of firms in a given year. Unfortunately, in practice we only have proxies for θ_K and θ_π. In particular, we observe the self-reported capital of the firm K, but not firm-specific r and we observe operating profits (before financial income, see a fuller discussion in Section 14.1 below) of the firm, which may or may not equate to economic profits. Nevertheless, if the discrepancy between these measures do not change too much over time a decomposition of these elements should still reflect changes for the firm. We continue to let λ be the share of a firm's value added out of overall value added, such that the first term on right hand side is the covariance term central to Figure 2 above. Recall that $N \times Cov(\lambda, \theta_L)$ is the contribution to the aggregate labor share holding the average labor share constant. The terms with θ_K and θ_π can be interpreted in analogous ways. We use operating profits over value added as reported by the firms for θ_π and we use the reported total capital stock from individual firms combined with aggregate data for $K_{i,t}$ and aggregate data from the Danish central bank for the average interest rate paid on corporate loans for Danish firms for r_t.[11] The figures are largely the same if we had used tangible capital stock instead. Figure 5 gives the results for

[10] The markup here is over *average* costs, whereas a firm would set its price as a markup over *marginal* costs. For a constant returns to scale production function these two are equivalent, but trends in the two could differ if the returns to scale change. De Loecker, Eeckhout and Unger (2020) make the same point on data for the United States and take a production process approach to explicitly estimate the parameters of the production function (as in De Loecker and Warzynski, 2012). They find that there is little contribution from changes to the scalability of the production function. It is worth noting that such production functions are estimated at industry-level and are not ideally suited for differences in production technology across firms within an industry. De Loecker et. al (2020) further argue that a shift of resources towards high markup firms implies a decline in aggregate efficiency. Such an analysis would be equally applicable to Denmark, though the analysis is beyond the scope of the present paper.

[11] This data only exists back to 2003 and we set all values before equal to 2003 value. The interest rate declined from around 5 per cent in 2003 to 3 per cent in 2017 with a peak of 7 before the financial crisis, that is there is a substantial decline over the past 10 years. We only use firms that report capital and operating profits though the figure doesn't change much when we allow these firms. The overall picture is the same if we use tangible assets (results not shown). Though we will employ the yearly interest rate, in practice capital is lumpy and firms might be locked into longer term loans implying that the interest rate towards the end of the sample overestimates the actual cost of capital.



(a) Manufacturing **(b)** Private Economy

Figure 5: Covariance of size with labor (cov_l), capital (cov_k) and profit shares (cov_pi) as well as a residual (cov_res)

manufacturing and the economy as a whole. [12]

As can be seen from Panel A, for the manufacturing sector, the pattern of a negative relationship between the labor share and the size of firms is not met by an increase in the covariance between the capital share and the size of firms. The relationship between size and θ_K remains zero throughout. Kroen, Liu, Mian and Sufi (2021) argue that interest rates in the US have declined disproportionately for larger firms. If a similar pattern were true in Denmark we would overestimate the trend in $Cov(\lambda, \theta_K)$ and there could potentially be a negative downward trend. In fact, the growing negative covariance between the labor share and value added is entirely matched by an increase in $N \times Cov(\lambda, \theta_\pi)$: large firms in 2017 have a substantially higher profit share and this was not true in 1995. Though less stark, Panel B demonstrates that essentially the same trend is true for the economy as a whole, though the increase in the residual makes strong conclusions more difficult to draw. In light of equation (3) this is most easily reconciled by a disproportionate increase in the the capital share of costs, α, and the gross markup, μ, for the larger firms.

We complement this finding by plotting operating profits (before financial items) over value added for different size groups in Figure 6. We see that whereas this number has been relatively constant at just below 20 per cent for firm with less than 100 employees,

[12]Since equation (4) does not hold as an identity in the data, for the reasons discussed, we include a residual as the deviation from the sum of the three elements from zero. This residual is effectively zero throughout for the manufacturing sector, but does see an increase for the whole private economy.

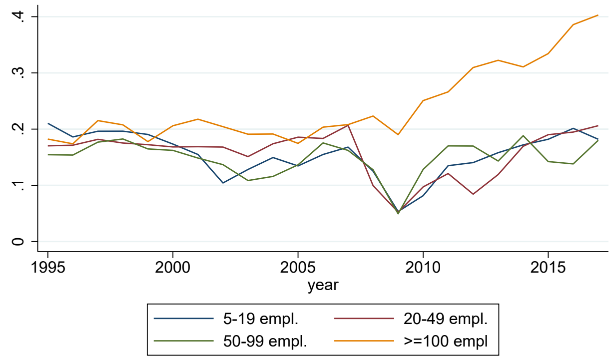


Figure 6: Profits (before financial transactions)

it has risen from 20 to 40 per cent for those with more than 100.[13] As demonstrated by Figure 29 this trend has not been clearly mirrored by the full economy.

In Section 5 below, we use the panel structure of our data to further analyze the impact of capital and other elements on the labor share.

We conclude that large firms have seen a disproportionate increase in the markup. This has been accompanied by a disproportionate shift towards capital for the largest firms. Whereas both trends lower the relative labor share for bigger firms, they offset one another for capital leaving capital's share of value added relatively independent of the size of the firm.

3.3 Sector and industry-level evidence

To what extent do these shifts reflect changes between firms within industries or shifts across industries? We find that there is a reallocation even within relatively narrow industries. For the purposes of this section we refer to sectors as aggregation (six sectors) and industries at various levels of disaggregates (typically 4 digit Nace equivalent).

3.3.1 Growing average labor share declining aggregate labor share across all sectors

Figure 2 demonstrate that the aggregate and median labor share have diverged for both the manufacturing sector and the private sector as a whole. In Figure 7 we show the aggregate labor share and various percentiles for the individual sectors of the economy

[13] The distinction between profits before and after financial items is important. As demonstrated in Appendix Figure 28a, income from financial items has increased substantially over the time period. These largely reflect income from foreign subsidies which are not included in revenue or exports. We undertake a more thorough discussion in Section 6.3.

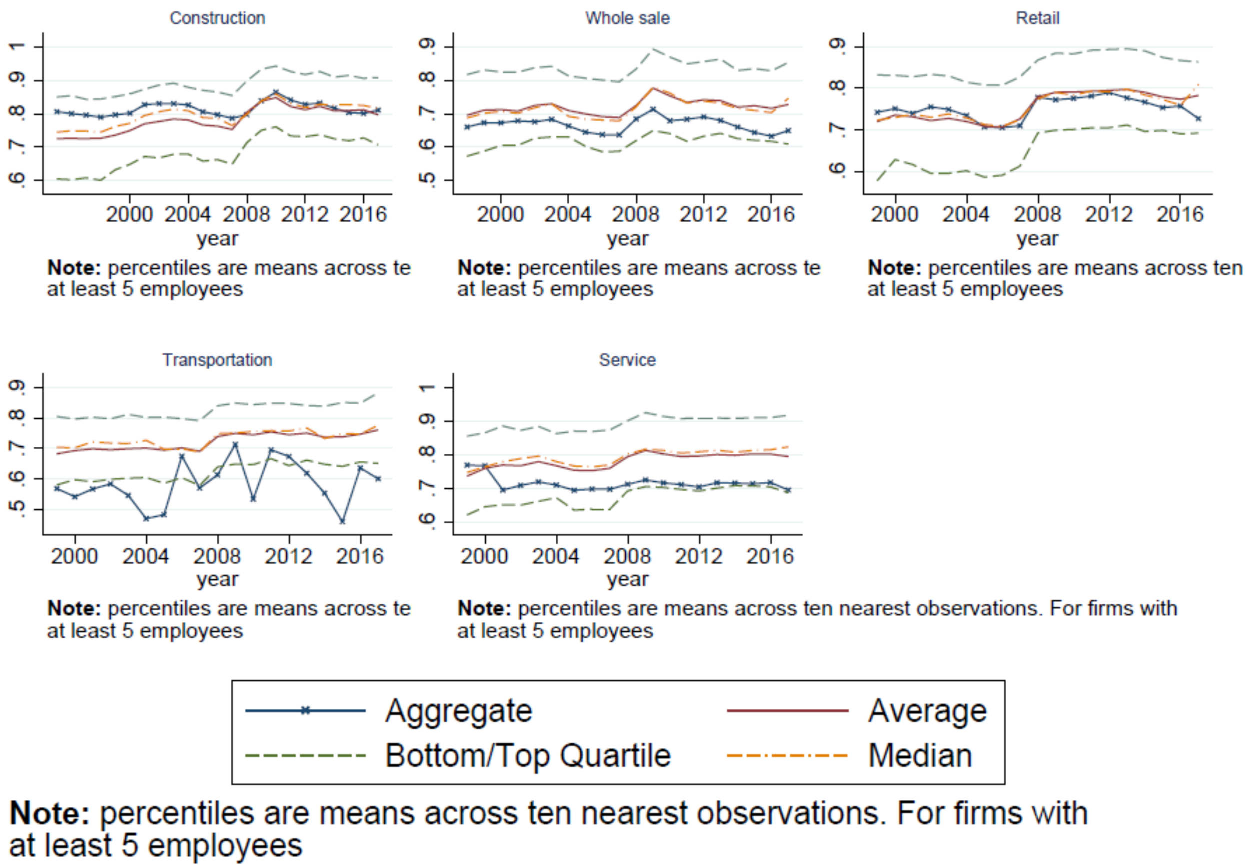


Figure 7: The aggregate and average labor shares across sectors

(we distinguish between 6 sectors of the economy and use the term industries for finer dis aggregations). For our purposes the private sector consists of "Construction", "Whole Sale Trade", "Retail", "Transportation" and "Services" (As can be seen from the figure, time periods vary across sectors). Though the aggregate labor share has not declined in all sectors, two facts are repeated across sectors: i) the median and the average labor share closely track one another and have generally increased and ii) these two have grown more than the aggregate labor share.

3.3.2 Industry-level analysis.

In the following we expand our analysis to the industry-level and employ the Danish Industry Nomenclature which is based on Nace Rev. 2 but is (slightly) more disaggregated. We have a total of 127 industries, 94 of which are in the sectors treated as the private economy in this paper. The manufacturing sector has 35. Table gives summary

Table 2: Industry-level Summary Statistics

	Export		Revenue	
	1999	2017	1999	2017
Herfindahl Index	0.068	0.090	0.023	0.022
Biggest industry share of total	0.196	0.230	0.064	0.053
Biggest 5 pct. industries share of total	0.477	0.597	0.290	0.268
Biggest 25 pct. industries share of total	0.975	0.983	0.709	0.716
Biggest 50 pct. industries share of total	0.999	0.999	0.909	0.899
Standard deviation for industry share	0.022	0.025	0.011	0.011

statistics for the distribution of revenue and exports at the industry-level for 1999 and 2017. For the whole economy, the 25 per cent biggest industries constitute around 71 per cent of revenue in both 1999 and 2017. The corresponding number for exports is 98 per cent. Top 5 per cent of industries declined slightly in terms of total revenue but rose from 48 to 60 per cent for exports. We also calculate the Herfindahl index (across industries) which shows a rise from 0.07 to 0.09 during this period.[14]

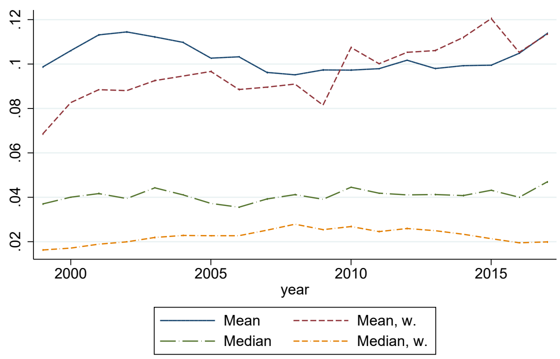
We relate this to within changes in concentration.[15] Figure 8.A shows the average and median Herfindahl index across industries. We show the trend both weighted and unweighted by total value added of that industry. Though there has been no upward trend in unweighted median and mean, the weighted index has grown. That is, there has been an increase in concentration for the biggest industries. Likewise there has been a small increase in the weighted median value. The Herfindahl across firms (irrespective of industry) has increased from 0.015 to 0.025. Appendix 12 shows analogous results when using alternative measures of concentration, namely the share of industry revenue going to the biggest 1,2 or 4 firms. Since our analysis has a focus on the biggest firms, for comparison Figure 8.B shows the share of revenue accruing to the four biggest firms. The figure largely mirrors that of Panel A. In particular, the weighted shares of the biggest firms has increased (The figure is essentially identical for share of top 1 and top 2 firms).[16]

Autor et al. (2020) show that the increase in concentration is related to the change

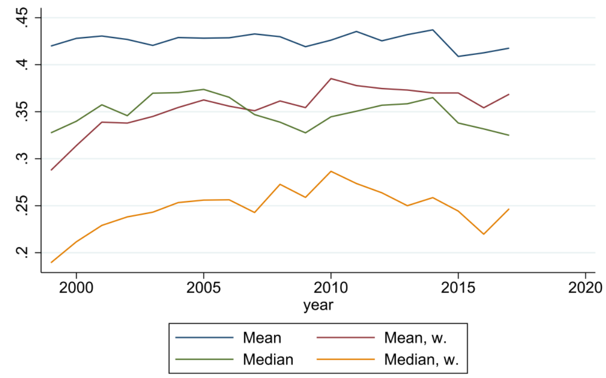
[14]For a set I of industries where industry i has total sales S_i the Herfindahl index is defined as $H = \sum_{i \in I} \left(\frac{S_i}{S}\right)^2$, where $S \equiv \sum_{i \in I} S_i$ is total sales for all industries. The Herfindahl index is between 0 and 1 and a higher value constitutes a higher level of concentration.

[15]We conducted the analysis at a more disaggregated. Though the results are noisier, the results are qualitatively similar.

[16]For confidentiality reasons those calculations do not include do not include the median of share of sales for the top 1 and 2 firms. In a few industries, Figure 8.B also violates confidentiality (in that biggest firms are too dominant). We dropped those industries, with little effect on the results.



(a) HH index: Share of sales for four biggest firms, unweighted and weighted by value added.



(b) Share of sales for biggest 4 firms:

Figure 8: Concentration measures for whole private sector

in the labor share on US data. In particular, they run a number of versions of the the following regression

$$\Delta\Theta_{j,t} = \beta\Delta CON_{j,t} + \lambda_t + \epsilon_{j,t},$$

where $\Delta\Theta_{j,t}$ is the change in industry-labor share over a five year period, $\Delta CON_{j,t}$ is change in concentration, λ_t is a time fixed effect and $\epsilon_{j,t}$ is an error term. Autor et. al. (2020) focus on the share of sales accruing to the top 4 or 20 firms. Due to the smaller size of the Danish economy we look at top 4. The results are qualitatively similar when we focus on HH, or top 1 or top 2 share (not reported). The results for the manufacturing sector are given in Table 3. We use the 35 6-digit industries within manufacturing and stacked five year differences from 1995 to 2017 (for $35 \times 18 = 630$ observations) . We cluster at the 6 digit level and weigh observations by industry sales. All regressions include year dummies and we winsorize observations at 5 per cent.[17] In column (1)-(4) the left hand side variable is change in industry-level labor share. We find that the share of sales of the 4 largest firms is strongly associated with a decline in the labor share of -0.289.[18] We control for export intensity in the first year and show that this does little to alter the coefficient.

We complement the regressions suggested by Autor et. al (2020) by including the change in the industry level covariance term. Column (4) show the important role of

[17]In a few years some small industries have extreme changes in labor share (due to very low value added). These observations dominate despite the weighing.

[18]Autor et. al. (2020) find a coefficient that is around half of ours. When they use the value of the top 20 firms they find a comparable coefficient of $-.23$.

Table 3: Regression of changes in labor share on concentration - industry-level regressions for manufacturing

	Δ LS	Δ LS	Δ LS	Δ LS	Δ Cov term	Δ Cov term
Δ Conc4	-0.289**		-0.273**	-0.0266		-0.362***
	(0.0955)		(0.0974)	(0.0713)		(0.0824)
Exp intensity		-0.0707***	-0.0633***		-0.0322	-0.0224
		(0.0164)	(0.0128)		(0.0187)	(0.0127)
Δ Cov term				0.714***		
				(0.0944)		
Observations	630	630	630	630	630	630
R^2	0.130	0.109	0.150	0.456	0.161	0.245

Standard errors in parentheses

Weighted by industry sale. All years used. Std. errors clustered at 6 digit industry-level.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 4: Regression of changes in labor share on concentration - industry-level regressions for the private economy

	Δ LS	Δ LS	Δ LS	Δ LS	Δ Cov term	Δ Cov term
Δ Conc4	0.0351		0.0348	0.149		-0.230*
	(0.191)		(0.191)	(0.167)		(0.110)
Exp intensity		-0.00367	-0.00360		-0.0242	-0.0246
		(0.0252)	(0.0251)		(0.0163)	(0.0160)
Δ Cov term				0.498***		
				(0.0938)		
Observations	1291	1267	1267	1285	1261	1261
R^2	0.095	0.095	0.095	0.326	0.052	0.076

Standard errors in parentheses

Weighted by industry sale. All years used. Std. errors clustered at 6 digit industry-level.

1 digit industry-dummy included

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

the covariance term of size of firm and labor share (where "covariance term" is $\tilde{Cov}$, that is the covariance of size and labor share multiplied by number of firms in industry). That is the association of higher concentration on the industry-level labor share happens through the changes in the covariance term. As show in columns (5) and (6), where we change the dependent variable to the covariance term, changes in concentration have a negative predictive power on changes to the covariance term. These results do not extent to the private economy as a whole as shown in Table 4 (where we include sector (1-digit industry) dummies). Despite this the concentration share continued to predict changes to the covariance term (column 6) and the covariance term and changes in labor share are strongly correlated (column 4).

We conclude that, although not as strong as for US data, there is a connection between the concentration rate and the labor share at the industry-level, at least for manufacturing. This effect happens through changes in the covariance term.

4 The Importance of Very Large Firms

4.1 The relative size of large firms has grown

We have demonstrated that low labor share firms are relatively larger today than previously. Here, we first explicitly show the size distribution of large Danish firms and then go on to show that the shifts in the economy largely come from changes to the top of the distribution.

A common way (See Luttmer, 2007) of illustrating the size distribution is to plot the log of the size of firms (here measured by value added) against the log of the number of firms that are larger than this size. When the size distribution of firms is Pareto distributed this is straight line with a negative slope of the corresponding Pareto parameter.[19] Panel A of Figure 9 plots the log of the value added against the log frequency of firms larger than this value. That is in 2007, 20 (= $exp(3)$) firms had value added of more than 3.5 BN kroners (= $exp(22)$). It shows that in the 1999 the distribution is close to, albeit not exactly, a straight line, but is closer to it in 2007 and 2017. Panel B relies on the top 200 firms. We fit the best fitting line on the 200 biggest firms. The figure shows a substantially flatter line in the later years, though not much of a change between 2010 and 2017. It also gives the mean over median for the top 200 firms. This number increased from 1.7 to 2.1.

In appendix 14, we conduct our analysis separately for exports and sales for firms. Whereas there is somewhat of an increase in the skewness of the size distribution for firms when measured by domestic sales (the slope increases from around -1.3 to -1.25) there is a much larger increase for exports (which increases from -1.25 to -1.10) during this period.[20] We conclude that large firms have grown disproportionately, including

[19]The Pareto cdf is $P(X > x) = (x/x_{min})^{-\alpha}$, where $x_{min} > 0$ is the minimum value and α captures the (inverse) of the skewness of the distribution. Taking logs shows that $log(P(X > x)) = -\alpha logx + \alpha logx_{min}$, such that the slope of the plot will have slope $-\alpha$. The relative size of the mean above x_{min} compared with x_{min} is $\alpha/(\alpha - 1)$ for $\alpha > 1$ (it is undefined for $\alpha \leq 1$.) For confidentiality reasons the figure drops the four biggest firms each year

[20]This is related to a literature initiated by Gabaix (2011) on the "granular" origins of macro fluctuations. When the tale of the firm size distribution is thick, shocks to individual firms can drive macrofluctuations (think Nokia in Finland). Similarly, in our context the profitability and markups of relatively few firms have a large influence on the macro features of the economy.

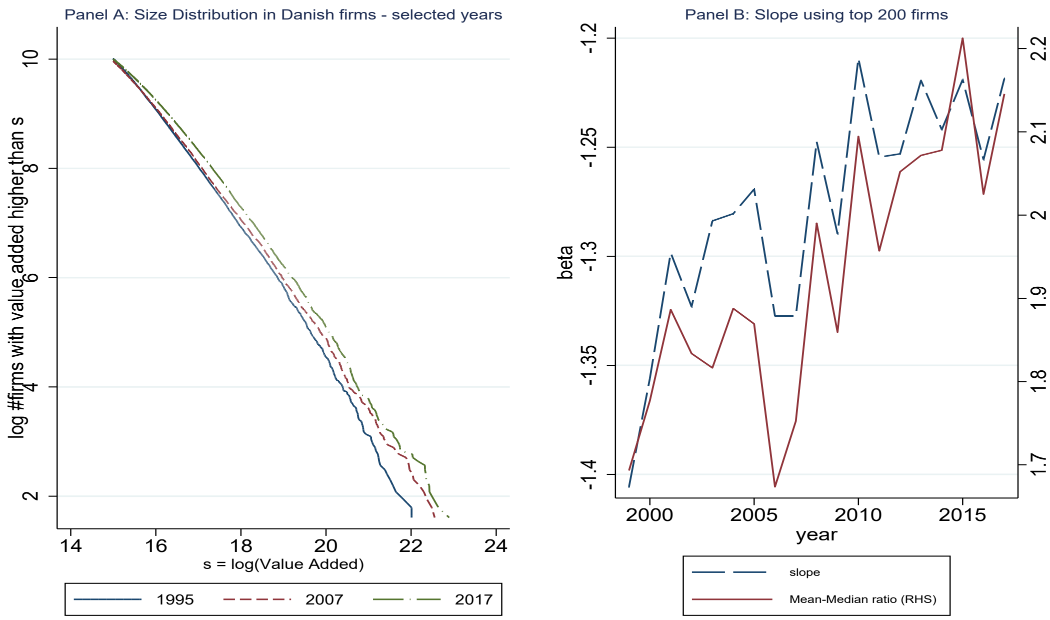


Figure 9: Size distribution using value added

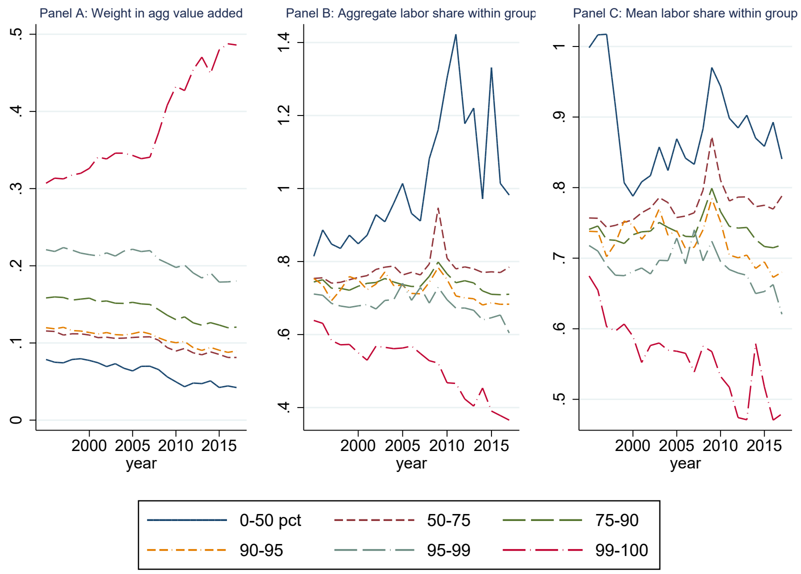
within the very top.

4.1.1 The changes to the labor share are dominated by the top 1 per cent of firms

In the following we make more explicit the role large firms play in the dynamics of the labor share. We do so by analyzing the labor share within various percentiles of the size distribution measured by value added. Figure 10.A splits the distribution of manufacturing firms into 6 groups starting from the bottom 0-50th percentile and ending with the top 1 per cent of firms (Panel A). The manufacturing sector (which satisfied our conditions on employment) constitutes 5,000-7,000 firms, implying top 1 per cent of 50-70. The figure also shows the aggregate labor share and the mean labor share (panel B) within each of the groups (panel C). Though there has been a small decline in both measures for firms in the 95-99th percentile, the most important contribution is for the top 1 per cent. In fact for the bottom 95 per cent there has been no decline in aggregate (within) labor share. Figure 10.B gives the corresponding figure for the whole economy, showing same overall trend though less dramatic.

[21]

[21] The "spike" in 2009 for the bottom 50 per cent of firms is a result of the financial crisis. A substantial fraction of Danish firms had negative value added during this year. Since firm percentiles are allocated



(a) Manufacturing

(b) Private Economy

Figure 10: The aggregate and mean labor share within groups by size

We conclude that an important element of the changing structure of the Danish economy over this period is the contribution of large firms. Appendix Figure 27 shows various other summary statistics. In particular, among the bottom 99 per cent of firms the share of value added going to bottom quintile of firms by labor share has increased from 20 to 25 per cent, much less than for the full population of firms. The covariance between size and labor share is also basically zero throughout for the smallest 99 per cent of firms.

Having established the importance of the large firms we turn to the question of why these firms are different. We decompose this into four separate sections. First, we show that for the private sector as a whole firms of a *given* size have not seen declines in the labor share. Instead, in the top there has always been a negative relationship between size and labor share, and large firms are becoming larger and with it getting lower labor shares. Second, we ask about possible explanations. We show that consistent with the analysis in Section 3.2.2, capital investments do predict increases declines in the labor share as does R&D employment. We further analyze various aspects of offshoring and international production in an IV setting. We show that though these do have some predictive power, they are not quantitatively large enough to account for the shifts. We go on to ask the dynamic question of whether large firms experience declines in the labor share, low labor share firms are growing in size, or the two are happening simultaneously. We show the latter is the dominant explanations. Finally, we show that the main contributor to an increase in the importance of low labor share firms is that firms that transition into lowest quintile of labor share are relatively larger today than in 1995.

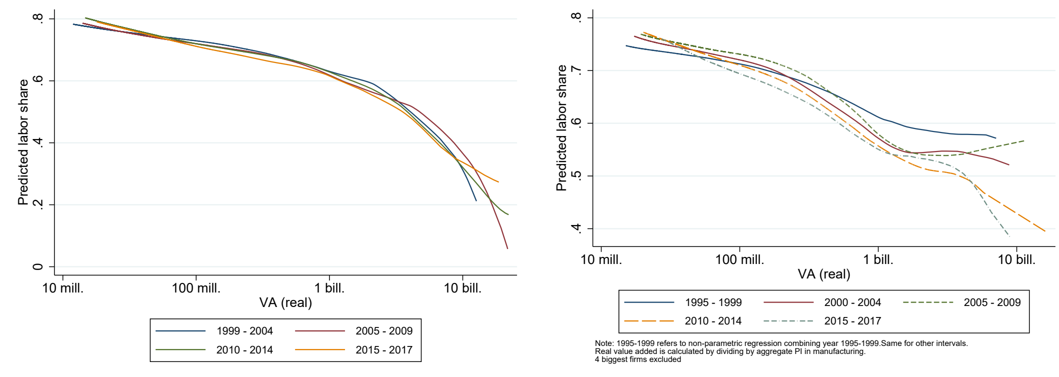
4.1.2 Non-parametric relationship between labor share and size

Here we focus on a non-parametric relationship:

$$\theta_{i,t} = f_t(VA_{i,t}) + \epsilon_{i,t},$$

where the negative relationship between size and labor share suggests that f_i is negatively sloped. A natural question to ask is whether f_i has changed. To answer this question we

based on value added these are placed in the bottom 50 per cent of firms. From 2008 to 2009 the size of negative value added relative to total value added among the smallest firms went from 10 to 40 per cent and declined to 10 per cent again in 2010. Since labor costs are much more stable, the labor share increased substantially.



(a) Private Sector

(b) Manufacturing

Figure 11: Non-parametric relationship between labor share and (real) Value Added

perform a locally linear non-parametric regression of labor shares on the real value added of firms (deflated by the producer price index). We lump years together in groups of 5 years and run the regression above and display the result in Figure 11. We display the whole private sector in Panel A, which displays a striking fact. There has always been a mild negative relationship between size and labor share in the interval between yearly value added of 10 million and 1 billion kroner.[22] 78 per cent in all years whereas a firm with a value added of 1 BN kroners is predicted to have one of just over 60 per cent in all years. The increasing negative relationship for the economy is to a large extent driven by the fact that more firms are in the upper range of the distribution where the relationship is steeper. Panel B shows the manufacturing sector which does show a notable increase in the negative slope. We conduct a parallel parametric regression analysis in Appendix 14.2. We recover that the coefficient between size and labor share is relatively constant over time and the included time dummies for the full economy are insignificant.

5 Both capital and R&D investments predict declines in labor share

In the following we directly address two possible explanations for the increase in size: Capital investments and Research and Development. Using the decomposition of equa-

[22]This might seem in contradiction with the earlier established fact of a close to zero correlation between size and labor share in 1999. This is reconciled by noting that there was always somewhat of a negative relationship and that the figure starts at 10 million. Plotting smaller firms would show a "hump-shaped" figure.

tion (3) above an increase in capital intensity, say, from automation, would increase α and research and development might allow firms to develop better quality products for which they can charge a higher markup.[23] For this analysis, we focus on the manufacturing sector.

We run the regression of:

$$\Delta\theta_{i,t} = \beta_1\theta_{i,t-s} + \beta_2 x_{i,t-s} + X_{i,t-s}\gamma + \epsilon_{i,t},$$

where $\Delta\theta_{i,t} \equiv \theta_{i,t} - \theta_{i,t-s}$ is the change in the labor share and we focus on five-year difference ($s = 5$) such that $\theta_{i,t-s}$ is the labor share five years ago. We include this due to the considerable mean-reversion in the labor share. This matters little for the remaining coefficients. $x_{i,t-s}$ is the covariate of interest (capital or research and development). $X_{i,t-s}$ is (log of) value added of firm in preceding years as well as fixed effects. We run the regression both weighted by value added and not. We focus on the manufacturing sector and consider a balanced panel of firms that have more than 5 employees throughout, though this latter adjustment has little influence on the coefficients. Research and development information is only available from 1999, though not for 2000. We therefore use years from 2004 onward, excluding 2005.

We focus on two measures of capital: "productive" capital which consists of equipment and machinery and total capital. Both scaled by employment. Research and development expenditure measured as total workers employed in research and development in the firm scaled by employment. We also include knowledge workers as share of total employment as defined in Section 3.2.1 above.[24]

Table 5 gives the results. Differences are overlapping and standard errors are clustered at the firm level. Columns (1)-(3) give results, unweighted by value added, con-

[23] There is an extensive literature on automation (see Zeira, 1998; Hemous and Olsen 2022; and Acemoglu and Restrepo 2018). Alternatively, with a elasticity of substitution between capital and labor of more than 1, cheaper capital would increase capital's share of input as well (Karabarbounis and Neiman, 2013). In either case, the disproportionate increase for large firms would require some element of a fixed cost (Hsieh and Rossi-Hansberg, 2021). Akcigit and Ates (2021) discuss conditions under which horizontal innovation can lead to increases in markups for industry leaders.

[24] Only around 10-15 per cent of firms report positive value for research and development, though these firms constitute more than 50 per cent of total value added. The average share of R&D employees for firms who have positive values has increased from 0.9 to 1.2 per cent. There are strong outliers with the 95th percentile (of those positive) increasing from 32 to 41%. We take logs and replace these missing value with 0 and include a dummy for such firm x year observations. Statistics Denmark also includes R&D expenditures, though this data is sparser and suffers from a data break in 2007. Most firms have positive value for productive capital. Though we scale by employment little would change if we were to use non-scaled variables or scale by value added or revenue.

Table 5: Regression analysis of changes to labor share - Manufacturing

	(1) Δ LS	(2) Δ LS	(3) Δ LS	(4) Δ LS	(5) Δ LS	(6) Δ LS	(7) Δ LS
Lagged labor share	-0.722***		-0.723***	-0.571***	-0.622***	-0.685***	-0.707***
	(0.0136)		(0.0136)	(0.0403)	(0.0331)	(0.0394)	(0.0392)
Lagged log(R&D share of empl)		-0.0129*	-0.0186**	-0.0437***	-0.0459***	-0.0246*	-0.0216*
		(0.00638)	(0.00685)	(0.0130)	(0.00898)	(0.0106)	(0.0100)
Lagged log(VA)						-0.0243***	-0.0281***
						(0.00682)	(0.00713)
Lagged log((Machines and prod. capital)/empl)						-0.0195***	
						(0.00443)	
Lagged log(Share of empl. with knl occ.)						-0.0262***	-0.0137
						(0.00673)	(0.00715)
Lagged log((Total capital)/empl)							-0.0269
							(0.0208)
Industry X Year FE					X	X	X
Year FE	X	X	X	X			
Weighted by VA				X	X	X	X
Obs.	28210	28210	28210	28153	28153	15037	16751
R^2	0.330	0.000443	0.331	0.319	0.458	0.512	0.509

Standard errors in parentheses
Standard errors clustered at firm level
Firms existing all years with at least 5 empl. All differences and lags are 5 years
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

trolling only for year fixed effects. They show strong mean-reversion and a negative association between lagged R&D intensity and changes to the labor share. Col um (4) show that this association is even stronger when weighing firms by value added: A one percent increase in R&D intensity is associated with a decline in the labor share of 0.043 percentage points. Column (5) shows that this result is unchanged when we control for 2-digit industry x year fixed effects. Column (6) includes lagged value added, productive machinery and share of employment in the knowledge/management category. These somewhat reduce the association with R&D to $-.0246$. There is a negative relationship between all of these controls and the change in the labor share. Column (7) includes total capital instead of productive capital leaving the coefficient on $R\&D$ largely unchanged. To facilitate the comparison of coefficients, we calculate "standardized" coefficients. These are -0.019 for R&D intensity, -0.021 for productive capital, -0.028 for share of workers with high knowledge-intensity and -0.05 for total capital.[25]

Though causal inference is difficult, the results above are consistent with a hypotheses in which both capital investment and research and development allow a firm to reduce the labor share in the subsequent years.

[25] Specifically, we run a weighted regression of X on industry x year fixed effects, where X is the right hand side variable of interest from column (7). We obtain the (weighted) standard deviation of these regressions. We scale the coefficients of column (7) by these values.

6 International Activities

Denmark is a small open economy and large firms in Denmark obtain the majority of their revenue from abroad and import a substantial part of their intermediate inputs. In the following we first examine the export behavior of Danish firms. We show that the shifts in the Danish economy are substantially more pronounced for industries that are export-oriented. Second, we examine the import behavior of Danish firms. We show that there is a plausible negative causal effect from offshoring on individual firm labor share. However, it is difficult to explain the disproportionate decline in labor share for large firms with imports since these firms have not disproportionately increased their imports. We also discuss, recent forms of global production captured by *factoryless production,* the phenomenon of Danish firms producing and selling products abroad without the goods crossing the Danish border. This presents statistical challenges in that labor used abroad is not counted as labor costs. We find that although factoryless production can account for some of the decline in the aggregate labor share of manufacturing it is unlikely to account for more than a quarter. Finally we discuss profits from subsidiaries abroad.

6.1 Large Danish firms are very reliant on exports

The proceeding analysis demonstrates an increasing concentration in the Danish economy where large firms have become more dominant. As Figure 12.A demonstrates these firms rely disproportionately on export. Data on exports is more detailed for the manufacturing sector and this figure and the following analysis is carried out on the manufacturing sector. As can be seen there is a strong positive trend between the size of a firm (measured by value added) and the share of revenue received from exports with firms in the top 20 percent of size receiving more than 50 per cent of revenue from exports in 2017. There has been a general upward trend in the share of revenue received from abroad with no disproportionate effect for larger firms.[26]

[26]For imports there is a much less clear relationship between size and import share or labor share and import share. If anything it is firms in the middle of the size distribution that have increased their relative imports the most.

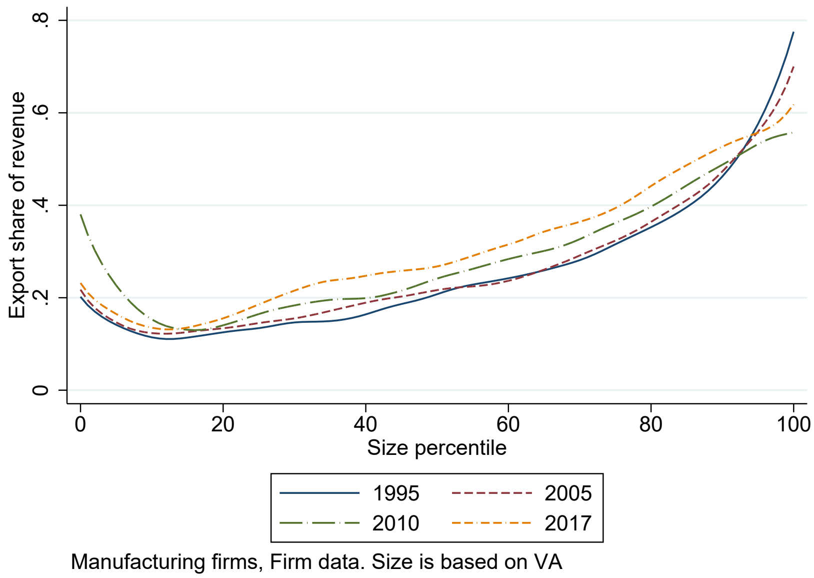


Figure 12: The share of revenue in manufacturing from exports along the (VA) size distribution

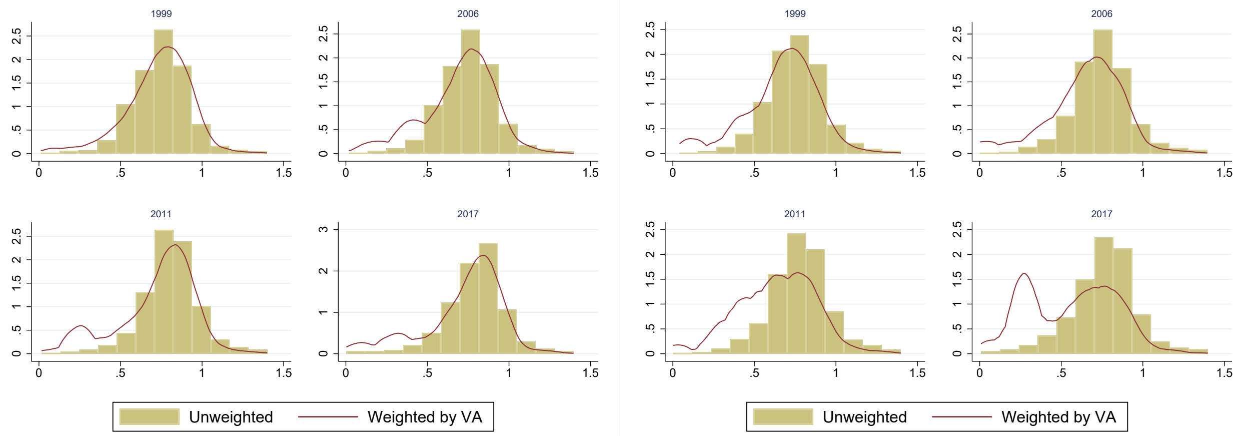
6.2 Exports play a disproportionate role in the reallocation of value added towards low labor share firms

6.2.1 The reallocation effect is stronger for export-oriented sectors and for export-oriented firms

We start out analysis by splitting the 6 digit NACE sectors into export-oriented sectors and non-export-oriented sectors based on their total exports ratio to total sales in 1999. We consider firms in an industry with an export intensity of less than the median (16 % in 1999) as non-export oriented and the rest export-oriented. This split leaves close to the same number of firms in each group. We then perform an analysis analogous to that of Figure 1 for each of the two separately. The results are presented in Figure 13. In the non-export oriented sector there is somewhat of a shift in importance of low labor share firms, but the trend is much more pronounced, in particular from 2007 to 2011.[27]

Figure 13 demonstrates that the shift in importance of low labor share firms is more pronounced in sectors that export more. To assess whether it is stronger for more export-oriented firms, we assign value added based on how export-oriented an individual firm

[27] One might wonder whether this is just a matter of recovering the fact that the shift is stronger for the manufacturing sector than the rest of the economy. In Appendix X we perform the same exercise only for manufacturing. Though the difference is less stark between export-oriented and not, there is still a noticeable difference.



(a) Non-export oriented Sectors

(b) Export oriented Sectors

Figure 13: Distribution of labor share, histogram and weighted by value added: Export-oriented and non-export oriented

is. It is not conceptually straightforward to define what share of value added accrues to domestic sales and exports, respectively. Nevertheless, we use the revenue share from exports as measure of the export-intensity of a firm and define the value added from exports, VA^{EX}, proportionately:

$$VA^{EX} = VA \times \frac{EX}{REV},$$

where REV is revenue in total and EX is the that comes through exports (a few firms have reported $EX > REV$. In such a case we set $EX/REV = 1$). We define $VA^{DOM} = VA - VA^{EX}$. Appendix Appendix Figure 33 performs analyses as those of Figure 1 and show that the shift is substantially larger for VA^{EX} than VA^{Dom}. Here, we instead, focus on the share of value added going to the bottom 20 per cent of the firms in the labor share distribution. That is, we define $LL_{i,t} = 1$ for the bottom quintile of firms in the labor share distribution in year t. Analogously to Λ_t^{EX} for equation (2), we then define

$$\Lambda_t^{VA^{EX}} = \frac{\sum_i L_{i,t} \times VA_{i,t}^{EX}}{\sum VA_{i,t}^{EX}},$$

as the share of VA^{EX} going to the LL firms. $\Lambda_t^{VA^{Dom}}$ is defined when using and $VA_{i,t}^{Dom}$. Figure 14.A shows these three measures for manufacturing and Panel B for the economy as a whole.[28] All of these were less than 30 per cent in 1995. The share of VA^{EX} going

[28] In this figure the data sources for exports are from two different sources. For the manufacturing

to LL firms increases by 41 percentage points from 22 to 63 per cent. This change was most pronounced in the period before 2010 with a substantial decline around the financial crisis. The corresponding number for VA^{DOM} increases by 18 from 26 to 44 per cent and has also remained relatively constant from 2010. To assess the underlying dynamics, we focus on the trend in value added for exports. We focus on two "counter-factuals", where we hold constant either LL *and* value added weight *or* the export-intensity at the start of the period. Panel B gives the result for a balanced panel of firms. First, the figure demonstrates that there is little difference between the aggregate trend for the balanced and full panel. Second, the change during this period partly reflects an increase in export intensity for firms which were already large and had a low labor share, though this change took place in the early part of the period. A large part of the contribution comes from the dynamics of $LL_{i,t}$ and value added for initially export-intensive firms.

In Appendix 15.2 we show that this is a "rising star" phenomenon in the nomenclature of Kehrig and Vincent (2021), that is the trend is driven by firms growing in size and reducing their labor share simultaneously. That is, a substantial part of the contribution to the growth in $\Lambda_t^{VA^{EX}}$ comes from firms who were already export-intensive and increased their size as reduced their labor share simultaneously. In Section 7.1 we perform a regression analysis inspired by Kehrig and Vincent (2021) and show that the simultaneous decline of labor share and value added is a dominant feature of firm dynamics. [29]

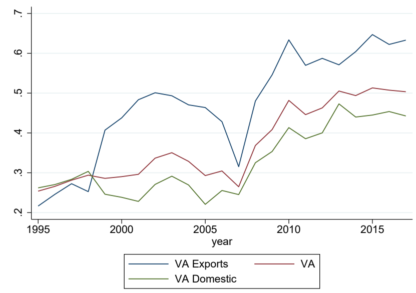
Panel C shows that change for the whole private economy. It shows overall trends that are similar, a larger increase for the value added attributed to exports, but at a less dramatic rate.[30]

In closing, we conclude that in the manufacturing sector, the increased share of value-added from exports, VA^{EX}, coming from low labor share firms is the source of two

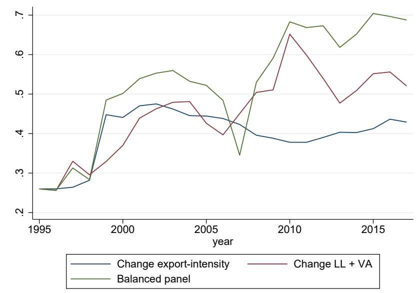
sector we use the complete records of goods traded across the Danish border. For the whole economy we use firms' self-reported exports (included for the manufacturing). The former data is much richer and Statistics Denmark considers it more exact but it does not cover services. We will be employing this in our analysis on the manufacturing sector below. For comparison we have also created Figure 14 using self-reported export data. The trends are largely the same though the rise for VA exports happens more gradually from 2000 to 2005 (figure not shown).

[29] In Appendix 15.2 we show that the effect from already-export intensive firms is driven by firm characteristics and not the industry. Specifically, we replace the export intensity of each firm with the industry (2 digit) average *excluding* that firm and find that figure 14.A shows an increase in $\Lambda^{VA^{EX}}$ of only 2/3 of that using individual firm export intensity. Furthermore the contribution from export-intensity, analogous to that drawn in 14.B, is zero.

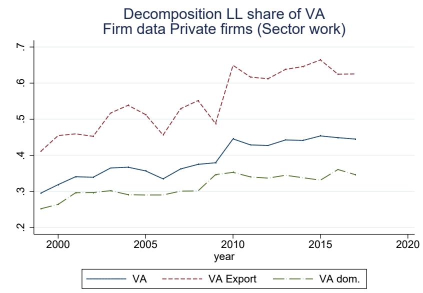
[30] This figure was unfortunately drawn for bottom 25 per cent of labor share distribution. The overall trends are the same and the correct figure will be included.



(a) Manufacturing firms



(b) Counter-factuals for VA^{EX}: Manufacturing firms



(c) Private Economy

Figure 14: Share of total, export-oriented and domestic-oriented value added going to bottom low labor share firms (see text for details)

changes: Already export-intensive firms have simultaneously increased their size and reduced their labor share, and those that were already large and with low labor share have increased their export intensity. These effects appear to be driven by individual firms and not characteristics of the industry. We expand on these elements when we rely on price data in Section

6.3 Offshoring and Factoryless Production

The increasingly global pattern of production present both statistical and conceptual challenges to domestic labor shares. If production previously done using Danish labor is moved abroad the measured labor share declines even if the same production processes are used.[31] In practice firms can move production abroad in three distinct manners:

- *Offshoring*: Intermediate inputs are produced using foreign labor and are imported to and used in production in Denmark. The payment to foreign labor is counted as imports and correspondingly as intermediate inputs.[32] This is the case, regardless of whether the production abroad is done in the same multinational or by a different company.

[31]Suppose a firm employs a CRS Cobb-Douglas production function with two types of labor, with factor shares θ_1 and θ_2 and markup $\mu > 1$. If both types of labor are employed in Denmark, the measured labor share will be $\frac{1}{\mu}(\theta_1 + \theta_2)$ with $\frac{1}{\mu}(1 - \theta_1 - \theta_2)$ being returns to capital and $1 - \frac{1}{\mu}$ the share going to profits. If labor of type 1 moves to a foreign country the measured labor share will be $\frac{1}{\mu}\theta_2$ even if nothing else in the production process has changed.

[32]Naturally, for a given firm this would also be the case if it were to outsource domestically. However, then the labor would be counted in another Danish firm.

- *Factoryless production / merchanting.* This form of production differs from offshoring in that the intermediate inputs do not cross the Danish border, but are bought, processed and sold abroad. Statistics Denmark counts such as inputs as imports and the sales as exports, despite the fact that they don't physically cross the Danish border. The distinction between factoryless production and merchanting is whether the intermediate inputs are owned by the Danish company during processing which is not important for our current purposes (and we refer to both as factoryless production henceforth). Factoryless production was virtually non-existing in the Danish economy prior to 2005 but is becoming increasingly important. See appendix 17.1 for details.

- *Sales through foreign affiliates.* A subsidiary of the Danish company produces and sells the product and profits are recouped by the Danish parent company. This can be done in two distinct ways. Either a Danish manufacturing company owns the foreign affiliate and profits are recouped as financial income or a holding company owns both the Danish and the foreign affiliate. In the former case financial income does not impact value added nor operating profits. In the latter case the (financial) income accrues to the holding company which we do not include in the current analysis.[33] This brings up issues of transfer pricing. Cristea and Nguyen (2016), Davies et. al. (2016) and Hebous and Johannesen (2021) demonstrate that MNCs employ strategic profit shifting between affiliates for tax purposes. In particular, Cristea and Nguyen (2016) show that Danish firms reduce the price of exports to low tax countries by between 5.7 and 9.1 per cent. Hebous and Johannesen (2021) find in a study of OECD countries that this effect is stronger for services. Though such activities are important for taxation of multinationals, it's unlikely to be a driving force between the results here. Denmark is not a tax haven, and any transfer prices would likely lead to lower prices, value added and operating profits for export-intensive firms, whereas we see that it is exactly these firms that see large increases in value added.[34]

For our purposes offshoring and factoryless production / merchanting are only distin-

[33] Alternatively a Danish manufacturing company might sell a license to a foreign affiliate which would be included in revenue and affect value added. These transactions are, however, relatively small (less than 3 % of value added in manufacturing in 2015)

[34] We calculate the share of Danish exports from manufacturing that goes to "Tax Havens" as defined in Hebous and Johannesen (2021). The share remains relatively constant at 7 per cent throughout our sample.

guished in that the latter is only for exporting and no Danish labor is (directly) employed, whereas simple offshoring can be for domestic sales and be used as an input in Danish production. For either case, the use of inputs from abroad are counted as imports regardless of whether the product physically crosses the Danish border. Though publicly available aggregate data that makes the distinction between offshoring, factoryless production and merchanting do exist, our micro data does not make the distinction. We take two approaches. First, we use the micro data to analyze the role of increased imports (for either offshoring og factoryless production) in the labor share. Second, In appendix 17.1 we perform some robustness checks on the use of factoryless production and find that for reasonable assumptions at most 20 per cent of the decline in the aggregate labor share can be explained by these new production methods. Given the aggregate data on factoryless production we cannot speak to the change in the covariance of size and labor share.

We take an approach analogous to Hummels, Jørgensen, Munch and Xiang (2014). They find that an (exogenous) increase in the use of offshoring increases the wages of the high-skilled workers and lowers that of the low-skill workers. We employ their framework but our interest is in the labor share of firms:

$$\theta_{i,t} = \beta_0 + \beta_1 log(\text{imports}_{i,t}) + X_{i,t}\delta + \epsilon_{i,t}, \tag{5}$$

where $\theta_{i,t}$ is the labor share of firm i in year t, imports are the dollar value of imports, and $X_{i,t}$ are various controls. There are obvious endogeneity problems with a simple regression of equation (5): If a firm faces a positive demand shock it might increase its markup, increase production and with it imports. This will create a spurious negative correlation between imports and the labor share. We address this in two way: first, we control for various observables and second we employ an instrumental variable regression along the lines of Hummels et. al (2014) . Table 6 shows the results. All regressions have year fixed effects. We run our regression from 2002-2017 and follow the restrictions of Hummels et al. (2014): Column (1) shows the OLS results with no covariance other than imports. We use the terminology of Hummels et al.(2014) and call this broad offshoring.[35] We find a negative relationship between imports and labor share, but when controlling for the size of firms measured by employment and revenue the sign flips and we find a positive relationship between imports and labor share. This result

[35]We contrast it with "narrow" offshoring in the sense of imports only in the product code where the firm itself produces in Appendix X.

remains relatively constant when including industry or firm fixed effects. As discussed in Hummels et. al (2014) there are numerous confounding effects including demand shocks to firms. We follow an approach similar to theirs and construct pre-sample weights for each importing firm of country and HS code of individual firms, $\omega_{i,s,h}$ where i is firm, s is source country and h is HS6 category. For each source country and HS6 product code we calculate (log) total exports to all but Denmark as $log(EX_{s,t,h})$. We then construct an instrument as:[36]

$$I_{i,t} = \sum_{s,h} \omega_{i,s,h} \times log(EX_{s,t,h}).$$

If the import share is endogenous to unobserved productivity shocks, so is various measures of the size of a firm. Consequently, if the instrument is valid the proper equation of estimation would be only including imports. We perform this exercise in column (5). It shows a negative relationship between offshoring and the size of the labor share consistent with the replacement of Danish labor by foreign inputs. We repeat the full set of OLS regressions using 2SLS instrumenting imports. They are given in columns (6)-(8). This is to be interpreted as a semi-elasticity, implying that a plausible reading of the data is that an exogenous increase in imports by 100 per cent decreases the labor share by 3 per cent.

To assess the importance of this for the overall trends, we perform the following exercise: Use the import data of the firms, and perform a counterfactual such that we update the labor share of an individual firm as: $\hat{\theta}_{i,t} = \theta_{i,t} - \beta_1 \left[log(\text{imports}_{i,t}) - log(\text{imports}_{i,1})\right]$, where $t = 1$ is the first year the firm appears. If the firm does not have values for imports in period t and $t = 1$ we do not update the labor share. We use a "high" estimate of $\beta_1 = -0.03$ and an implausibly high estimate of $\beta_1 = -0.1$ to plot the average labor share and the covariance between the (updated) labor share and the value added. Figure 15 gives the result. It shows that the average labor share could have been around 2 percentage points higher had it not been for increased imports (for $\beta_1 = -0.03$) and possible 6 percentage points for the high estimate of $\beta_1 = -0.1$. The covariance term might have declined from -0.05 to -0.22 (instead of -0.24 for the actual data). Even with the very high estimate of -0.1 there would still have been a substantial decline in the covariance term.

We conclude that there is some evidence that an exogenous shock to imports shares lowers the labor share, there is little support for it being a driving factor of the changes

[36]Hummels et al. (2014) also employ information on changing exchange rates. We do not do so here.

Table 6: Regressing labor share on various covariates

	OLS (1) Labor share	(2) Labor share	(3) Labor share	(4) Labor share	IV (5) Labor share	(6) Labor share	(7) Labor share	(8) Labor share
log(broad offsh.)	-0.0163***	0.00905***	0.0124***	0.00945***	-0.0264***	-0.0120	-0.00269	-0.0694
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.255)	(0.807)	(0.665)
log(empl)		0.202***	0.214***	0.327***		0.183***	0.202***	0.348***
		(0.000)	(0.000)	(0.000)		(0.000)	(0.000)	(0.000)
log(revenue)		-0.220***	-0.236***	-0.400***		-0.176***	-0.205***	-0.317*
		(0.000)	(0.000)	(0.000)		(0.000)	(0.000)	(0.048)
Constant	0.980***	3.897***	4.104***	6.704***				
	(0.000)	(0.000)	(0.000)	(0.000)				
Industry FE			X				X	
Firm FE				X				X
Obs.	13698	13698	13698	13628	12680	12680	12680	12612
R^2	0.0302	0.131	0.165	0.480	0.0150	0.103	0.102	0.0383

p-values in parentheses
All regressions with year FE
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

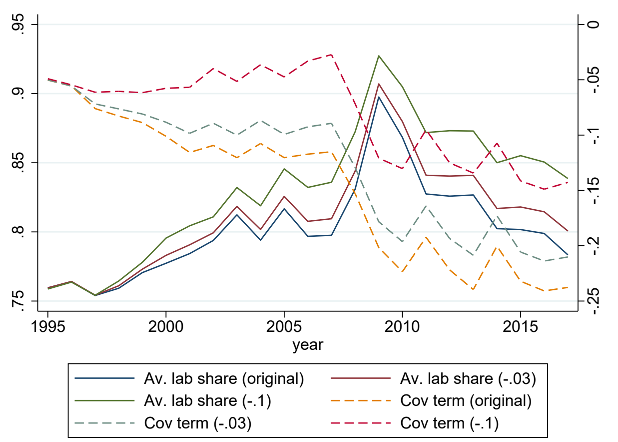


Figure 15: Updating the labor share according to the IV estimate of equation (5) (labor share, LHS and Cov. term, RHS)

to the overall structure of the labor share.

Finally, Appendix 38 performs an alternative assessment using the aggregate data on factoryless production. In principle a Danish firm could move it's entire production, including HQ, R&D and production to a foreign affiliate (or non-affiliated firm). If the firm sells the product abroad all that would be counted is the value added from this transaction, not the labor costs and the firm would have zero labor share. This suggests correcting the data by subtracting aggregate value added from factoryless production and merchanting from official value added and recalculate the labor share. If we perform such an exercise we find that the aggregate labor share in manufacturing has not seen a decline during this period. We show, however, that this presupposes that the entire danish labor force associated with the value added can be moved abroad. For more reasonable assumptions on the share of labor that can be used abroad we find that perhaps 15-20 per cent of the decline in the aggregate labor share can be "explained" by these new forms of production.

6.4 Danish export is increasingly concentrated in product codes, but less concentrated in country destinations

The export data contains detailed information on destination, product category, price and quantity of Danish exports. All good exports is categorized into highly disaggregated 8 digit codes. Such a code might be: "pharmaceutical products, insulin, packaged for retail", code 30.04.3110, with a distinct code for insulin that is not packed for retail. The data further contains information on destination country as well a price (FOB) and quantity. We perform a detailed analysis of the exports for the manufacturing sector in Appendix 16. Here we give highlights of the findings. Table 7 shows some summary statistics of export distribution.[37]. The median firm in 2017 exports to 4 country destinations, whereas the 95th percentile is 41, having gone up from 29 in 1995.[38] If we weight the percentiles by value of exports we find a median that has increased from 27 to 43 per cent. The country as a whole exports to 221 countries, and a sizable number of firms export to a substantial subset of those countries.

Though the median firm exports only 6 product categories, 5 per cent export more than 48. There has been a substantial increase in the weighted distribution for which the 95th percentile has increased from 139 to 853. This is out of a total of more than 6000 categories.

In the appendix we conduct a more thorough analysis. We focus on the Herfindahl index across country destinations and product categories, both for the economy as a whole and individual firms. We find

- Danish exports as a whole have become more concentrated in product categories. This happens despite the fact that individual firms have become somewhat less concentrated in product codes. We reconcile these two facts by showing that individual firms are much more concentrated than the country as a whole and the overall distribution of firm exports has become more skewed.

[37] For confidentiality reasons, percentiles are calculated as averages across ten nearest observations

[38] Percentiles continue to refer to averages across 10 firms.

Table 7: Summary Statistics for Exports - manufacturing

Country Destinations						
	Unweighted					Total
Year	25 pct	50 pct	75 pct	90 pct	95 pct	
1995	1	3	9	19	29	216
2007	1	4	12	27	39	223
2017	1	4	13	30	41	221
	Weighted					
1995	14	27	51	84	92	
2007	20	38	58	98	105	
2017	22	43	90	100	132	
Product codes						
	Unweighted					Total
Year	25 pct	50 pct	75 pct	90 pct	95 pct	
1995	1	4	8	15	23	5590
2007	1	5	14	25	41	6455
2017	1	6	14	30	48	6031
	Weighted					
1995	8	15	45	124	139	
2007	16	41	104	143	191	
2017	17	62	231	338	853	

- Danish exports as a whole have become less concentrated in country destinations. This reflects a broad decrease in how concentrated individual firms are across country destinations.

That is, as the biggest firms become more dominant the overall distribution becomes more narrowly reflected in the export categories of these firms. But since large firms export broadly across destinations, Denmark as a whole has become less concentrated. In Section 8 below we use price data to disentangle price and quantity effects.

7 Dynamical Aspects of the Labor Share

Having established a number of patterns in the cross sectional data we now employ the panel dimension. We first consider the transition in and out of being a low labor (LL) firm. We show that this transition is surprisingly transitory and happens largely through changes in the value added rather than wages or employment. Consistent with this, we exploit a decomposition proposed by Kehrig and Vincent (2020) and find that firms become low labor share and large simultaneously. We further show that the increase in the share of value added going to low labor share firms is increasing primarily because firms that become low labor share firms tend to be larger today than previously and to some extent because firms grow more when they transition into LL status.

Finally, we take advantage of detailed price and quantity data for the exports of goods to decompose the growth of firms that expand their exports. We find that that close to 2/3rds of the growth in exports come from increases in quantity.

7.1 Firms decrease their labor share primarily through changes to value added

We start out by decomposing the change rate of micro-level labor shares ($\Delta log\theta_{i,t}$) into the contributions from wages ($\Delta log(W_{i,t})$), employment ($\Delta logL_{i,t}$) and value added ($\Delta logVA_{i,t})$). We exploit the following relationship:

$$\Delta log\theta_{i,t} = \Delta logW_{i,t} + \Delta logL_{i,t} - \Delta log(VA_{i,t})$$

This reflects three potential ways the labor share could change: By reducing wages, by reducing employment or by increasing value added (holding the others constant). Our strategy is to use a regression approach to quantify the change of a specific variable for LL establishments relative to their peers. We will focus on five year differences for each firm in a panel. Specifically, we run the following regression:

$$\Delta logx_{i,t} = \beta_0 + \beta\mathbf{1}\{\mathrm{LL_{i,t}}\} + \gamma X_{i,t} + \epsilon_{i,t}, \text{ where } x_{i,t} = \theta_{i,t}, W_{i,t}, L_{i,t} \text{ } or \text{ } VA_{i,t}. \quad (6)$$

Of course, by definition a firm in the group of low labor share firms will have a lower labor share than other firms - around 30 points - but we seek here to establish whether this lower labor share comes from value added, wages or employment. Note, we do not put any restrictions on LL firms in year t as to whether they are LL five years prior. The vector of controls includes industry-categories and year dummies. We run the regression for the total labor share, and each of the sub-component. Note, there is an exact relationship between these four estimates. The results are given in Table 8 for the whole economy. Columns 1 - 3 run the regression on value added and show that in the weighted regression a low labor share firm has seen a disproportionate decline in its labor share of 36 per cent (not pp). Columns (4)-(6) demonstrate that this effect is largely driven by higher value added and not through the labor payment either through wages or employment. These results indicate that it is unlikely that monopsony power in the labor market is the main driver behind the low labor share.

One might, in addition, conclude that automation that saves on employment is un-

Table 8: Regression analysis on low labor share status

	(1) Lab Share	(2) Lab Share	(3) Lab Share	(4) W	(5) Emp	(6) VA
LL	-0.290***	-0.309***	-0.363***	0.00862***	0.0327***	0.405***
	(0.00134)	(0.00137)	(0.00189)	(0.00114)	(0.00284)	(0.00282)
_cons	0.0830***	0.0240***	0.0519***	0.132***	0.198***	0.319***
	(0.000609)	(0.00198)	(0.00257)	(0.00155)	(0.00387)	(0.00383)
N	437644	437644	437644	432281	432281	437644

Standard errors in parentheses

column 3-6 are weighted by value added. Column 2-6 include industry dummies

Column (1) unweighted and without year industry fixed effects

Column (2) with year and industry effect

Column (3-6) with year and industry fixed effects and weighted by value added

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

likely to be the driver. This would be premature, however. Any economically valuable automation will have two opposite effects on labor demand: they will reduce demand for given production, but through cheaper production costs increase demand through higher production (Hemous and Olsen, 2022). It is perfectly possible for these two effects to offset one another in which case one would recover the pattern above.

7.2 The Dynamics of the labor share components

The previous section found that low labor share firms have on average seen disproportionate increases in value added but not in employment or wages. This leads us to ask the question of whether changes in the aggregate covariance between size and labor share come through changes in labor shares for already existing large firms, through growth in firms that have low labor share or a joint movement of both of them. For this we utilize the framework employed by Kehrig and Vincent (2021). We abstract from entry and exit over a period of 5 years and make the following decomposition:

$$\Delta Cov(\lambda_{i,t}, \theta_{i,t}) = Cov(\lambda_{i,t-1}, \Delta\theta_{i,t}) + Cov(\Delta\lambda_{i,t}, \theta_{i,t-1}) + Cov(\Delta\lambda_{i,t}, \Delta\theta_{i,t}), \quad (7)$$

where the three terms on the right in turn represent

- $Cov(\lambda_{i,t-1}, \Delta\theta_{i,t}) < 0$: "Big Player": Already large players ($\lambda_{i,t-1}$ large) see declines in the labor share. This could be true if large firms are better able to exploit new technology, expand into new markets or use market power in other ways.

- $Cov(\Delta\lambda_{i,t}, \theta_{i,t-1}) < 0$: "Superstar" scenario. Firms that already have low labor share ($\theta_{i,t-1}$ low) would see a disproportionate growth in their size. This could be true if medium size firms with low labor shares have better products or technology that allows them to scale up more easily.

- $Cov(\Delta\lambda_{i,t}, \Delta\theta_{i,t}) < 0$: "Shooting star" scenario. Firms experience declines in the labor share and increases in the value added simultaneously. This could be if through a demand shock firms are able to raise their prices. Alternatively, if firms are characterized by increasing returns to scale, say through fixed costs, and they are able to capture a new market without proportionately higher labor costs, we would also see declines in labor share along with growth in size. Finally, some versions of capital investments which increase sales and reduce the reliance on labor will also fit with a shooting star scenario.

We calculate the decomposition of equation (7) for each five year period in the data. Figure 16 plots the accumulated effect over subsequent 5 years period starting in 1999 for the whole economy (Panel A) and 1995 for the manufacturing sector (Panel B). For the whole economy the covariance term declines from -0.04 to -.1. The "big player" mechanism pulls in the opposite direction during this period. Large firms tend to have higher growth in their labor share. The contribution from firms with already low labor share (the superstars) is close to zero, implying that more than a 100 per cent of the overall decline in the covariance term can be ascribed to the "shooting star" phenomenon: Firms grow and reduce their labor share simultaneously. Panel B shows that the same pattern holds for the manufacturing sector, although the overall negative effect from "shooting stars" is substantially higher.

7.3 Firms that become LL firms are relatively larger today

Having established that firms reduce their labor share simultaneously with an increase in value added we now tie this to the change in the covariance between size and labor share. The share of value added going to the bottom 20 per cent of the labor share distribution can increase for one of three reasons: i) Firm birth and death disproportionately favors large LL firms, ii) Firms that are low labor share firms grow faster than those that are not iii) firms that become LL firms are bigger compared with those that leave that

(a) Manufacturing sector

(b) Whole Private Sector

Figure 16: Decomposing the change in the covariance.

category. In Appendix 18.2 we formally decompose these trends and show that iii) is the dominant feature (partly because firms that transition are bigger and to a smaller extent because they grow more when they do so). This is illustrated in Figure 17 for the manufacturing sector. For each year we group non-LL firms who will survive for a year into deciles based on their value added. For each we calculate the probability of entering LL status. For 1995 this probability is largely independent of size and around 7-8 per cent along the size distribution. By 2015 there has been a substantial shift: Firms in the top deciles have almost a 12 per cent chance of transition whereas those in the bottom have less than 6 per cent. We perform the same calculations for those leaving LL status (compared with those that remain). Throughout the period there has been a negative relationship between size and probability of leaving and this relationship has increased somewhat in intensity. Seen through this lens, the group of low labor share firms is gradually "accumulating" large firms despite the fact that LL firms do not grow faster.

We close this section by examining the transition of firms in and out of low labor share firm status in Figure 18. Consider first Panel A, which shows firms that are low labor share firms at year 0 (either 2002, 2006 or 2010) and ask what share of these firms were low labor share firms in previous and subsequent years. As can be seen around 50 per cent of firms were low labor share firms years earlier and around 50 percent will be again in 5 years. This trends is largely symmetric around 0 and basically constant across time periods. Panel B shows the same figure but weighted by value added. This increases the probability of remaining in the category somewhat.

The overwhelmingly large role of firms that experience declines in the labor share

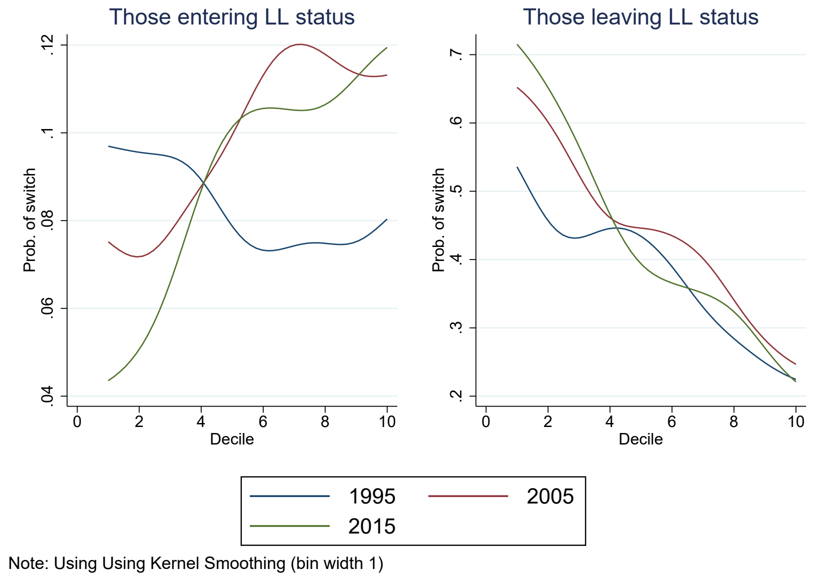


Figure 17: Probability of switching in and out of LL status by size decile

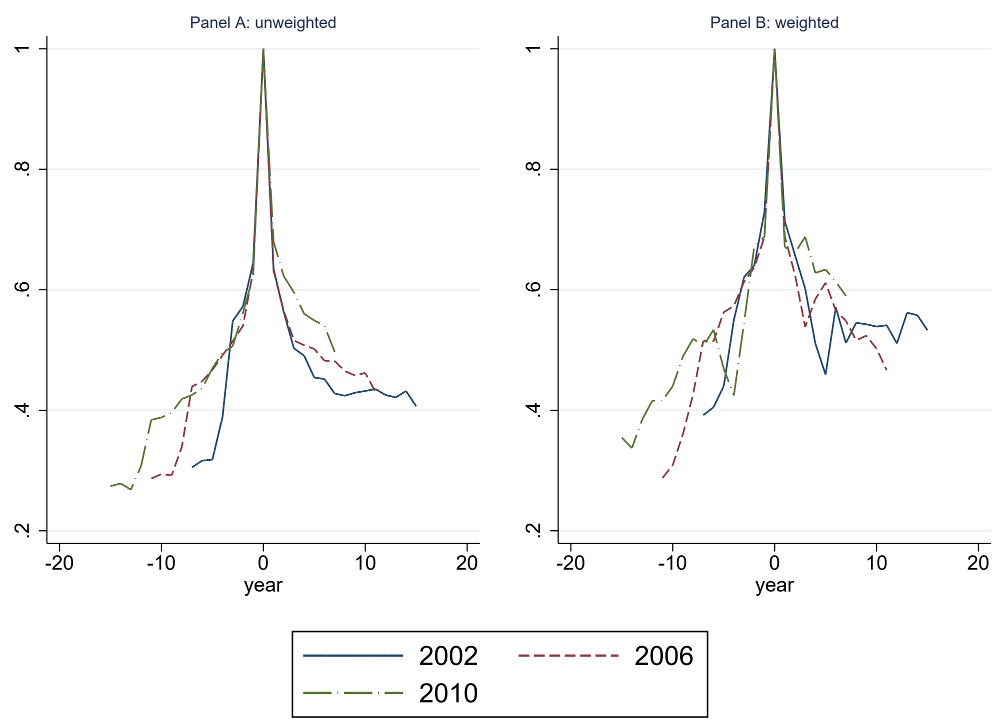


Figure 18: Transitions of LL firms for the whole economy

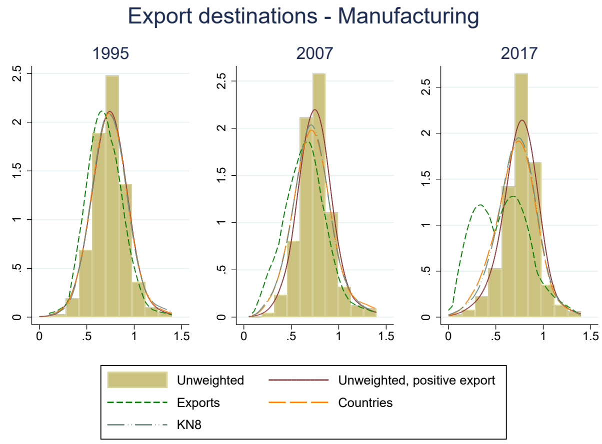


Figure 19: Labor share weighted by various measures of exports

while simultaneously seeing increases in size suggests several possible explanations: i) A positive demand shock would drive up prices and potentially quantity. Whether this would increase the labor share depends on the behavior of markups and whether the firm's production function features increasing returns to scale. ii) An investment in investment technology which drives down costs would see an increase in exports through a decline in prices. Correspondingly, determining whether sales grow through declining or rising prices is an important fact.

Though Statistics Denmark does collect price and quantity data for a sub sample of Danish manufacturing firms, the data on exports are both complete and of higher quality. Since a large part of the growth in value added comes through an increase in exports in the following we will focus on changes to exports.

8 Decomposing Exports: the role of quantity expansions

We expand on this finding by looking at the details of the export data in Figure 19. We focus on manufacturing. In 1995 we find the common pattern of previous figures: There is no relationship between the labor share of a firm and its exports, the number of countries it exports to or the number of HS8 categories that it exports it (KN8 category equals HS8). This pattern remains true for export destinations and export categories in 2017. However, for total size of exports the shift is sizable.

To decompose the value into price and quantity, we consider changes to export. We start out by noting that changes to total exports are given by:

$$\Delta EX_t = \sum_{i \in N_t} EX_{i,t} - \sum_{i \in N_{t-1}} EX_{i,t-1},$$

where t denotes years, $EX_{i,t}$ is the exports in kroners for firm i and N_t is the set of firms that export in year t. We can further decompose this into:

$$\Delta EX_t = \underbrace{\sum_{i \in N_{t-1} \bigcap N_t} max\{\Delta EX_{i,t}, 0\}}_{\text{Growing Exports}} + \underbrace{\sum_{i \in N_{t-1} \bigcap N_t} min\{\Delta EX_{i,t}, 0\}}_{\text{Declining Exports}}$$
$$+ \underbrace{\sum_{i \in N_t \setminus N_{t-1}} EX_{i,t}}_{\text{Entry}} - \underbrace{\sum_{i \in N_{t-1} \setminus N_t} EX_{i,t-1}}_{\text{Exit}},$$

which demonstrates that total growth in exports can be decomposed into four parts: The contribution from firms who see their exports grow ($\Delta EX_{i,t}>0$), those that see their exports decline ($\Delta EX_{i,t} < 0$) those that enter the export market and those that exit the export market (not necessarily through firm entry or deaths). Panel A in Figure 20 shows that for most years the effects from exports and entry are small. Danish exports grow substantially throughout this period so the sum of the terms is considerably above zero.

Given our focus on firms that expand their value added, we further decompose the term for growing exports into:[39]

$$\Delta EX_{i,t} = \underbrace{\sum_{j \in N_{i,t} \cap N_{i,t-1}} (q_{j,i,t} - q_{j,i,t-1}) p_{j,i,t}}_{\text{Increases in quantity}} + \underbrace{\sum_{j \in N_{i,t} \cap N_{i,t-1}} (p_{j,i,t} - p_{j,i,t-1})\, q_{j,i,t-1}}_{\text{Increases in price}} +$$

[39]For a small number of products there is a change in the unit of measurement from say 10,000 doses of insulin to a kilo of insulin and corresponding enourmous change in price. Not correcting for this introduces a substantial amount of noise. In the data we replace $(p_{j,i,t} - p_{j,i,t-1})$ with $min\{(p_{j,i,t} - p_{j,i,t-1}), 3p_{j,i,t-1}\}$ such that we do not allow prices to more than quadruple in a single year. We correspondingly assign the remainder to the change in quantity. The results are not sensitive to the exact choice of maximum allowed price change.

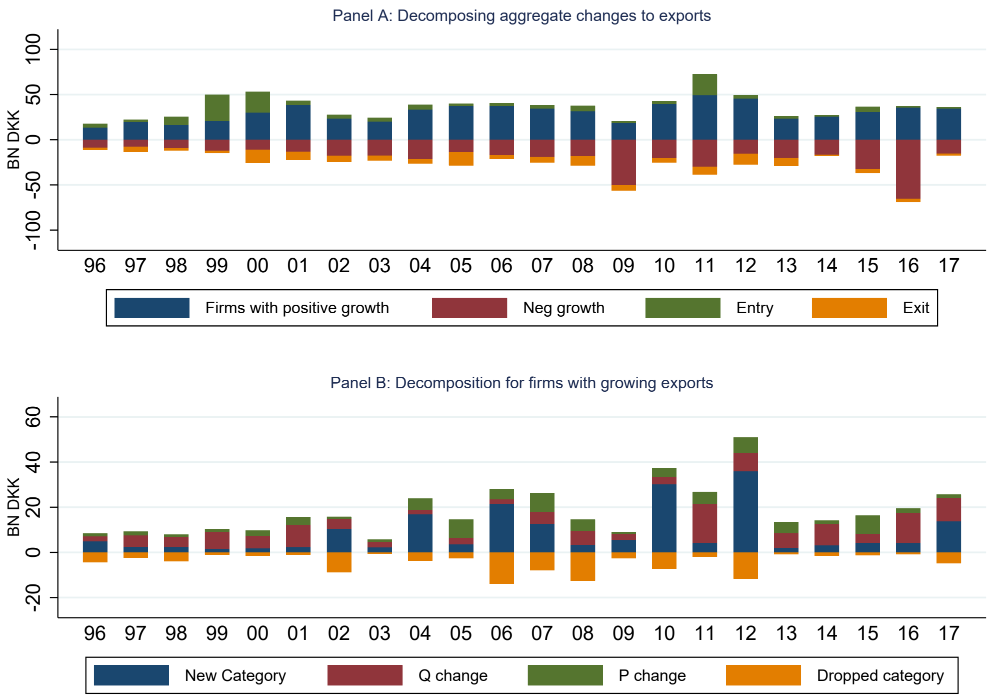


Figure 20: Decomposing exports

$$\underbrace{\sum_{j \in N_{i,t} \setminus N_{i,t-1}} EX_{j,i,t}}_{\text{Entry into new HS8 categories}} - \underbrace{\sum_{j \in N_{i,t} \setminus N_{i,t-1}} EX_{j,i,t-1}}_{\text{Dropped from HS8 categories}},$$

where $EX_{j,i,t} = p_{j,i,t} \times q_{j,i,t}$ is the exports of firm i in HS8 category j in year t, $p_{j,i,t}$ is the price and $q_{j,i,t}$ is the corresponding quantity. The decomposition shows that changes in exports for a given firm is composed on changes to quantity of existing products, changes in price of existing products as well as the next flow in and out of product categories. Panel B shows the decomposition for firms who have seen increases in exports. The net effect of new categories and dropped categories is close to zero and the majority of the effect comes from the first two terms. As can be seen both the price and quantity effects are positive, but the contribution from quantity is on average twice as high.

Investment in new production technology would imply growth through lower prices and the data suggests that the growth in exports comes through demand side effects, whether these be exogenous to the firm or arising as the result of deliberate attempts to break into new markets.

9 Conclusion

There has been a substantial shift in the distribution of labor shares in Denmark over the past 20 years. Whereas the unweighted distribution of labor shares has moved around 5 points to the right, the labor share of the biggest firms has declined. We show that declines in the labor share overwhelmingly happens through increases in value added without corresponding increases in labor costs, that a lot of the growth has come through exports, and that a majority of export growth happens through quantity and not prices. The data does not suggest that offshoring is a primary driver. Firms that reduce their labor share do have disproportionate R&D and capital investments in previous years. We argue that positive demand shocks coupled with increasing returns to scale in production are important. Where these demand shocks come from and how much firms themselves can do to affect them is an important topic for future research.

References

Acemoglu, D. and Restrepo, P. (2018). The race between machine and man: Implications of technology for growth, factor shares and employment. *American Economic Review*, 108(6):1488–1542.

Aghion, P., Bergeaud, A., Boppart, T., Klenow, P., and Li, H. (2019). A theory of falling growth and rising rents. NBER wp 26448.

Akcigit, U. and Ates, S. (2021). Ten facts on declining business dynamism and lessons from endogenous growth theory. *American Economic Journal, Macroeconomics*, 13(1).

Autor, D., Dorn, D., Katz, L., Patterson, C., and Van Reenen, J. (2020). The fall of the labor share and the rise of superstar firms. *The Quarterly Journal of Economics*, 135(2):645–709.

Barkai, S. (2020). Declining labor and capital shares. *Journal of Finance*, 75(5):2421–2463.

Bessen, J. (2017). Information technology and industry concentration. Boston University School of LawLaw and Economics Paper No. 17-41.

Bockerman, P. and Maliranta, M. (2012). Globalization, creative destruction, and labour share change: evidence on the determinants and mechanisms from longitudinal plant-level data. *Oxford Economic Papers*, 64(2):259–280.

Cristea, A. and Nguyen, D. (2016). Transfer pricing by multinational firms: New evidence from foreign firm ownerships. *American Economic Journal: Economic Policy*, 8(3).

Davies, R., Martin, J., Parenti, M., and Toubal, F. (2018). Knocking on tax haven's door: Multinational firms and transfer pricing. *Review of Economic and Statistics*, 100(1).

De Loecker, J. and Eeckhout, J. (2020). Global market power.

De Loecker, J., Eeckhout, J., and Unger, G. (2020a). The rise of market power and the macroeconomic implications. *The Quarterly Journal of Economics*, 135(2):561–644.

De Loecker, J., Eeckhout, J., and Unger, G. (2020b). The rise of market power and the macroeconomic implications. *Quarterly Journal of Economics*, 135(2).

De Loecker, J. and Warzynski, F. (2012). Markups and firm-level export status. *American Economic Review*, 102.

de Ridder, M. (2020). Market power and innovation in the intangible economy.

Eden, M. and Gaggl, P. (2018). On the welfare implications of automation. *Review of Economic Dynamics*, 29:15–43.

Eggertsson, G., Robbins, J., and Wold, E. G. (2018). Kaldor and piketty's facts: the rise of monopoly power in the united states.

Elsby, M., Hobijn, B., and Sahin, A. (2013). The decline of the u.s. labor share. *Brookings Papers on Economic Activity*, 2013(2):1–63.

Gabaix, X. (2011). The granular origins of aggregate fluctuations. *Econometrica*, 79(3).

Gouin-Bonenfant, E. (2020). Productivity dispersion, between-firm competition,and the labor share.

Gutierrez, G. and Philippon, T. (2017). Declining competition and investment in the u.s.

Hebous, S. and Johannesen, N. (2021). At your service! the role of tax havens in international trade with services. *European Economic Review*, 135.

Hémous, D. and Olsen, M. (2022). The rise of the machines - automation, horizontal innovation and income inequality. *American Economic Journal, Macroeconomics*, 14(1).

Hopenhayn, H., Neira, J., and Singhania, R. (2018). From population growth to firm demographics: Implications for concentration, entrepreneurship and the labor share. NBER wp 25382.

Hsieh, C. and Rossi-Hansberg, E. (2021). The industrial revolution in services. *Working Paper*.

Hubmer, J. (2020). The race between preferences and technology.

Hubmer, J. and Restrepo, P. (2021). Not a typical firm: The joint dynamics of firms, labor shares, and capital labor substitution.

Hummels, D., JÃžrgensen, R., Munch, J., and Xiang, C. (2014). The wage effects of offshoringÃ evidence from danish matched worker-firm data. *The American Economic Review*, 104(6).

Kaldor, N. (1961). Capital accumulation and economic growth. *In F.A. Lutz and D.C. Hague, eds.*

Karabarbounis, L. and Neiman, B. (2014). The Global Decline of the Labor Share. *Quarterly Journal of Economics*, 129(1):61–103.

Kehrig, M. and Vincent, N. (2021). The micro-level anatomy of the labor share decline. *The quarterly journal of economics*, 136(2):1031–1087.

Koh, D., SantaeulaliaâLlopis, R., and Zheng, Y. (2020). Labor share decline and intellectual property products capital. *Econometrica*, 88(6).

Lashkari, D., Bauer, A., and Boussard, J. (2020). Information technology and returns to scale.

Luttmer, E. (2007). Selection, growth, and the size distribution of firms. *Quarterly Journal of Economics*.

Martinez, J. (2019). Automation, growth and factor shares.

Melitz, M. (2003). The impact of trade on intraâindustry reallocations and aggregate industry productivity. *Econometrica*, 71(6).

Melitz, M. and Polanec, S. (2015). Dynamic olley-pakes productivity decomposition with entry and exit. *RAND Journal of Economics*, 46(2).

Peters, M. and Walsh, C. (2019). Declining dynamism, increasing markups and missing growth: The role of the labor force.

Piketty, T. and Zucman, G. (2014). Capital is Back: Wealth-Income Ratios in Rich Countries 1700-2010. *Quarterly Journal of Economics*, 129(3):1255–1310.

Rognlie, M. (2015). Deciphering the fall and rise in the net capital share: Accumulation or scarcity? *Brookings Papers on Economic Activity*, 46(1):1–69.

van Vlokhoven, H. (2021). Estimating the cost of capital and the profit share.

Zeira, J. (1998). Workers, machines, and economic growth. *The Quarterly Journal of Economics*, 113(4).

Appendix

10 Correcting for judicial changes to firms

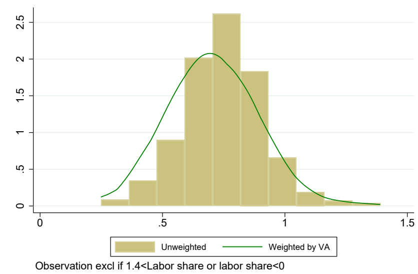
A regular feature of the data is that certain firms shut down, another reopen in the same industry and the majority of workers switch from one firm to another. A stylized version of this is shown in Table 9 below. In this table a firm of 1000 employees exists until 2004 and the shuts down. In the following year another firm opens in the same industry and a sizable number of the employees from firm 1 have switched to firm 2. When this is the case we combine firm 1 and 2 into one. Specifically, we join two firms if 1) a firm shuts down (meaning declines by more than 90 employees), 2) more than 50 per cent of the workers move to firm 2, 3) firm 2 starts operating within one year of firm 1 having shut down.

Year	Emp firm 1	VA firm 1 (mill)	Emp firm 2	VA firm 2 (mill)
2003	1000	1000	0	
2004	1000	1000	0	
2005	0		1100	1200
2006	0		1100	1200

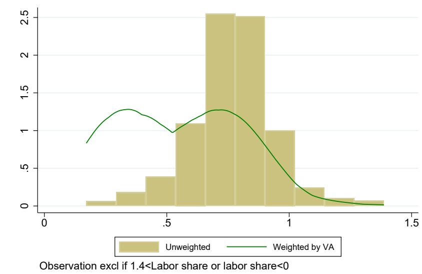
Table 9: Stylized example of accounting changes to firms

11 Measurement error

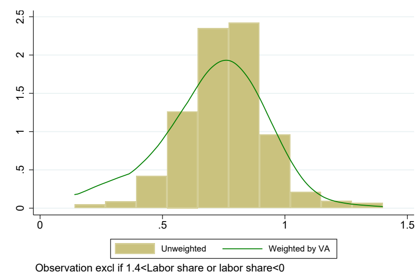
A concern when regression labor share on value added is that the same variable appears on both sides of the equation. Any measurement error in value added will therefore give a downward bias in the estimates of equation (8). Note this will be the case even if fluctuations in value added aren't caused by classical measurement error, but are instead, say, multi-year projects with a one-time payment or other accounting matters that don't necessarily reflect underlying economic activity. We address this in two ways: First, we repeat versions of Figures 1 and 2, where we show the weighted distribution of labor shares as well as the share of value added going to low labor share firms. The results are shown in Figures 21 and 22. As can be seen there is little difference between these figures and those of the main table. Consequently, measurement errors from year-to-year variations in value added are unlikely to be substantial driver of the results.



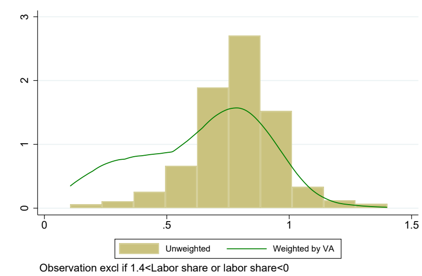
(a) Manufacturing (1995/1996)



(b) Manufacturing (2015/2016)



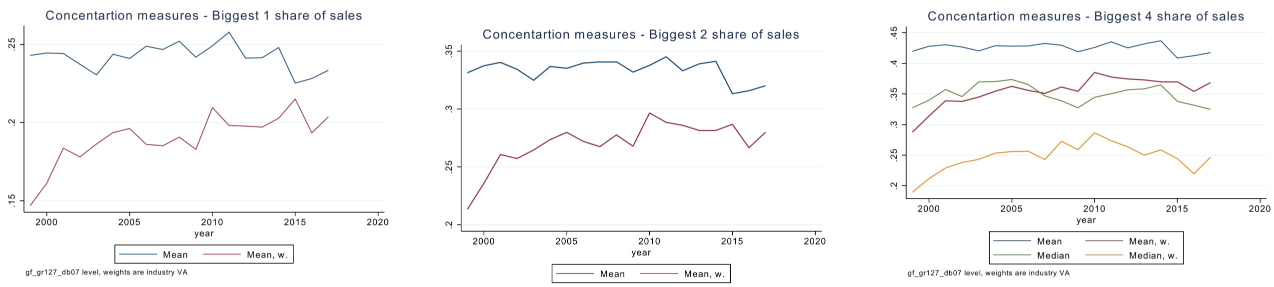
(c) Private Sector (1999/2000)



(d) Private Sector (2015/2016)

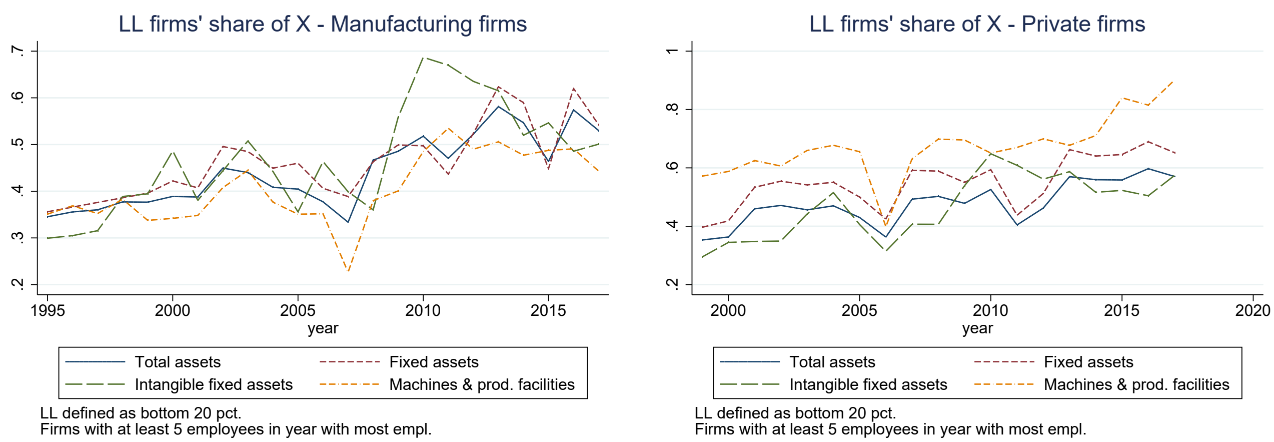
Figure 21: Unweighted and Weighted (by VA) distribution of labor shares (Aggregated Years)

Figure 22: Share of value added going to lowest quintile labor share firms



(a) Biggest firm **(b)** Two biggest firms **(c)** Four biggest firms

Figure 23: Revenue share for biggest firms across industries, unweighted and weighted (by value added).



(a) Manufacturing **(b)** Private Sector

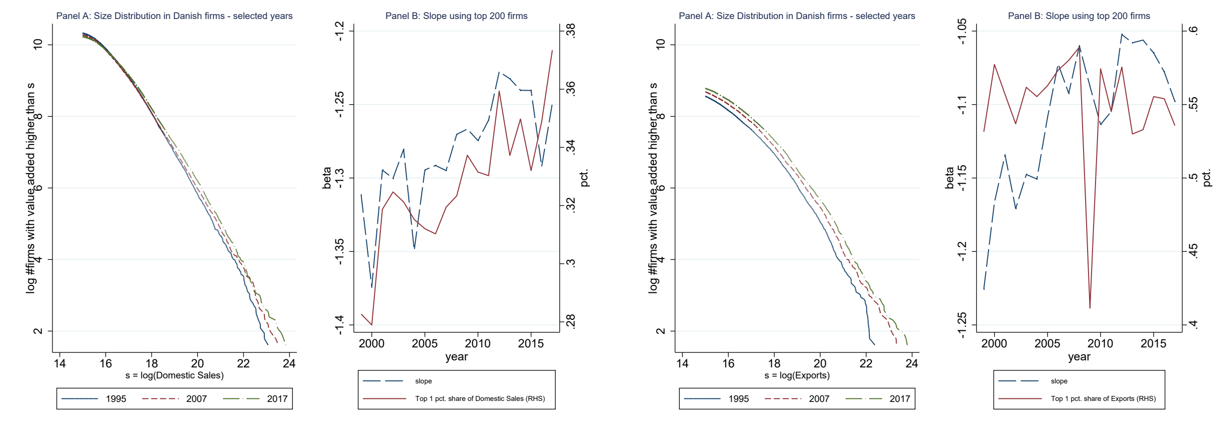
Figure 24: The share of various types of capital owned by bottom quintile of labor share firms

12 Concentration Measures

We plot three alternative measures of concentration for comparison with Figure 8.

13 Other capital measures

In the main analysis we focus on total assets of firms. Here we focus on selected subcategories of capital, namely: intangibles, productive capital (equipment and machinery) and all physical assets (including buildings). Figure 24 shows that all types of capital follow similar paths, largely tracking that of value added as a whole.



(a) Domestic Sales

(b) Exports

Figure 25: Size Distribution of firms for the whole economy

14 The Importance of Large Firms

We show versions of Figure 9 which plots the size distribution of firms for domestic sales and exports, respectively. These are represented in Figure 25

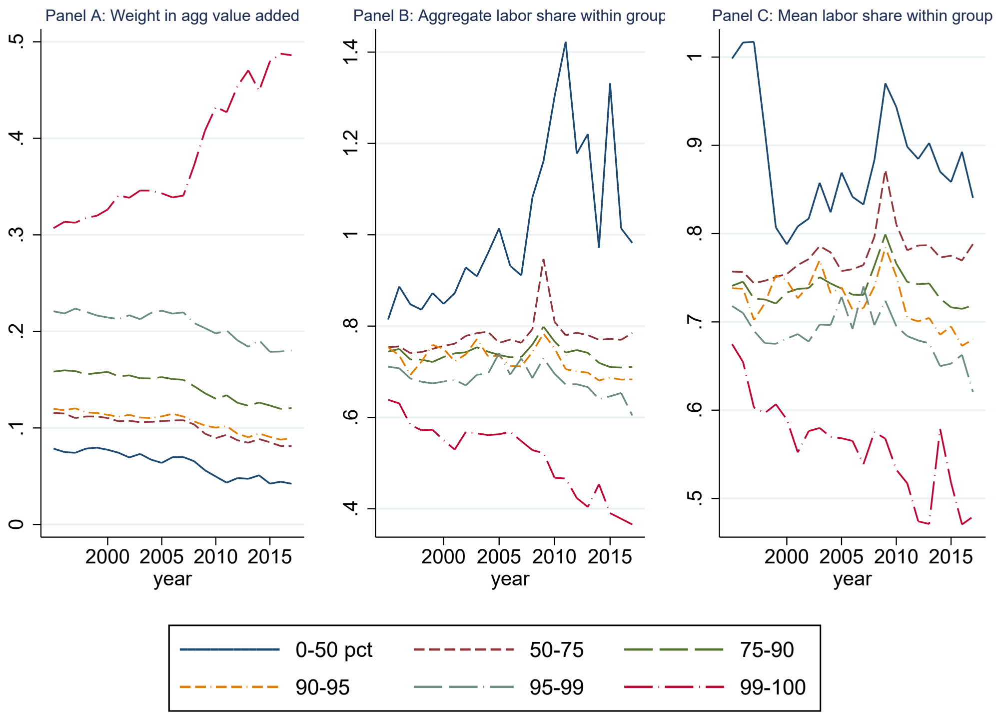
We show a version of Figure 10b for just the manufacturing firms

We show various summary statistics where we exclude large firms (top 1 per cent of value added) and low labor share firms (bottom quintile of labor share distribution).

14.1 Operating profits have increased for the largest firms, profits before taxes have increased even more

We showed in Section 3.2.2 that there is increasing correlation between operating profits and size. Figure 28.a shows profits as a share of value added for the manufacturing sector. It gives both profits before financial income (operating profits) and after financial income (profits before taxes). The distinction is important: Profits earned from exporting directly are captured in revenue and profits before financial transaction, whereas activities from foreign subsidiaries are captured in financial income.[40] Profits before financial transactions shows a moderate upward trend from 15 to 20 per cent from 1995 to before the financial crisis, but a substantial upward trend thereafter, reaching more than

[40] In some cases financial income accrues to a holding company which owns both a Danish manufacturing firm and a Foreign subsidiary. These holding companies are registered in the financial industry and are not included in Figure 28 (since we don't include the financial sector). Our data does not permit us to link holding companies to manufacturing companies.



Panel A: Weight in agg value added
Panel B: Aggregate labor share within group
Panel C: Mean labor share within group
0
.1
.2
.3
.4
.5
.4
.6
.8
1
1.2
1.4
.5
.6
.7
.8
.9
1
2000 2005 2010 2015
year
0-50 pct
50-75
75-90
90-95
95-99
99-100

Figure 26

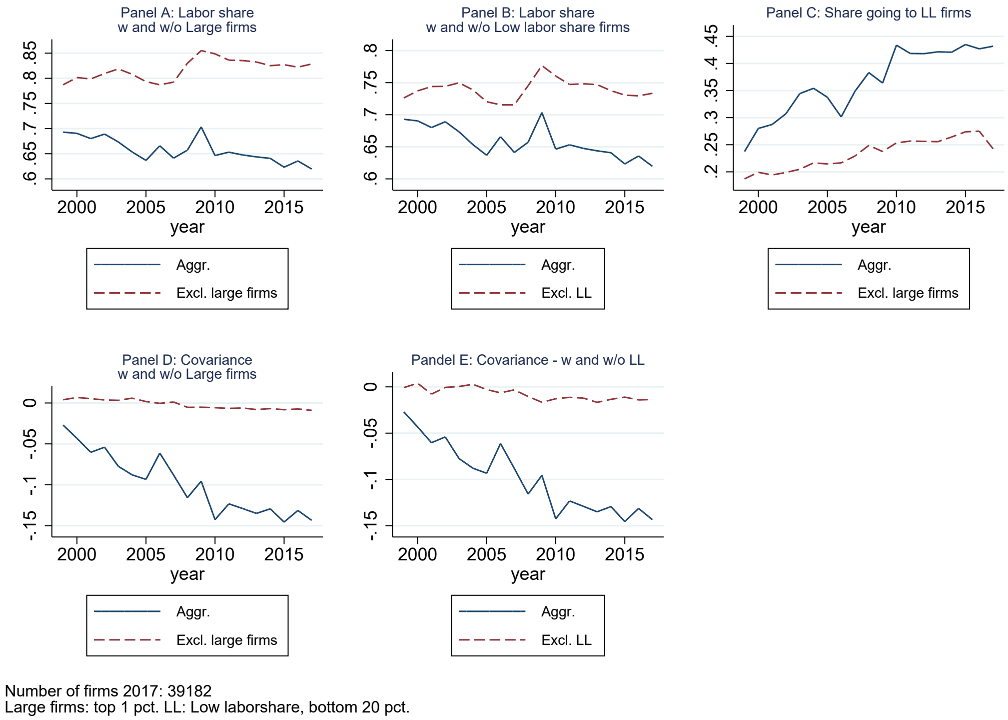
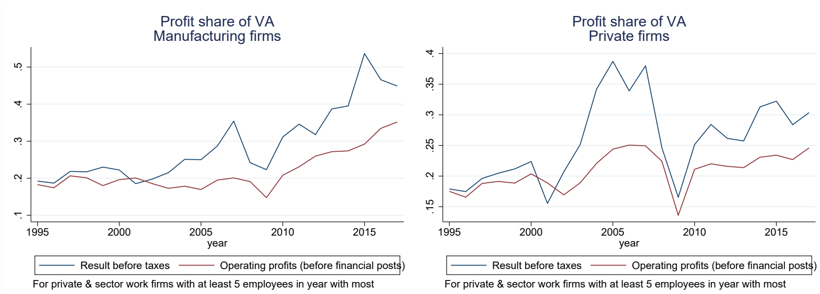


Figure 27: Summary statistics excluding large firms and low labor share firms

35 per cent in 2017. The increase in profits after financial transactions is considerably steeper, reflecting increased income from before. Figure 28.b shows the corresponding value for the whole private sector. Though there is an increase in operating profits before over value added from 17 to 24 per cent the trend is considerably more volatile. This is even more so for profits after financial transactions. Figure 28.c shows that the strong trend of increasing operating profits for large manufacturing firms is much less clear for the whole private sector.

We show two figures analogous to Figure 28, but for the whole private sector. Before the Financial Crisis, there is considerable fluctuations, but since then growth has been higher for the larger firms, though not as stark as for manufacturing firms.



(a) Results before taxes and operating profits (as share of value added) : Manufacturing

(b) Results before taxes and operating profits (as share of value added) : Private Sector

Figure 28: Profit share of value added for manufacturing sector

Figure 29: Operating profit over value added

14.2 Parametric relationship between labor share and size for manufacturing firms

14.2.1 The relationship between labor share and size for the biggest firms

In the following we focus on the top 2 per cent of firms and control for various firm observables. We use top 2 per cent of firms instead of top 1 per cent because the latter would leave only a few dozen firms in the manufacturing sector. We generally weight our regressions by value added.

Informed by the non-parametric regressions of Figure 11, we run regressions of the following form:

$$\theta_{i,t} = \beta_0 + \beta_1 \left[log(VA_{i,t}) - log(\bar{VA}) \right] + X_{i,t}\gamma + \beta_t + \epsilon_{i,t}, \tag{8}$$

where value added is deflated by the producer price index, $X_{i,t}$ is a vector of controls including industry dummies as well as expenditures on research and development, capital stock, import behavior etc. β_t is a time fixed effect where in general we lump years together in groups of five for ease of exposition (this is immaterial for the results). We subtract the average value added across the sample and let 1999 be the omitted time fixed effect. When we omit other controls, β_0 can be interpreted as the labor share of a firm of average size across the sample and the other time fixed effects as changes in this value.

We show the simplest case of equation 8 by excluding all other controls than time dummies in Table X. Columns (1) and (2) use the non-deflated value added where column (2) includes time fixed effect. Columns (3) and (4) repeats the same exercise, but deflates the value added. All four columns show a very steady semi-elasticity between labor share and value added: Among large firms a doubling of the size of the firm measured by value added is predicted to reduce the labor share by just over 8 percentage points. The coefficients on the time fixed effects reestablishes the trend that firms of a given size do not experience much of a decline in the labor share.

We repeat the same exercise for firms in the manufacturing sector (where 1995-1999 is not the omitted variable). We find a slightly larger semi elasticity of around -0.07. At the same time there is a decline in the labor share of a firm of average size of around 6 percentage points when we deflate by the value added (column (4)), though as can be seen from column (2) this result is quite sensitive to specification. With the aggregate labor share among the largest 2 per cent of manufacturing firms having declined by 23.5

Table 10: Labor share on (real) Value Added: Firms in top 2 per cent. Private economy

	(1)	(2)	(3)	(4)
log(VA)	-0.0811***	-0.0833***		
	(-5.81)	(-5.62)		
log(Real VA (PI))			-0.0841***	-0.0837***
			(-5.79)	(-5.63)
Years 00-04		-0.000214		-0.00665
		(-0.02)		(-0.59)
Years 05-09		0.0125		-0.00298
		(0.78)		(-0.20)
Years 10-14		0.0222		-0.00157
		(1.21)		(-0.09)
Years 15-17		0.0114		-0.0140
		(0.55)		(-0.73)
Constant	0.672***	0.661***	0.673***	0.678***
	(66.26)	(43.64)	(66.33)	(47.43)
Observations	4966	4966	4966	4966

t statistics in parentheses
Std errors clustered at firm-level. Value added deflated by aggregate producer price index
Year=1999 omitted year
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

points we conclude that around 75 per cent of this decline is due to the growth in the size of manufacturing firms though some can be explained by a decline in the labor share of the average firm. The total decline among the top 2 per cent of all firms is around 12.8 point which is entirely explained by the larger size of firms.

We go on to include fixed effects for each 4 digit NACE category. We further weight by the size of firms. The results for both the whole economy and for the manufacturing sector are largely unchanged and we place the results in Appendix Figures X and X. There is little change from these regressions. The following regressions all include industry fixed and are weighted by value added.

14.3 Including industry-fixed effects.

We replicate Tables X and X but include industry-fixed effects. We also weight the regressions by firm value added

Table 11: Labor share on (real) Value Added: Firms in top 2 per cent. Manufacturing

	(1)	(2)	(3)	(4)
log(VA)	-0.0702***	-0.0655***		
	(-4.12)	(-3.58)		
log(Real VA (PI))			-0.0707***	-0.0657***
			(-3.89)	(-3.57)
Years 00-04		-0.0181		-0.0243
		(-1.06)		(-1.46)
Years 05-09		-0.00165		-0.0145
		(-0.07)		(-0.60)
Years 10-14		-0.0311		-0.0518*
		(-1.12)		(-1.99)
Years 15-17		-0.0406		-0.0634*
		(-1.21)		(-2.04)
Constant	0.624***	0.638***	0.626***	0.651***
	(41.53)	(34.78)	(41.16)	(36.82)
Observations	1503	1503	1503	1503

t statistics in parentheses
Std errors clustered at firm-level
Value added deflated by aggregate producer price index in manufacturing
Year==1999 omitted year
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

	(1)	(2)	(3)	(4)	(5)	(6)
VA	-0.0702***	-0.0781***				
	(-4.12)	(-6.35)				
Real VA (PI)			-0.0853***	-0.0783***		
			(-6.30)	(-6.37)		
Rel VA (mean)					-0.0647***	-0.0778***
					(-6.61)	(-6.38)
Years 00-04		-0.00903		-0.0164		-0.0239
		(-0.60)		(-1.11)		(-1.64)
Years 05-09		0.0169		0.00155		-0.0140
		(0.75)		(0.07)		(-0.61)
Years 10-14		-0.00771		-0.0325		-0.0533*
		(-0.34)		(-1.51)		(-2.52)
Years 15-17		-0.0224		-0.0495		-0.0921**
		(-0.80)		(-1.79)		(-3.27)
Constant	0.624***	0.650***	0.654***	0.665***	0.619***	0.679***
	(41.53)	(32.39)	(28.99)	(30.93)	(27.80)	(29.78)
Observations	1503	1503	1503	1503	1503	1503

Std errors clustered at firm-level. Weighted by VA. With 4 digit industry codes

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

	(1)	(2)	(3)	(4)	(5)	(6)
VA	-0.0683***	-0.0665***				
	(-6.15)	(-8.19)				
Real VA (PI)			-0.0677***	-0.0668***		
			(-7.98)	(-8.21)		
Rel VA (mean)					-0.0722***	-0.0669***
					(-7.66)	(-8.22)
Years 00-04		0.0105		0.00528		0.000609
		(1.03)		(0.52)		(0.06)
Years 05-09		0.0340*		0.0216		0.00679
		(2.09)		(1.36)		(0.43)
Years 10-14		0.0357		0.0169		-0.000451
		(1.95)		(0.95)		(-0.03)
Years 15-17		0.0147		-0.00554		-0.0360
		(0.67)		(-0.26)		(-1.65)
Constant	0.669***	0.592***	0.618***	0.606***	0.623***	0.620***
	(72.58)	(35.98)	(44.54)	(35.09)	(47.01)	(34.04)
Observations	4966	4966	4966	4966	4966	4966

Std errors clustered at firm-level. Weighted by VA. With 4 digit industry codes

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

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14.4 Including Imports for manufacturing firms

Table 12: Regressions on labor share - Manufacturing

	(1)	(2)	(3)	(4)	(5)
Real VA (PI)	-0.100***	-0.0698***	-0.0811***	-0.0629**	-0.0762***
	(-6.66)	(-3.59)	(-5.00)	(-3.14)	(-4.54)
Import / VA		0.0970*		0.0114	
		(2.55)		(0.39)	
IMP/VAxYear				0.00913*	
				(2.54)	
log(IMP/VA)			0.0681*		0.0247
			(2.35)		(0.97)
log(IMP/VA)xYear					0.00592
					(1.71)
Observations	1335	1335	1333	1335	1333

t statistics in parentheses

Using top 2 pct of firms each year by value added. Std errors clustered at the firm-level.

With 4 digit industry codes.

Including year dummies in groups (see details in text). Import data only exists from 2002 onwards

,

size(small)

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

	(1)	(2)	(3)	(4)	(5)	(6)
	Lab Share	Lab Share	Lab Share	W	Emp	VA
LL	-0.293***	-0.302***	-0.317***	0.0213***	0.0287***	0.367***
	(0.00263)	(0.00267)	(0.00239)	(0.00163)	(0.00391)	(0.00422)
_cons	0.0795***	0.0195***	0.0853***	0.126***	0.120***	0.161***
	(0.00119)	(0.00464)	(0.00369)	(0.00250)	(0.00602)	(0.00650)
N	102554	102554	102554	101734	101734	102554

Standard errors in parentheses

column 3-6 are weighted by value added. Column 2-6 include industry dummies

Column (1) unweighted and without year industry fixed effects

Column (2) with year and industry effect

Column (3-6) with year and industry fixed effects and weighted by value added

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

(a) Export oriented industries (above median)

(b) Non-export oriented (below median)

Figure 30: Unweighted and Weighted (by VA) labor share for manufacturing

15 A decomposition of value added into export and non-export

15.1 Export-oriented sectors versus non-export oriented sectors in manufacturing

We replicate the analysis of Figure 13 on the manufacturing sector. Figure

15.2 Large low labor share firms see disproportionate growth in export-intensity

Section 6.2.1 decomposes the share of export-oriented value added:

$$\Lambda_t^{VA^{EX}} = \frac{\sum_i 1_{i,t} \times (EX/REV)_{i,t} \times VA_{i,t}}{\sum_i (EX/REV)_{i,t} \times VA_{i,t}},$$

where we repeatedly hold two of the variables constant. Figure 31 performs this analysis. "Balanced panel" and "Change export-intensity" repeats the plots from Figure 14.B Further, the figure demonstrates that only changing the size of the firm or its low labor share intensity has little to no effect on $\Lambda^{VA^{EX}}$. "Residual" captures the part of the change not captured by these three terms. Unlike for Figure 14.B the residual here is substantial, reflecting the comovement of the labor share and the size of the firm.

Does the growth in export-intensity reflect an industry-wide growth in export-intensity? We show that it does not by replacing $(EX/REV)_{i,t}$ by the industry-wide export-

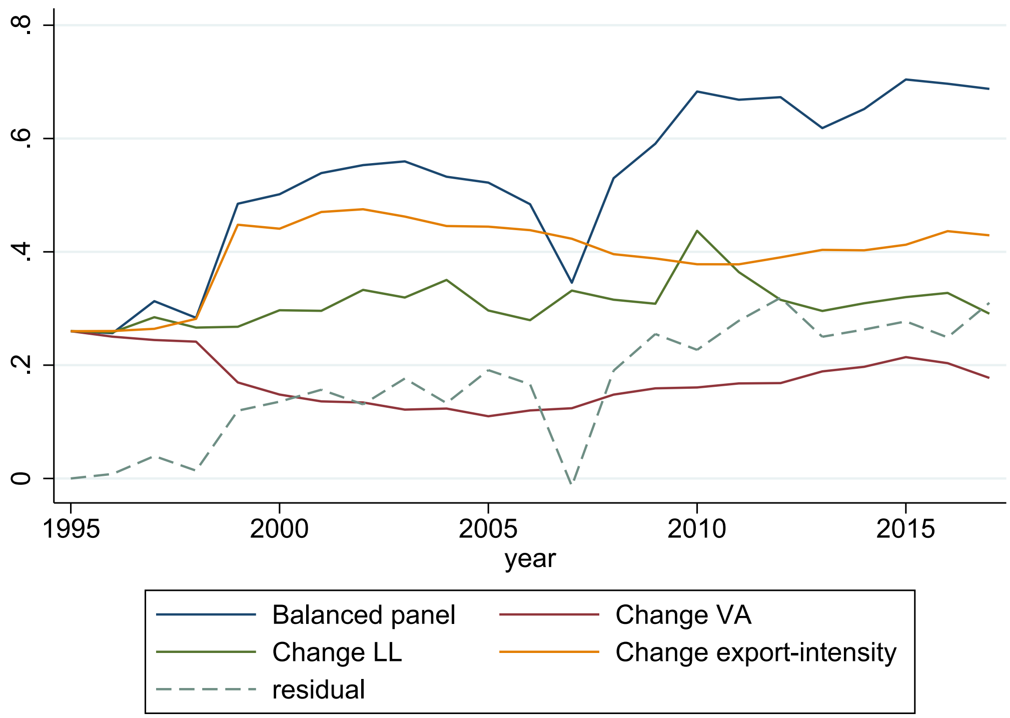
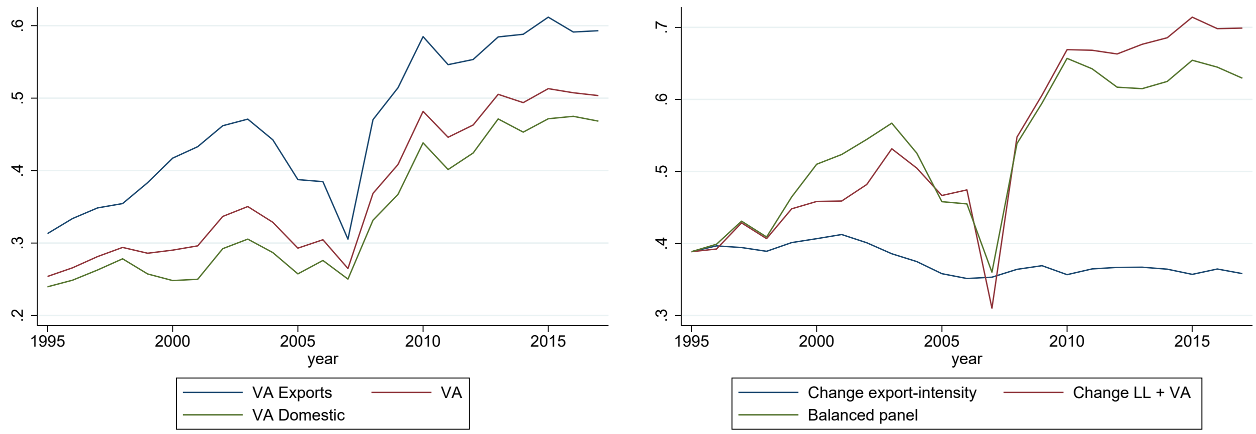


Figure 31: Counter-factual experiments of $\Lambda^{VA^{EX}}$



(a) The share of various measures of value added going to LL firms

(b) Counter-factual changes

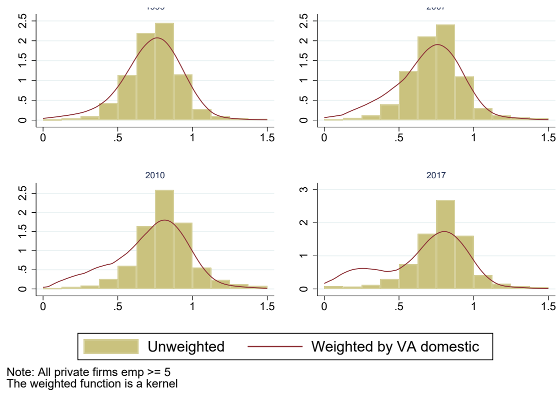
Figure 32: Share of value added going to LL firms, replacing export-intensity with industry-level

intensity excluding the firm in question. We use 2-digit industries of which there are 24 in the Danish manufacturing sector. Figure 32.A shows that the increase in $\Lambda^{VA^{EX}}$ is less dramatic when considering the industry export intensity. Plot B demonstrates that, unlike for firm-specific export intensity, there is no disproportionate growth in the industry-wide export intensity for large firms with low labor share.

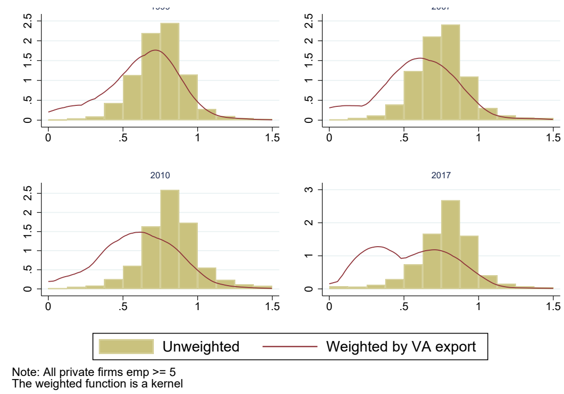
Finally, we plot the whole distribution of labor shares, unweighted and weighted by export-oriented value added in Figure 33 for the whole economy. We replicate the fact that the majority of the effect happens in the lower end of the labor share distribution.

16 Herfindahl Indices

We continue the analysis of Section 6.4 and analyze the concentration of Danish exports along two dimensions: The product codes and the country destinations. We calculate the Herfindahl index across product categories for individual firms as well as for the country as a whole. Figure 34.A shows the aggregate Herfindahl index as well as the export-weighted average of the individual firms. Whereas the average firm has seen a decline in the Herfindahl index — and thereby an increase in its product scope — the manufacturing sector as a whole has seen the opposite. A substantial increase in the importance of some product categories. Figure 34.B reconciles the two by calculating



(a) Domestic Value added



(b) Export value added

Figure 33: Distribution of labor share, histogram and weighted by value added: Domestic and Export value added

the Herfindahl index across firms (ignoring product categories) and shows a substantial rise from 0.005 to 0.03.

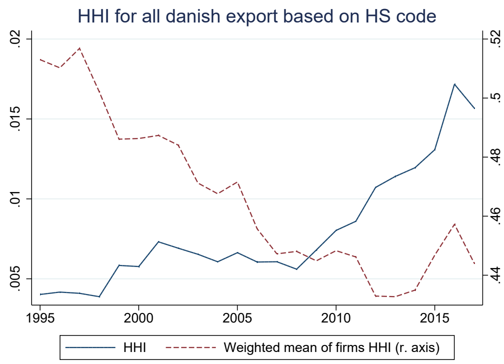
More formally, we let $x_{i,s,t}$ denote the value of exports of firm i in product category s for year t and let $x_{s,t} = \sum_i x_{i,s,t}$ with $x_{i,t}$ defined analogously. $X_t = \sum_s x_{s,t}$ is aggregate export in a year.

The country-wide Herfindahl index across product categories is therefore defined as: $H = \sum_s (x_{s,t}/X_t)^2$. We can decompose this into:

$$H = \underbrace{\sum_i \lambda_{i,t}^2 H_{i,t}}_{\text{(Square)-weighted firm HHI}} + \underbrace{\sum_i \sum_s \frac{x_{i,s,t}}{X_t} \left(\frac{x_{-i,s,t}}{X_t} \right)}_{\text{Similarity index}}, \tag{9}$$

where $H_{i,t}$ is the firm Herfindahl index over product categories, $x_{-i,s,t}$ is total exports for all firms but i in category s at time t and $\lambda_{i,t} = x_{i,t}/X_t$ as firm $i's$ share of export at time t. The first part of the expression is a (square-) weighted average of the individual firms' Herfindahl indices and the *similarity* index is analogous to a covariance term: The higher is the covariance between firm $i's$ export share in product category s and the export share of other firms in the same category the higher will be the Herfindahl index. Figure 35 repeats the overall HHI across product categories and *add weighted firm HHI,* the first term on the right hand side of equation (9), the difference between the two being the *similarity index,* which has remained constant over the period.

We further, plot $\sum_i \lambda_{i,t_1}^2 H_{i,t}$,where t_1 refers to the first year that a firm exists. This



(a) Product category HHI for country and export-weighted for individual firms

(b) HHI across firms (ignoring product codes)

Figure 34: Herfindahl Index at product code

figure is declining reflecting that individual firms have become less concentrated in their product codes. Finally, we analogously fix H_{i,t_1} (weighted firm HHI (fixed HHI)) which has increased substantially. Hence, it is the changing $\lambda_{i,t}$'s that are the main driver.

16.0.1 Export country categories

We perform an analysis analogously to that of above, where the Herfindahl index is over country destinations. Contrary to the product category Herfindahl index, the one based on countries has declined. This is so even though the term $\sum_i \lambda_{i,t}^2 H_{i,t}$ has seen a small increase. This is because the similarity index has declined substantially over this period. Firms are exporting to a broader set of countries and have become more similar in the countries that they export to.

17 Foreign Processing

Since 1995 the use of integrated production processes has increased substantially for the Danish manufacturing industry. In the following, we address how this might have affected the measured labor share. If a part of the labor input is moved abroad and this is not measured in the official statistics, the measured labor share will decline even if no other aspects of production or competitive environment have changed. If fixed cost are associated with such a move, large firms will disproportionately move production and we will observe the pattern in our data.

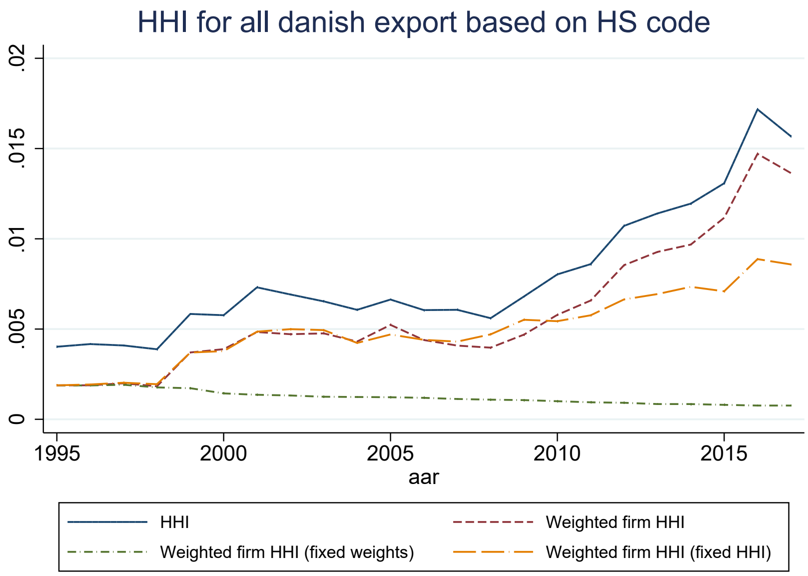


Figure 35: Decomposition of product level Herfindahl index

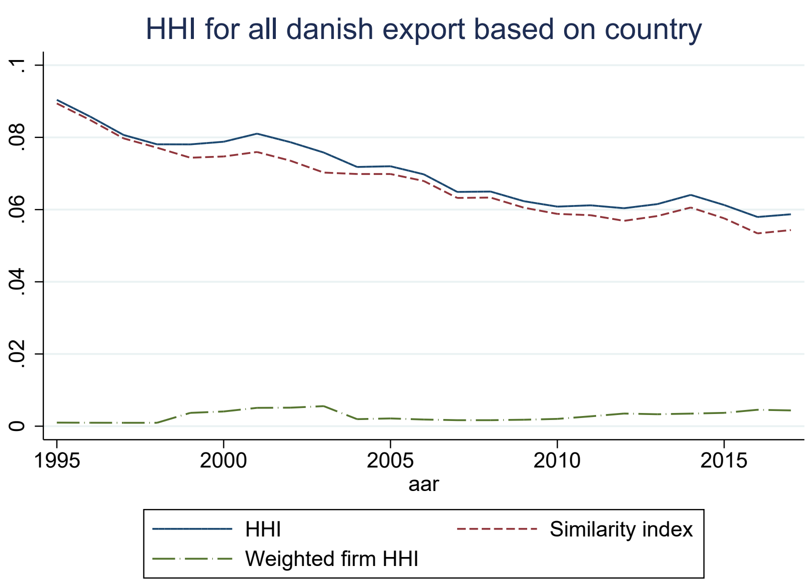


Figure 36: Decomposition of country-level Herfindahl Index

To address this, we split the use of foreign labor into four categories: i) *classical offshoring:* A firm purchases inputs from abroad that it could otherwise have produced itself. The inputs cross the Danish border and become part of the production in Denmark, ii) *Foreign Processing/Merchanting*: A Danish firm processes its production abroad (either at arms-length or in an integrated organization). The Danish firm sells the product abroad. The product never physically crosses the Danish border. iii) *Profits from subsidiary*: A Danish holding firms owns a subsidiary abroad which conducts production and earns profits from sales abroad. Profits appear as financial income on Danish holding company's P&L.[41]

Profits from subsidiary are a financial income and will not be recorded in value added. Furthermore, typically subsidiaries will be owned by a Danish holding company. By excluding the financial sector we omit holding companies. Hence, in the following we consider the former two means of foreign production.

17.1 Foreign Processing/Merchanting

Foreign processing and merchanting concerns production and sales that take place entirely outside the borders of Denmark. Statistics Denmark splits these activities into two: For factoryless production, the Danish firm owns the products throughout the production process but pays a foreign firm for the production services. For merchanting the Danish firm buys the final product from a foreign firm (usually to order) and only takes ownership once the production process has finished. In both cases the product is sold abroad and never physically crosses the Danish border. According to Statistics Denmark, usually merchanting is done by Danish firms in the whole sale or retail industry whereas merchanting is usually done by firms in the manufacturing industry. Figure 37 demonstrates the growth in value added of both merchanting and factoryless production which both grew from close to zero to around 60 BN DKK by 2019. The Figure also shows factoryless production as a share of total value added in manufacturing which reaches 17 per cent in 2019.

We de note have micro data on the merchanting and factoryless production for individual firms. To assess the overall importance, we consider a simple model of a firm using two factors of production: labor and capital. Some of the value added of this firm accrues from domestic sales and some of it from exports. However, the firm only

[41] In principle, the profits could be paid out as a licensing fee as well. These amount to less than 10 BN DKK a year and are ignored in the following analysis.

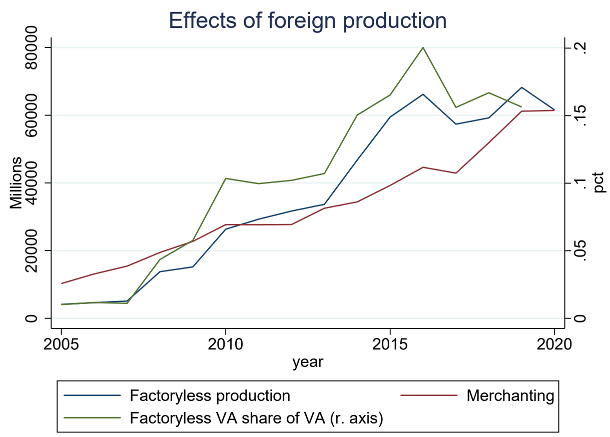


Figure 37: Factoryless Production

produces at home and has a labor share of:

$$\theta = \frac{w^H L^H}{VA^H},$$

which we suppose takes the value $0 < \theta < 1$. Here $w^H L^H$ are wage costs in Home and VA^H is value-added in Home.

Now, allow for the possibility of moving part of the labor inputs of its export-destined production abroad. Production is taken over by a supplying firm (either a subsidiary or a non-affiliate). The Danish firm then purchases the products directly and combining sales price with purchasing price gives value added attributed to this transaction. Note, however, that this transaction does not include the labor costs of the foreign affiliate which mechanically lowers the labor share. To see why, suppose that nothing changes in production technology such that both for foreign production and domestic production the labor share is θ. However for Foreign Production a share $0 < \gamma < 1$ is done by foreign workers. Since labor costs are not observed for Factoryless Production, what is counted as value added is:

$$FP = VA^F - \gamma w^F L^F = (1 - \gamma\theta) VA^F.$$

When official data is used to calculate the labor share, FP is used as value added from Foreign Sales and the share $\gamma\theta$ is not counted as labor. Noting that home labor costs is now a share θ of Home value added and the remaining labor costs $(1-\gamma)\theta$ of Foreign value added gives an observed labor share of:

$$\theta^{OBS} = \frac{w^H L^H}{VA^H + FP} = \frac{\theta VA^H + (1-\gamma)\theta VA^F}{VA^H + (1-\gamma\theta)VA^F} = \frac{\theta VA^H + \theta VA^F - \gamma\theta VA^F}{VA^H + VA^F - \gamma\theta VA^F} < \theta, \quad (10)$$

where the inequality follows because $\theta < 1$. Consequently, observed labor share understates the labor share. Equation (10) immediately suggests a remedy: Correct for $\theta\gamma VA^F$. This is not observed, but since FP is, we can write:

$$\gamma\theta VA^F = \frac{\gamma\theta}{1-\theta\gamma} FP, \quad (11)$$

where FP is directly observed. In the following we perform the following thought experiment: Measure the labor share calculated by equation (10) but add $\gamma\theta VA^F$ as calculated by equation (11) to both the numerator and the denominator. If the entire decline in the labor share is attributable to Factoryless Production the labor share will not feature a decline. In Figure 38 we perform this analysis using the average value of the labor share for the period 1995 to 2005 for θ (68 per cent) and three values of γ: The average share of low-skill labor out of total labor costs during the period 1995-2005 (33 per cent), the combined value of all labor not in management/knowledge occupations (50 per cent) and the (unreasonably high) 90 per cent.. As is apparent from the figure even if 50 of the labor associated with production can be moved abroad only a small share of the decline in the labor share can be explained by Factoryless Production. If 90 per cent of the production could be moved abroad a noticeable share of the decline could be explained by factoryless production. Do note, however, that in this case factoryless production would account for around 40 per cent of total value added.

We conclude that a reasonable estimate of the share of the decline in the labor share in manufacturing that can be attributed to factoryless production is 13 per cent (2 percentage points out of a total of 15).

18 Additional Results on Transitional Dynamics

18.1 Holding labor share or size constant - Missing figures. Coming soon

We supplement the analysis in Section X by holding the labor share or the relative size of firms constant. That is, we use that $\Theta_t = \sum_{i \in N_t} \lambda_{i,t}\theta_{i,t}$, where N_t is the set of firms

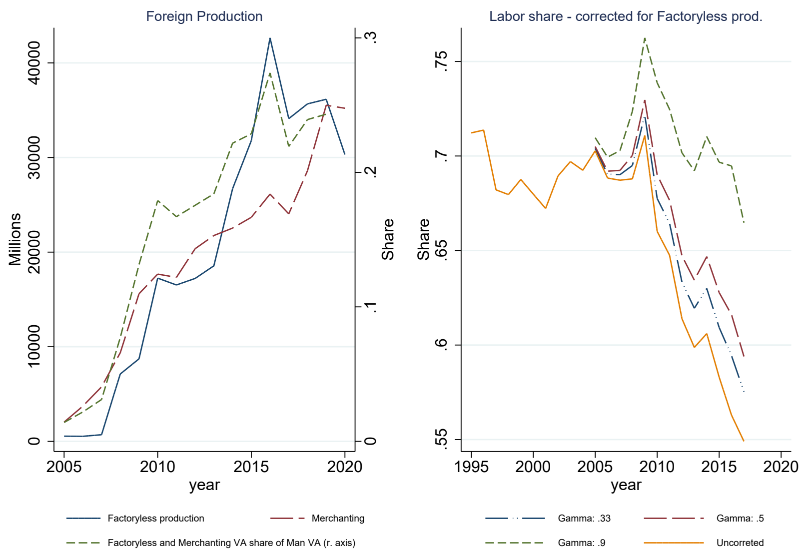


Figure 38: Foreign Production

Figure 39: Counter-factuals for Manufacturing Sector

existing at time t. Since we have previously demonstrated that firm death and birth is not a large contributor, we consider a fixed set of N of firms alive throughout the period and focus on the manufacturing sector. We then compute $\sum_{i \in N} \lambda_{i,1}\theta_{i,t}$ and $\sum_{i \in N} \lambda_{i,t}\theta_{i,1}$, that is we compute the aggregate labor share holding the relative size or the labor share constant, respectively. The results are given in Figure 39 which demonstrates that the decline in the aggregate labor share is largely attributable to the simultaneous shifts in labor share and value added.

18.2 A decomposition of the share of value added going to low labor share firms

We focus on the manufacturing sector. We note that the year to year change in the share of value added going to low labor share firms can be decomposed as:

$$\Lambda_t - \Lambda_{t-1} = \frac{\sum_{i \in N_t} 1_{LL,i,t} VA_{i,t}}{VA_t} - \frac{\sum_{i \in N_{t-1}} 1_{LL,i,t-1} VA_{i,t-1}}{\sum_{i \in N_{t-1}} VA_t}$$

$$= \underbrace{\sum_{i \in N_t \cap N_{t-1}} \left(1_{LL,i,t} \frac{VA_{i,t}}{VA_t} - 1_{LL,i,t-1} \frac{VA_{i,t-1}}{VA_{t-1}} \right)}_{\text{Change of existing firms}} + \underbrace{\sum_{i \in N_t \setminus N_{t-1}} LL_{i,t} \frac{VA_{i,t}}{VA_t} - \sum_{i \in N_{t-1} \setminus N_t} LL_{i,t-1} \frac{VA_{i,t-1}}{VA_{t-1}}}_{\text{Firms birth and death}},$$

where $1_{LL,i,t}$ is an indicator for whether a firm is low labor share (here bottom 20 per cent) and VA_t is total value added in year t. The first term is the change for firms that exist between year $t-1$ and t. The second term is contribution from firm birth of firms who are immediately low labor share and death of firms who were low labor share. Panel A of Figure 40 gives the results. The values are to be read as accumulated year contributions such that changes within firms that exist from year to year contribute to an increase in the share of value added accounted for by LL firms of 30 percentage points between 1995 and 2017. There is essentially no contribution from firm death and birth.

We utilize this fact and proceed to decompose the growth rate of existing firms (year-to-year not necessarily firms who exist throughout all years). We do so by noting that:

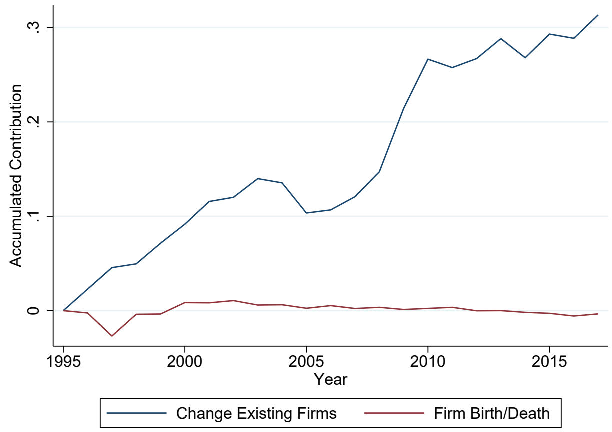
$$\sum_{i \in N_t \cap N_{t-1}} \left(1_{LL,i,t} \frac{VA_{i,t}}{VA_t} - 1_{LL,i,t-1} \frac{VA_{i,t-1}}{VA_{t-1}} \right) \tag{12}$$

$$= \underbrace{\sum_{i \in N_t \cap N_{t-1}} \frac{VA_{i,t}}{VA_t} \left(1_{LL,i,t} - 1_{LL,i,t-1}\right)}_{\text{Entry/Exit of LL status}} + \underbrace{\sum_{i \in N_t \cap N_{t-1}} \left(\frac{VA_{i,t}}{VA_{i,t-1}} - \frac{VA_t}{VA_{t-1}} \right) \frac{VA_{i,t-1}}{VA_t} 1_{LL,i,t-1}}_{\text{Relative Growth of LL firms}}.$$

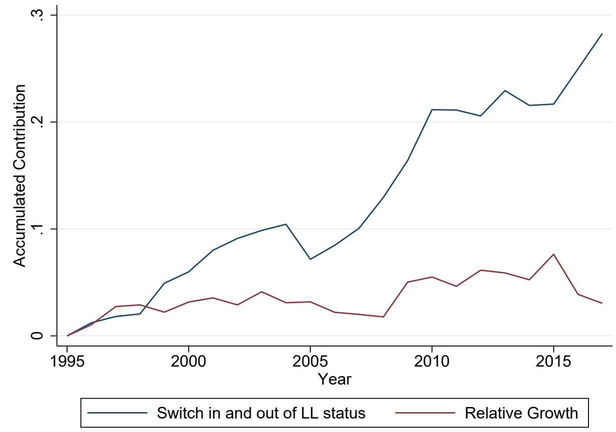
The first term captures the relative size of firms that enter LL status ($1_{LL,i,t} - 1_{LL,i,t-1} = 1$) and those that exit LL status ($= -1$). All else equal if firms that become low labor share firms are relatively larger it will increase the importance of low labor share firms. The second term captures the alternative possible source of growth: that firms that are already low labor share firms grow faster. Panel B of the figure gives the results. It shows that the overwhelming contribution is from changes in and out of LL status.[42] That is, low labor share firms do not grow disproportionately, but the flow in and out of LL status is the reason for the change.

We decompose this contribution into that coming from entrants and leavers from LL status. To facilitate exposition, we let $VA_t^{LL} = \Lambda_t VA_t$ and $VA_t^{N-LL} = (1-\Lambda_t)VA_t$ denote total value added among LL firms and non-LL firms, respectively. We further let N_t^{LL} and N_t^{N-LL} denote the number of firms in each category. We can then define

[42]The terms of Inflow in and out of LL status and relative growth do not sum exactly to the change in the share of value added going to top shares due to negligible contributions from firm birth and death.



(a) Contribution from firm/death and existing firms



(b) Contribution from switch in and out of LL status and relative growth

Figure 40: Decomposition of share of value added going to low labor share firms - manufacturing

the relative size of a firm compared to non-LL firms and LL firms as:

$$\psi_{i,t}^{N-LL} = VA_{i,t}/\left(VA_{i,t}^{N-LL}/N_t^{N-LL}\right),$$

$$\psi_{i,t}^{LL} = VA_{i,t}/\left(VA_{i,t}^{LL}/N_t^{LL}\right),$$

where we will be centrally interested in the relative size of entrants compared with the average non-LL firm and the relative size of leavers compared with LL firms. Since we are focused on change in status we will label the second term of of equation (12), concerned with relative growth, asM_t. All summations in what follows are over firms in $N_{t-1} \cap N_t$, that is firms who exist in both period t and $t-1$. Ignoring negligible contributions from firm birth and death, the change in the share of value added arising from LL firms is then:[43]

$$\Lambda_t - \Lambda_{t-1} \approx$$
$$\sum \frac{VA_{i,t}}{VA_t} 1_{i,t}^{EN} - \sum \frac{VA_{i,t}}{VA_t} 1_{i,t}^{EX} + M_t,$$

where $1_{i,t}^{EN} = max\{1_{i,t}^{LL} - 1_{i,t-1}^{LL}, 0\}$ is an indicator for a firm that switches from non-LL to LL status, and $1_{i,t}^{EX} = -min\{1_{i,t}^{LL} - 1_{i,t-1}^{LL}, 0\}$ is an indicator for a firm switching to non-LL status. In practice $\sum_{i \in N} 1_{i,t}^{EX} \approx \sum_{i \in N} 1_{i,t}^{EN}$, that is inflow in and out of LL

[43] We ignore firm death and birth to make exposition easier. Including them makes little quantitative difference but complicates expressions.

status are close to equivalent (in practice, within a few per cent of each other each year). We let VA_t^{N-LL} and VA_t^{LL} be the aggregate value added for the group of non-LL and LL status firms, respectively. We can then write:

$$\Lambda_t - \Lambda_{t-1} \approx$$

$$(1-\Lambda_t)\frac{\sum 1_{i,t}^{EX}}{(1-\nu)N}\underbrace{\frac{\sum \psi_{i,t}^{N-LL} 1_{i,t}^{EN}}{\sum 1_{i,t}^{EN}}}_{\psi_t^{EN}} - \Lambda_t \frac{\sum 1_{i,t}^{EX}}{\nu N}\underbrace{\frac{\sum \psi_{i,t}^{LL} 1_{i,t}^{EX}}{\sum 1_{i,t}^{EX}}}_{\psi_t^{EX}} + M_t,$$

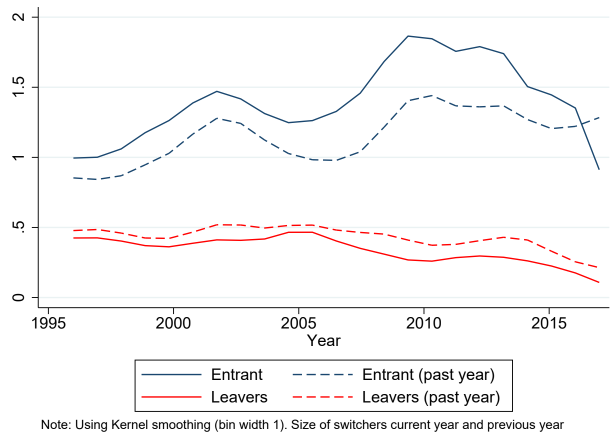
where ν is the share of firms in LL status (20 per cent in our analysis) and ψ_t^{EN} is the average relative size of a firm that enters LL status compared with those that are non-LL firms, with ψ_t^{EX} correspondingly defined for those that leave LL status.

Consider a year where Λ_t doesn't change – a steady-state. This gives:

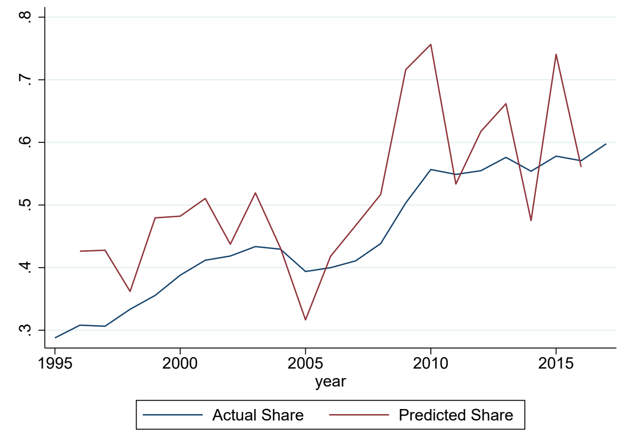
$$\Lambda_t = \frac{\frac{1}{(1-\nu)}\psi_t^{EN} + \frac{M_t}{\sum 1_{i,t}^{EX}/N}}{\left(\frac{\psi_t^{EN}}{1-\nu} + \frac{\psi_t^{EX}}{\nu}\right)}. \tag{13}$$

Empirically $M \approx 0$. Consider a case in which $\psi_t^{EN} = \psi_t^{EX}$ and $M_t = 0$ in which case $\Lambda_t = \nu$, that is, if there is no relatively higher growth of the LL status firms, and those that switch are equally representative of the group they are leaving, the aggregate labor share of LL firms will be ν, the share of firms that they represent. If $\psi_t^{EN} = 2\psi_t^{EX}$, that is the firms that enter are twice as big compared with the peers relative to those that leave LL status, we would find a steady state fraction of value added for LL firms of 1/3. When $M = 0$ this ratio doesn't depend on how many firms transition each period only the speed of transition does.

We calculate ψ_t^{EX} and ψ_t^{EN} for each year in the left panel of Figure 41. In 1996, firms entering $\psi_{i,t}$ were representative of other firms in non-LL (consistent with Figure 17). In 2017 they were twice as big. At the same time there has been somewhat of a trend downward of the corresponding value for those leaving LL- status. The figure also plots the relative size of firms the year before they switched. They has been somewhat of an increase in the growth of firms transitioning into LL status and little change for firms that transition out (who on average decline in value added). Panel B of the figure plots the current share of value added going to LL firms against the "predicted" value of equation 13 (this includes the term from the relative growth rates within LL status,M_t, though that makes only a small contribution). A plausible reading of this is that in the



(a) Values of ψ^{EX} and ψ^{EN}



(b) Actual and Predicted share of value added going to LL firms

Figure 41: The relative growth of firms transitioning in and out of LL status

period before 1995, $\psi^{EN} \approx \psi^{EX}$, and that the increase in the share of value added going to LL since then reflect a disparate development of these values.