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Firms and inequality

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Abstract
In the last few decades, dramatic changes have been documented in the US business landscape. These include rising productivity and pay dispersion *between* firms, higher aggregate markups (of price over variable costs), growing dominance of big companies ("superstar firms"), a fall in the labour share of GDP and a decline in business dynamism. We review the existing literature and present a new analysis using comprehensive firm level panel data, to show that qualitatively, these trends are also apparent in the UK. This similarity suggests that common trends in technology (or globalisation) have been the driving force behind these changes, rather than country-specific institutions (such as weaker US antitrust enforcement). Since (at least) the mid-1990s, there has been a large increase in UK firm-level inequality (especially in the upper tails) of productivity, wages, markups, and labour shares. Of course, inequality between firms is much less of a concern than inequality between people. However, it can signal economic problems, such as a slowdown in the diffusion of ideas between leading and laggard firms and can foster higher wage inequality. Indeed, there has been little aggregate UK productivity growth since the Global Financial Crisis, and this has been a serious drag on median and mean real wages. We suggest a simple theoretical framework for understanding some of these trends and quantitatively analyse why, despite increasing markups, the, the UK labour share has not fallen as sharply as that in the US. Finally, we suggest some policy options in response to these worrying trends, include modernising competition rules to deal with the growth of superstar firms and strengthening worker bargaining power.

Key words: firms inequality, financial crisis

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1. Introduction

There have been some dramatic changes in the business landscape in American firms over the last four decades that have been extensively documented by researchers and are the subject of much public debate (e.g. Van Reenen, 2018; Akcigit and Ates, 2019). In broad terms, one could summarise many of these trends by saying that firm inequality has increased – companies are looking increasingly different in terms of their productivity, wages, markups and size. These changes have been accompanied by several worrying trends such as declining productivity growth, stagnating real wages (especially for low-educated workers), rising markups, a falling share of labour in GDP and declining business dynamism (e.g. the share of workers in young firms has declined).

There are a large number of possible explanations for some (or all) of these trends. Broadly, some authors stress factors that are common across countries such as technological change and globalisation (e.g. Aghion et al., 2019; Peters and Walsh, 2019; Hsieh and Rossi-Hansberg, 2019; Baqaee and Farhi, 2020; De Ridder, 2020). Others point to US-specific factors such as weakening anti-trust enforcement and the erosion of labour market institutions such as the minimum wage and unions (e.g. Philippon (2019) and Stansbury and Summers (2020) respectively). Of course, it is very likely that these forces interact with each other. Take the presence of technological change in a rapidly globalising world, where firms source from highly complex supply chains across the globe, while at the same time potentially selling to a much larger potential pool of consumers. Changes in technology have enabled companies to trade in larger markets and fragmented production in global value chains. This has differential implications for local labour and product markets. Certain countries might find themselves as the beneficiaries of this process, while others (at least relatively) are mostly absorbing the negative shocks. Even within a country, the 'China shock', for example, displaces manufacturing jobs in local US labour markets (see Autor, Dorn and Hanson (2016)), but there are other places where firms and people benefit from having access to cheaper final and intermediate goods (e.g. Jaravel and Sager, 2019). Recent empirical work has shown the benefits from increased globalisation in lowering the cost of production (a standard 'gains from trade' argument). However, firms with market power will capture part of this cost saving, and this will give rise to increasing dispersion in firm performance, and dynamically can further widen the gap between firms, ultimately giving rise to some of the facts mentioned above (see World Bank (2020) for a discussion in the context of global value chains).[1]

Studying whether these trends have also occurred in Britain is important for two reasons. First, such developments can have important implications for overall UK inequality. To give some examples: (i) rising dispersion in firms' productivity translates into increasing wage inequality between those employed in high- versus low-productivity companies; (ii) a lower labour share means falling pay or jobs for a given level of GDP, as well as higher household inequality (as capital income is more unequally distributed than labour income); and (iii) rising markups imply higher prices for a given level of marginal costs (or that less of any cost falls gets passed on to consumers), reducing living standards.

A second reason for studying UK business trends is to help assess the explanations of such economic shifts. If the trends are just US-specific, then this suggests that American institutions are more likely explanations than global factors such as technology or trade that broadly affect all countries. While several papers take an international approach to these trends, or have

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[1] *De Loecker et al. (2016) present evidence of rising markups during the drastic trade reforms in the Indian manufacturing sector, precisely through the incomplete pass-through of lowering input tariffs. More generally, productivity improvements may be disproportionately captured by firms rather than workers and consumers.*

studied a particular economy, there have been few 'deep dives' into what the UK experience has been like and, to our knowledge, that cover a wide range of business sector outcomes. The primary purpose of this chapter is to summarise what we know about these trends in the UK. We draw on several data sources, in particular Historical Orbis (HO), a relatively new panel of the population of incorporated firms since the mid 1990s. We also consider more traditional administrative data sources from the Office for National Statistics (ONS).

We find that almost all of the US trends are present in the British data, although the UK information is generally not as rich as that in the US. In particular, we document at the micro level increasing between-firm differences in productivity, wages, size and markups, similar to those in America. Generally, these changes appear to be stronger in the top half of the distribution, with a widening of the upper tail as 'superstar' firms pull away from the rest of the pack. Similarly, at the macro level, the UK has experienced a rise in aggregate markups (like the US), slower growth in productivity and wages since the Global Financial Crisis (more dramatically than in the US), and a fall in the wage share of GDP since 1980 (much less stark than in the US).[2] UK entrepreneurship trends in the UK are more ambiguous.

The structure of the chapter is as follows. In Section 2, we ask why we should care about inequality between firms, before discussing data sources in Section 3. Section 4 is our main contribution where we document the stylised facts of business trends in the UK and implement a rough framework for quantification. We examine possible explanations for these changes in Section 5. In Section 6, we offer some tentative policy implications, before concluding in Section 7. Online appendices cover the data in more detail (A), offer some further analysis (B) and give more mathematical details of the calculations for markups and labour shares (C).

2. Why should we care about inequality between firms?

There are many good reasons to care about inequality between people, households and communities. However, why should we care about inequality between *firms*? We first document some facts about cross-sectional firm inequality, and then discuss this fundamental question.

There is certainly a great deal of cross-sectional firm inequality: as in other countries, the UK firm size distribution is very skewed (see Table 1). There were just under 6 million firms in the UK at the start of 2020, with 3.3 million of these being unregistered for employee withholding tax (PAYE) or value added tax (VAT), so employing no workers – the employment figure is for the owners of these firms.[3] Table 1 shows that 95.7% of businesses have nine employees or fewer (55.6% in unregistered firms and 40.1% in registered firms). Although numerous, these micro firms account for only a third of employment and 21.5% of turnover,[4] implying that they have lower labour productivity than larger firms as measured by turnover per worker. By contrast, there are only 8,000 firms (0.1% of businesses) with at least 250 workers, but they employ almost 11 million people and produce just over £2 trillion in turnover. Consequently, these big firms accounted for almost two in five of all jobs (39.3%) and just under half of aggregate turnover (47.8%).

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[2] *See Gutiérrez and Piton (2020) and Teichgraeber and Van Reenen (2021). The relationship between the aggregate labour share and measures of profitability is a complex one, even putting all the notorious measurement challenges aside (see Van Reenen (2018), Koh, Santaeulàlia-Llopis and Zheng (2020), Autor et al. (2020) and Barkai (2021)). See subsection headed 'Connecting labour and product markets: a simple framework' in Section 4 for more discussion.*

[3] *Even among the registered firms, many employ no workers, so of the 6 million firms in Table 1, only 24% were employer firms. Note that the fraction of workers who are self-employed rose from 15.3% in 2010 to 17.6% in 2020. Therefore, on this measure, the 'gig economy' has grown over the last decade but it is still less than one in five workers.*

[4] *We will use turnover interchangeably with 'revenue' and 'sales' throughout.*

We can compare these firm demographics with those in the US using Census Bureau Business Dynamics Statistics data.[5] The US is a larger economy, with 5.17 million employer firms (i.e. with at least one worker in addition to the owner), compared with 1.41 million in the UK. Of the US firms, 41,772 have 250 employees or more and these accounted for 57.7% of all employment in employer firms. This compares with 47.9% in the UK. This is consistent with the idea that there are fewer barriers to firms growing to greater scale in the US (e.g. Hsieh and Klenow, 2009; Bartelsman, Haltiwanger and Scarpetta, 2013).

Many politicians talk about helping small firms, as if this is an end in itself. The logic for this is unclear, however. Given the large numbers of workers in big firms, shown in Table 1, focusing solely on small firms is a poorly targeted way of helping individuals. Furthermore, smaller firms are on average less productive, pay lower wages and offer fewer fringe benefits. None of these facts is an argument for subsidising large firms. However, these business demographics suggest that the multitude of policies explicitly or implicitly subsidising small firms needs a more solid economic justification. One argument is that small firms suffer from more financial constraints. However, this is likely to be more due to the age of firm than their size (see Decker et al. (2014)). Studies of firm growth suggest that young firms create many jobs, not small firms per se. Consequently, distorting taxes and regulations to favour small firms can be a drag on growth (e.g. Garicano, Lelarge and Van Reenen, 2016). Moreover, if financial constraints are the friction affecting smaller firms, then there may be more direct ways to correct financial market failures than offering blanket subsidies to small and medium-sized enterprises (SMEs).

In summary, it is important to realise that the quite justifiable desire to support households on low income is quite different from the arguments to support SMEs.

Table 1. Private sector businesses in the UK by number of employees

	Businesses (thousands)	Employment (thousands)	Turnover (£ billion)	Businesses (%)	Employment (%)	Turnover (%)
Unregistered	3,328	3,633	128	55.6	13.1	3.0
Registered:						
Micro (0–9)	2,397	5,529	802	40.1	19.9	18.5
Small (10–49)	212	4,140	646	3.5	14.9	14.9
Medium (50–249)	36	3,534	694	0.6	12.7	16.0
Large (250+)	8	10,896	2,077	0.1	39.3	47.8
Total	5,981	27,732	4,347	100	100	100

Note: A registered firm is one that is registered for Pay-As-You-Earn (PAYE, withholding tax for employees) or value added tax (VAT).

Source: Table 1 of BEIS (2020a).

With these policy caveats established, there are several good reasons for studying inequalities between firms. One primary reason is simply a descriptive interest in business demographics, which has fascinated industrial organisation scholars such as Gibrat (1931). But beyond this, there are many reasons that we might care about firm inequality. Understanding how business structures have evolved may help us understand broader questions of what is happening to the economy and how it affects people.

[5] *Specifically, 2016 data (https://www.census.gov/programs-surveys/bds.html).*

First, there is the issue of whether the changes in the inequality between firms cause (or signal) a fall in aggregate productivity growth, which is important as productivity growth is the critical determinant of long-run income growth. For example, several OECD papers (e.g. Andrews, Criscuolo and Gal, 2015) have argued that increasing productivity differences between leading firms and followers ('the best versus the rest') indicate a slowdown of the diffusion of new technologies and/or management practices. Since diffusion is a key component of productivity growth, this could have first-order welfare effects (see also Akcigit and Ates (2019)). Another example is from the voluminous literature on misallocation. In a wide class of models (e.g. Hsieh and Klenow, 2009), an increase in the dispersion of (revenue-based) firm productivity indicates greater misallocation and therefore lower aggregate output.[6] In UK policy circles, this is often termed the 'long tail of unproductive firms' and reducing this is part of the current government's 'levelling up' agenda. It is important to realise that this difference is not simply an issue of inequality in the lower part of the productivity distribution. For example, if median-productivity firms find it increasingly hard to catch up with leading firms (say those in the top 5%), this could be an even larger drag on productivity.

Second, a growing literature in labour economics has documented how workers' wages and well-being depend on the firms that they work for over and above their individual skills and characteristics (see the survey in Card et al. (2018)). Larger and more productive firms pay higher wages (see Van Reenen (1996) for early causal evidence from the UK). Additionally, employer–employee matched panel data show that the same worker gets very different wages depending on the firm where she is employed (Abowd, Kramarz and Margolis, 1999). Given these stylised facts, increasing differences between firms will translate into increasing pay dispersion between workers and therefore higher overall income inequality. This could be one of the reasons behind the substantial increase in UK wage inequality.[7]

Third, there is evidence of an increase in the aggregate markup (the wedge between prices and variable cost) since the early 1980s in US firms (De Loecker, Eeckhout and Unger, 2020) and in other countries (De Loecker and Eeckhout, 2018). This seems to be related to increasing differences between firms, as the markup of the median firm has not risen. The well-documented fall in the share of US labour in national income could be the flip side of this (as Autor et al. (2020) argue) because labour is a major component of variable costs. A rise in aggregate markups could have several negative welfare effects. For example, if it reflects rises in monopoly distortions, this means higher prices and lower real wages. Merely documenting rising markups, rising profit margins and rising concentration is insufficient to evaluate the welfare effects without understanding the underlying causes, which we discuss in Section 5.[8]

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[6] *The intuition for this is that in simple static models, marginal revenue products should be equalised when firms face the same factor prices. For example, if revenues per worker measure the marginal revenue product of labour, then all firms should adjust employment until these are equal to the wage. Firm-specific frictions will drive a wedge between wages and marginal revenue products, causing greater dispersion of this measure of 'productivity'.*

[7] *For evidence on the non-trivial magnitude of this effect over time for the UK, see Faggio, Salvanes and Van Reenen (2010) and Bell, Bukowski and Machin (2019).*

[8] *Several recent papers try to integrate equilibrium models to incorporate these changes. De Loecker, Eeckhout and Mongey (2020), for example, formulate a macro model with heterogeneous firms facing fixed and variable cost of production, while taking into account strategic behaviour in the product market. They find that both technology and market structure play an important role in explaining the secular trends, and argue that the welfare effects from increased market power are negative. Obviously, this is a very recent literature and more work is needed to get a robust understanding of what can be economy-wide sweeping causes of rising market power, and the implications of such events. At the same time, scholars in industrial organisation are increasingly engaged in studying these patterns in greater detail for a single industry, with a perhaps new perspective on the time series. Both of these efforts might help a great deal in improving our understanding of the root cause and implications of the facts reported so far in the literature.*

Fourth, there is the issue of whether growing inequality between firms translates into greater corporate power to lobby and skew the 'rules of the game' in favour of business over consumers and workers. The textbook view of economics considers a firm as an organisation that delivers a product or service using a bundle of inputs, knowledge and expertise. It does so while operating under a set of rules governing labour and product markets, and adhering to tax law and financial regulations. However, in practice, firms do influence these rules, and try to create a more advantageous position for themselves. Firms engage in a host of lobbying activities from funding interest groups and campaigns to direct financial relationships with politicians, and the ability to engage in these activities is very likely to be a function of firm profitability. This would suggest a connection between the state of competition and lobbying, or, in other words, we expect that in a highly competitive market place, firms do not have the extra cash to try to influence the rules of the game. However, as markets get less competitive, and economic activity is more concentrated, we could expect lobbying to become prevalent, and of course further fuel the increasing market power. This hypothesis is complicated to reliably test, not least because measuring lobbying activities (broadly defined) is challenging.

Recently, a few attempts have been made to relate lobbying activities to firm characteristics and outcomes. Almost all studies have been done on the US, both because there has been a sharp increase in corporate spending geared towards influencing policy and because there are, in general, better data to measure the objects of interest. Lobbying expenditures in the US rose from $1.5 billion in the late 1990s to over $3 billion today, the vast majority of this by businesses (Center for Responsive Politics and Federal Lobbying Disclosure Act – see Philippon (2019)). Huneeus and Kim (2018) study the effect of lobbying activities in the US. They match political connections to firm-level financial variables, and find that lobbying activities are positively correlated with firm size (measured by sales) and firm profits. They use these facts to calibrate a macro model and find sizeable productivity losses from lobbying activities, through a misallocation of resources. Ferracuti, Michaely and Wellman (2020) find that politically active firms are better insulated from volatility, and perform better during periods of policy uncertainty. It is also worth bearing in mind that lobbying also occurs through SMEs, many of which are very effective at organising through trade and professional associations (see Atkinson and Lind (2018)). For example, US physicians are a very effective lobbying organisation through, for example, the American Medical Association.

The evidence is much less clear for the UK and the European Union. The levels of spending certainly seem much lower as total lobbying expenditure in the EU in 2016 was about $1.5 billion – about half of that in the US (see LobbyFacts.eu and the EU Transparency Register). There are no longer-term databases to track the trends, however. It may be that the EU will follow in the footsteps of the Americans, and certainly Big Tech has increased its lobbying activities in Brussels. There is a risk that the UK will be more vulnerable to lobbying activities (especially by large British firms) having left the powerful and independent umbrella of DG-COMP, the EU's competition enforcer.

There are many other interconnections between firm dispersion and society's well-being, but we believe these four certainly justify some investigation of UK trends.

3. Data sources

We give full details on all the data sets used in the data appendix (Appendix A) and the relevant parts of the chapter. This section gives a briefer overview. We draw on many data sources in our study. We use several publicly available data sets from the UK Office for National Statistics (ONS), which are aggregations of administrative micro data sets to the country or broad industry level. We also draw on the Business Structure Database (BSD), which contains the

population of all UK registered firms since 1997.[9] The BSD contains no information on value added or wages. For this, we use the Annual Business Survey (ABS; formerly known as the Annual Business Inquiry, ABI), which has the population of firms with 250 or more employees, but only a stratified random sample of smaller firms.

The main micro data set we use in this study is Historical Orbis (HO). HO is a relatively new data set from Bureau Van Dijk (BVD), a company that provides digitised versions of the available accounts of essentially all incorporated firms in the world. We focus on firms that are incorporated in the UK, and are therefore listed in Companies House. Table A1 shows that there are about 2.9 million firms in the latest full year (2016). Many previous versions of these data (e.g. BVD's AMADEUS or ORBIS products) dropped inactive firms after five or ten years, so were subject to serious selection bias. To deal with this, researchers had to append overlapping cohorts of the data (e.g. Kalemli-Ozcan et al., 2015; Bloom, Draca and Van Reenen, 2016). By contrast, HO keeps in principle all inactive firms where available. In brief, HO has the advantage that the data are public and not anonymised, so companies and business groups can be analysed and merged with other data sources. Further, the accounts are audited, which provides some degree of data reliability. Moreover, HO is clearly more comprehensive than a survey.

Nevertheless, there are limitations of the HO data. First, although data from the UK are available from 1982 onwards, the coverage is only comprehensive for more recent years. Our analysis suggests that the UK data coverage is broadly reliable from 1996 but, prior to this, coverage seems to be increasingly selected, missing some inactive firms. The most recent years also have incomplete coverage, as there is a lag between the information being gathered by a firm, the publication of its accounts, the accounts being lodged in Companies House and the data then being digitised by BVD into HO. Consequently, our main analysis sample uses the two-decade period 1996–2016. A second drawback of HO is that the availability of data items depends on accounting rules. For example, in the UK (as in other countries), almost no firms report some useful data items such as intermediate inputs, as it is not an item investors pay much attention to. By contrast, the ABI/ABS administrative data have purchases of intermediate inputs. Broadly, large publicly listed firms have to report many accounting items, whereas small unlisted firms only have to report very basic information. These reporting requirements also change over time. Some firms voluntarily choose to report more than what is legally required, but obviously this raises concerns over sample selection. This means, for example, we have information on the capital of just about every firm as even the smallest firms have to report an abbreviated balance sheet with assets and liabilities. However, we only have employment for a subsample of firms. Incomplete coverage of data items for the very small firms is not a problem for some types of analysis (aggregate productivity), but is more of an issue when we want to examine the lower quantiles of distributions.

In general, in our main HO analysis, we restrict our analysis to the 'market economy', dropping difficult-to-measure industries such as those with connections to the public sector (e.g. health, education), agriculture, energy extraction (including oil), finance and real estate.[10] We also drop duplicate firms, use data at the highest level of the business group within the UK and drop firms

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[9] *We focus on the domestic firm level called the Enterprise Reference Unit ('Entref'). Although employment is available at the establishment level in the BSD, turnover data are only available at the enterprise level (from VAT records). The BSD also has information on age, industry, geographical location and foreign ownership. The BSD is essentially an annual snapshot of Inter-Departmental Business Register (IDBR) data. It contains data on all firms active in the UK that are registered for VAT or operate a PAYE scheme, covering 97% of total revenue in 2020 (see Office for National Statistics (2006)). The businesses excluded from the data set will include sole traders and self-employed workers whose revenue is below the VAT threshold.*

[10] *See the data appendix for further details on the sample definition. We show that our broad findings are robust to bringing these sectors back into the analysis.*

with under 10 employees.[11] We develop two main 'analysis samples' from HO that differ by which variable we insist on having no missing values. 'Sample A' drops missing values on employment, the wage bill and profits (as measured by EBITDA, earnings before interest, tax, depreciation and amortisation). These are the items we need to construct labour productivity (value added per worker) and labour shares. We measure value added by the wage bill plus profits. We measure the labour share as the wage bill divided by value added. 'Sample B' has non-missing values on sales, employment and cost of goods sold (COGS). These are the crucial items needed to construct our proxies for gross markups (price divided by marginal cost) – see Appendix C.

We do several other cuts of the data, in particular distinguishing between UK publicly listed firms and unlisted firms (this includes both private UK firms and the subsidiaries of foreign multinationals). We also compare the listed firms in HO with Worldscope, another database of (only) publicly listed firms around the world, which is available for earlier years than HO.

4. Changes in the UK business landscape

Overview

We seek to document some simple facts. Table 2 presents a series of changes to the level and distribution of several important economic outcomes: productivity, wages, markups, firm size, labour shares and entrepreneurship. Column 1 summarises the US trends and column 2 our analysis of the UK trends (presented in more detail below). Our broad take is that the similarities between Britain and America are quite striking.

Before starting our statistical tour, a few caveats are in order. First, even in the US, where research work has focused, there is still controversy over some of the stylised facts as we lay them out, qualitatively as well as (inevitably) in magnitude and timing. For some of the findings, the controversy is less about the facts and more about the interpretation. We mention these in the relevant subsections below. Second, space constraints prevent us from a deeper investigation into countries other than the UK and the US, but we mention some of the similarities and differences especially with regard to other European countries. Third, much of what we present on the UK is new work on the Historical Orbis (HO) database, so it is more preliminary and we discuss the source in more detail. Where possible, we compare this with administrative data.

With these caveats in mind, Table 2 gives a brief and crude summary of our findings for the UK compared with the US. There are many issues that we will discuss, but broadly there is much similarity. One apparent difference, however, is that the labour share of GDP does not appear to have fallen as dramatically in the UK as it has in the US and we will discuss this in more detail below.

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[11] *Obviously, the dropping of micro firms could be a concern as we documented earlier that they account for about a fifth of aggregate UK turnover. This sample restriction is inevitable because of low reporting rates by very small firms due to accounting regulations. We check for biases by comparing the baseline results with those from administrative data and looking at robustness in HO to alternative thresholds (including no size threshold).*

Table 2. Comparison of trends in the US and the UK

Indicator	(1) US	(2) UK
Aggregate productivity growth	Slowdown since Great Recession	Slowdown since Great Recession
Productivity dispersion	Increase	Increase
Aggregate wage growth	Slowdown since Great Recession	Slowdown since Great Recession
Wage dispersion	Increase	Increase
Aggregate markup	Increase	Increase
Markup dispersion	Increase	Increase
Share of activity in large firms	Increase	Increase
Industrial concentration	Increase	Increase
Labour share	Fall	Stable (falls after adjustments)
Dispersion of labour share	Increase	Increase
Share of activity in young firms	Fall	Stable/Fall

Note: This is a summary of the UK results presented in this chapter. The US facts are documented in Van Reenen (2018), Akcigit and Ates (2019) and De Loecker, Eeckhout and Unger (2020). These refer to trends from the mid 1990s onwards. Markups are estimates of the ratio of price to variable costs (see Appendix C).

To summarise:

- There has been a slowdown in aggregate labour productivity growth (GDP per hour) after the 2008–09 Global Financial Crisis in the macro data. This is also evident in the HO and other micro databases when aggregated. The US and other OECD countries also experienced a slowdown, although less dramatically than the UK. The HO data also show an increase in productivity dispersion between firms, which is consistent with other UK sources (especially for the above-median upper tail of the distribution). This is similar to the US and other OECD countries.

- UK aggregate real wage growth also stagnated after the Global Financial Crisis, at a similar rate for the mean and the median worker. Wage inequality has also risen between firms (and individuals) since the late 1970s. In the US, wage stagnation for median workers began earlier, at about the same time as wage inequality took off (from the mid 1970s).

- Aggregate markups appear to have risen in the UK and the US.[12] The dispersion of markups has increased (e.g. markups for the median firms have stayed broadly stable in both countries).

- As in the US, the share of turnover in large firms has risen and industrial concentration has increased.

[12] *We discuss this more in Appendix C. Intuitively, the share of a variable factor in sales is equal to the technological output elasticity with respect to that factor under perfect competition. As firm product market power increases, prices will be marked up over marginal costs and the factor share will be less than the output elasticity. Hence, the larger the wedge between the elasticity and share, the larger will we estimate markups to be.*

- The labour share of GDP has fallen substantially in the US. The share has been more stable in the UK since 1981, but falls to some degree when we consider measurement issues relating to self-employment and non-wage benefits.

- Entrepreneurship indicators such as the share of activity in young firms have fallen in the US. In the UK, these are more ambiguous: the share of turnover in young firms has fallen, but their share of jobs has not.

Trends in indicators: detailed analysis

For each business indicator, we start with looking at aggregate patterns from (usually) public administrative data and then compare these with suitably aggregated data from our micro sources. We look at the private sector market economy first and then (when available) very broad industrial sectors. We then look at dispersion across firms using the micro data.

Productivity

Aggregate patterns. The UK has a well-known productivity problem in levels, with lower GDP per hour than its peer nations such as the US, France and Germany (see Valero and Van Reenen (2019)). Furthermore, although most countries experienced a slowdown in productivity growth after the Global Financial Crisis, this slowdown was particularly severe in the UK. Figure 1 shows labour productivity as measured by real GDP per hour (normalised to 100 in 1981).[13] UK productivity growth averaged about 2.4% per year in the period until the Global Financial Crisis, but fell by an order of magnitude afterwards, being almost flat. A similar picture holds for output per worker (rather than per hour) growth.

How does this compare with aggregated micro data from Historical Orbis? Figure 2 shows the HO trends from 1996 in labour productivity (the sum of all value added divided by the sum of all employees). This is taken from our 'Sample A'. The macro trends are in line with the aggregate data, with strong increases in productivity until the Global Financial Crisis. Productivity then drops sharply, recovers somewhat and then stagnates after 2010. The broad similarity is reassuring, since there are a large number of reasons why the ONS numbers could differ from HO.[14]

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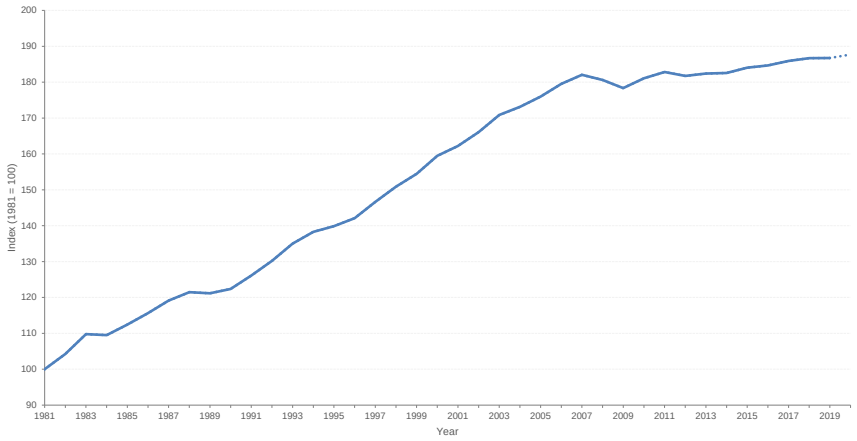
[13] *Relying on labour productivity as a measure of productivity implies the usual and well-known caveats. Chief among them is the omission of other factors of production, most notably capital. In the UK and the US, the total factor productivity (TFP) trends have broadly followed the labour productivity trends.*

[14] *First, the measures are from separate data sources and the exact definitions of value added and employment are not the same. Second, the accounts data are consolidated. Although we try to take this to the domestic (rather than global) ultimate owner, some of the activity could still originate from a firm's overseas affiliates (which are not included in the ONS data). Third, we have the restrictions inherent in the Orbis data (discussed in Section 3) that not all firms report all the relevant data items. Fourth, we have imposed some sample restrictions, such as limiting to firms with 10 or more employees in Orbis and looking only at the market economy, conditions that are not imposed in Figure 1. Fifth, productivity is measured per hour in Figure 1 and per worker in Figure 2. See Appendix B for a longer discussion.*

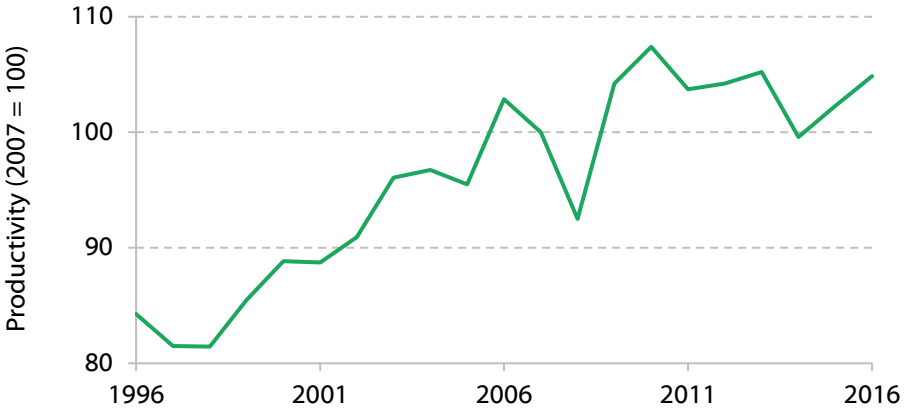
Figure 1. UK aggregate labour productivity: real GDP per hour



Note: Whole economy real GDP per hour worked. 1981 = 100.

Source: Teichgraeber and Van Reenen (2021) using ONS and OECD data.

Figure 2. Productivity: value added per worker from Historical Orbis



Note: Productivity is the sum of all value added across firms divided by the sum of all employment across firms. Value added deflated to be in 2007 prices.

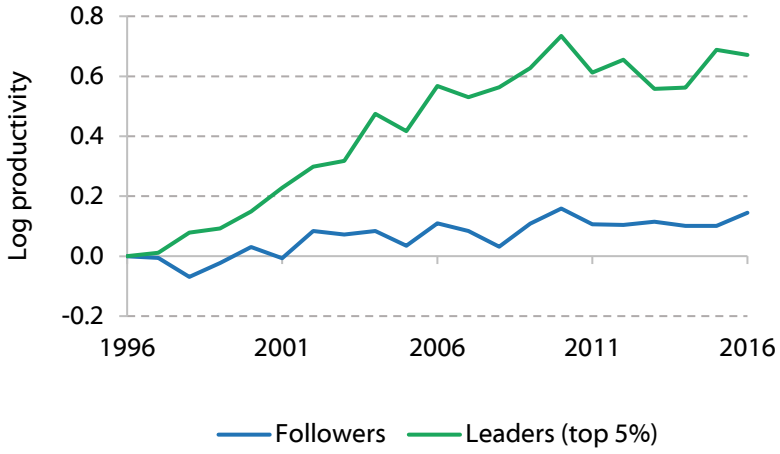
Source: Market sector from HO data using Sample A (see Appendix A).

A further way to compare the productivity trends across data sources is by industry. Appendix Figure A1 breaks down value added per worker in HO by the five broad sectors in the market economy and compares it with administrative data. The patterns seem similar across the two data sources.

Productivity dispersion. In order to examine firm inequality, we must use the full micro data. Having validated the aggregate productivity trends in HO, Figure 3 uses it to show one measure of the dispersion of productivity across firms. Following the OECD (e.g. Andrews, Criscuolo and Gal, 2015), we compare average productivity for the 'frontier' (defined as the employment-weighted average productivity of firms in the top 5% of the productivity distribution in each year) compared with 'followers' (the rest of the economy). We normalise the series to 0 in 1996 and use logarithms, so cumulative productivity growth can be read off the figure. Hence, the value of 0.03 in 2005 for followers indicates a growth of 3 log points (or 3%) between 1996 and 2005. As in the US and other OECD countries, dispersion in productivity appears to have risen

since 1996 on this measure. Leading firms' productivity grew by 67 log points between 1996 and 2016 whereas follower productivity grew by 14 log points. Since the Global Financial Crisis, both groups of firms have seen their productivity stall.

Figure 3. Productivity dispersion has widened (OECD method), log(value added per worker) growth



Note: Growth of labour productivity (normalised in 1996). 'Leaders' is the employment-weighted average productivity growth of firms in the 95th percentile and above of the year-specific level of productivity distribution. 'Followers' is the employment-weighted average productivity growth in the rest of the distribution (below the 95th percentile). Productivity is measured by inflation-adjusted value added per worker.

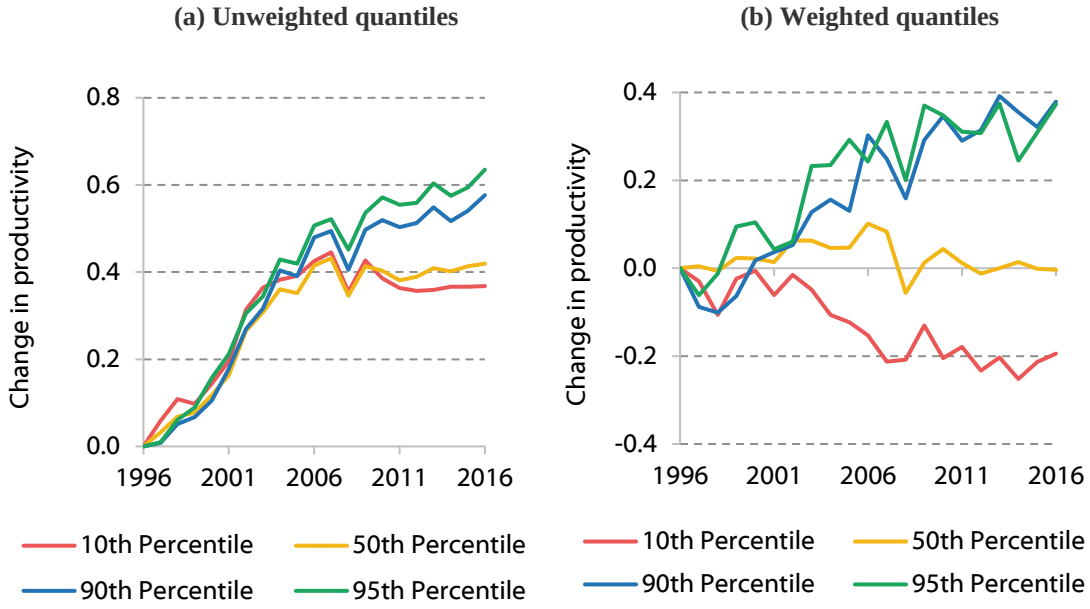
Source: Market sector from Historical Orbis using Sample A.

Figure 4 presents a more conventional quantile plot comparing the 10th, 50th, 90th and 95th percentiles. The left-hand panel is unweighted (by firm) and the right-hand panel is weighted by firm employment. The unweighted panel again shows a fanning out of the distribution, especially after the financial crisis: there was some mild slowdown from firms in the top decile, but more dramatic stagnation – and even falls – in productivity for the median and the bottom decile of firms. The figure shows upper-tail productivity rising much more than dispersion in the lower tail, below the median.

A broadly similar picture emerges in the right-hand panel of Figure 4, which weights firms by their employment. Here, the median line reflects the productivity of the firm where the median employee works (rather than simply the unweighted median across all firms regardless of size as in the left-hand panel), so it is arguably more policy relevant. The fanning out of the distribution is also evident, although here the change is more dramatic, starting in the late 1990s. Median productivity has not increased over this period and the lower tail (the 50:10, the ratio of the median to the 10th percentile) widens more than in the unweighted quantiles. Firms at the top of the distribution (which are the larger firms) have enjoyed steady productivity growth.[15] As noted above, these figures are all in log points. So in panel b the value of almost 0.4 in 2016 indicates that the 90th percentile had almost a 50% ($(e^{0.4} - 1) \times 100 = 49.2\%$) increase in productivity over the 1996–2016 period.

[15] *Interestingly, this increased dispersion continues a trend that may have begun at least as far back as the early 1980s (see Faggio, Salvanes and Van Reenen (2010)) and mirrors the picture in the US (see Barth et al. (2016)).*

Figure 4. Quantiles of productivity: log(value added per worker)



Note: Panel a is unweighted (by firm) and panel b is weighted by firm employment. Productivity is value added per employee.

Source: Market sector from Historical Orbis using Sample A.

Other papers. Our finding of widening UK productivity dispersion is broadly consistent with other sources using administrative data (e.g. Bahaj et al., 2017; Office for National Statistics, 2019). Oliveira-Cunha et al. (2021) use the public release version of the ABI/ABS administrative data in Office for National Statistics (2020) to examine productivity dispersion. We give a detailed comparison of the trends in the two data sets in Appendix B. Broadly, the ONS data also find substantial increases in productivity dispersion in the upper tail. For example, productivity at the 95th percentile of the (employment-weighted) firm distribution has risen a lot, whereas it has been stagnant at the median, consistent with our analysis of HO in panel b of Figure 4. The magnitude of the increase is lower in the ONS data, however, and there is no sign of increasing dispersion in the lower tail. We think this is likely to be because coverage in both HO and ONS is comprehensive for the upper tail, but less reliable in the lower tail.

Summary on productivity. UK aggregate productivity growth has dramatically slowed since 2007 in the macro data and in most broad industrial sectors. We see similar trends when aggregating our firm-level data from Historical Orbis, which is a useful validation. We also document a large increase in productivity dispersion between firms, and even more so when we take into account the weight of a firm in terms of employment, indicating that growth itself was unequal across the firm size distribution. Comparing this with ONS firm-level data suggests that this increase is strongest in the upper-tail (above-median) part of the productivity distribution.

Wages

Aggregate mean and median wages. Figure 5 plots real wages for the mean and median employee since 1980 from administrative sources (ASHE) over roughly the same period as the labour productivity series in Figure 1. As can be seen, the qualitative features of average wages follow those of productivity trends. There was a healthy growth up to the Global Financial Crisis, then a sharp fall thereafter. Real wages began rising from about 2013, but by 2020 had still not fully recovered to where they were pre-crisis.

Figure 5. UK real average wages since 1980

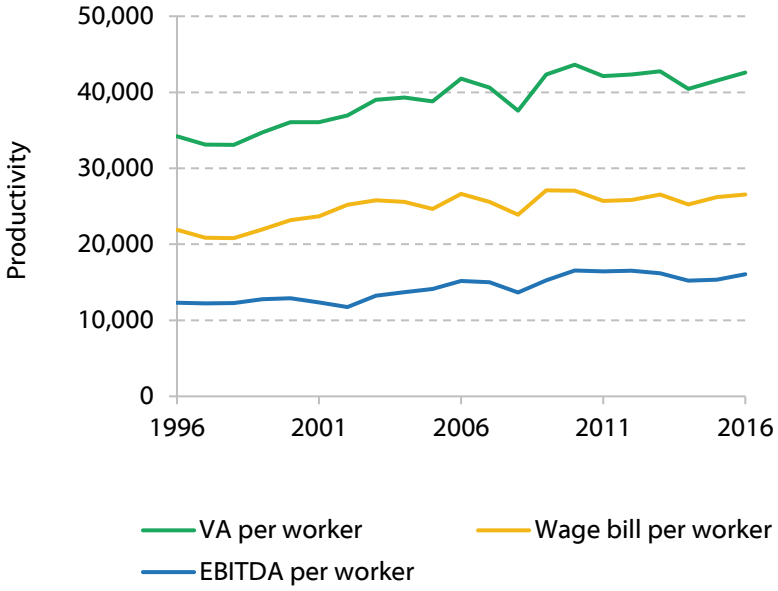
Note: UK average weekly earnings for individual employees, deflated by the CPI.

Source: Annual Survey of Hours and Earnings (ASHE).

A second important fact regarding Figure 5 is that median real wages have grown much more slowly than mean wages since 1980, reflecting the well-known growth of UK wage inequality. As can be observed in the graph, there has not been an increase in this measure of wage inequality from the mid 2000s onwards. Although wage inequality has also grown dramatically in the US since the mid 1970s, a major difference is that median real wages have been quite stagnant in America since the 1970s, whereas Figure 5 shows that they grew at a healthy clip in Britain until the financial crisis. Indeed, for the three decades preceding the financial crisis (1979–2007), national income per person grew faster in the UK than in the US, France and Germany, reversing Britain's relative decline over the previous century. Corry, Valero and Van Reenen (2011) argue that there were many UK policy-related factors underlying this, including reforms to labour and product markets, educational attainment and joining the European Union. Since the financial crisis, however, median wage growth has broadly tracked mean wage growth and productivity. Again, this suggests that for the last decade, the main UK problem has not been inequality (at least as measured by the difference between the mean and median wage), but rather slow productivity growth. The fact that policy helped improve the UK's productivity position after the 1970s holds up some hope that appropriate institutional and policy reforms could help this happen again (Besley and Van Reenen, 2013).

Figure 6 presents HO data for productivity (value added per worker), wages (wage bill per worker) and profits per head (EBITDA per worker). Payroll is about two-thirds of our measure of value added.

Figure 6. Aggregate firm wage, productivity and profits from Historical Orbis



Note: VA stands for 'value added'. EBITDA stands for 'earnings before interest, tax, depreciation and amortisation', and it is a measure of profits. Productivity is in 2007 £.

Source: Market sector from Historical Orbis using Sample A.

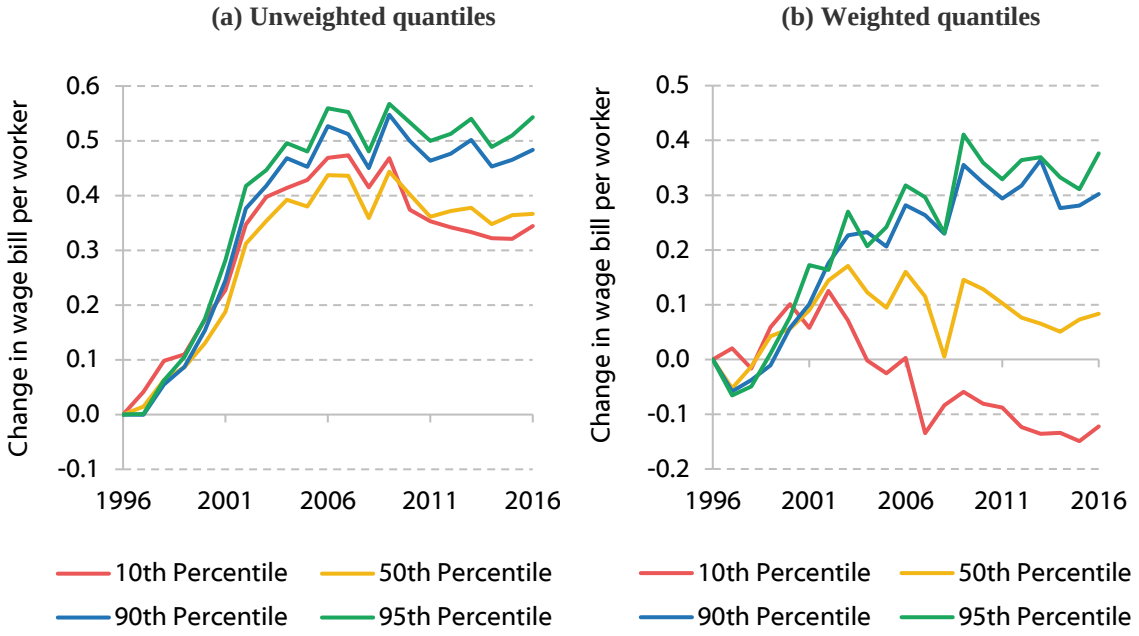
Wage dispersion. Although much is known about wage inequality between individuals, much less is known about the distribution of wage inequality between firms. Figure 7 (from HO) shows that it has also increased since 1996. The patterns are similar to those for productivity in Figure 4 with an increase in dispersion in both unweighted (left-hand) and employment-weighted (right-hand) panels.[16]

These patterns are broadly consistent with US work. For example, Song et al. (2019) use employer–employee matched data from the Social Security Administration and Barth et al. (2016) use data from the LEHD (state-specific Unemployment Insurance systems). These papers suggest the majority of inequality growth across workers is due to increasing average wage differences between firms. Unfortunately, there is not comprehensive employer–employee matched data in the UK over many decades to do a rigorous decomposition of the within- versus between-firm wage differentials as these papers can do. The similar firm-level patterns do suggest an important role for companies in wage inequality, however.

Summary on wages. UK wages have stagnated at the mean and median since 2008–09. Wage inequality between individuals has been increasing since the late 1970s, and firm-level wage dispersion has been on the increase.

[16] *Note that the fall in wages at the 10th percentile in the weighted panel does not mean that the 10th percentile for workers as a whole has been falling (we know that it has not, and has been helped by the minimum wage), because this depends on the distribution of individual workers' wages across firms.*

Figure 7. Dispersion in firm log(wages)



Note: The average wage is computed as the wage bill divided by employment for each firm. Panel a shows the unweighted quantiles and panel b shows the quantiles weighted by firm employment.

Source: Market sector from Historical Orbis using Sample A.

Firm markups of prices over marginal costs

The markup of price over marginal cost is challenging to measure: although prices are in principle easy to record, marginal costs are not.[17] First, one can use engineering estimates, but detailed cost data are rarely available. Second, one can estimate demand systems using quantity, price and product characteristic data and infer costs indirectly using an optimisation assumption. However, detailed brand price data are unavailable across large ranges of goods. To look across the whole market economy, a more popular approach starts from the production function and a cost minimisation assumption that generates the well-known relationship between a factor's share of revenue and the output elasticity (see Appendix C). When prices are equal to marginal cost (a markup of one with zero profits) as under perfect competition, the share of a variable factor (such as materials) should equal the output elasticity with respect to that factor (a technological parameter). As markups increase, the share of the variable factor will fall relative to the elasticity. The cost of goods sold (COGS) is the most easily observable proxy for variable costs in accounting data. For stable technology, a fall in the COGS share indicates an increase in the markup.

We stress that the results presented here rely on a calibrated output elasticity (time and firm invariant).[18] This was the starting point of De Loecker, Eeckhout and Unger (2020) in their

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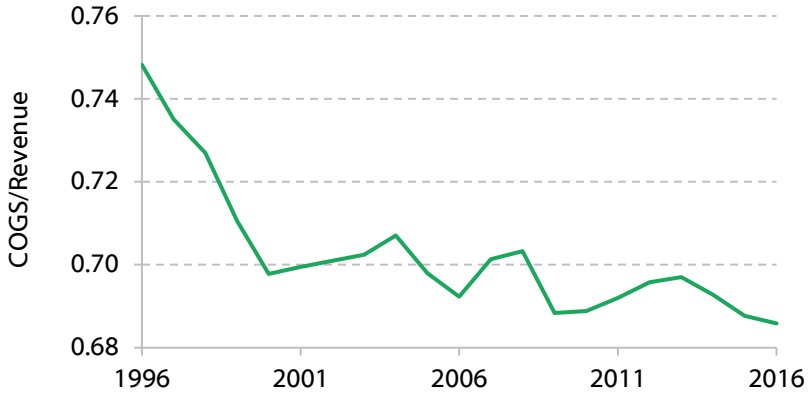
[17] *For example, see subsection II.A of De Loecker, Eeckhout and Unger (2020).*

[18] *We do not impose this restriction because we think it is necessarily correct, rather it enables us to focus in a transparent way on the raw variation in the data. The calibrated elasticity of course also abstracts away from cross-sectional heterogeneity in the output elasticity, and therefore the analysis is potentially subject to compositional changes in economic activity across industries over time.*

initial analysis of the US data.[19] Note that profit rates will include measures of fixed costs, so that even when markups over variable costs rise, profit rates may not rise because of the increase in the importance of fixed costs. Although one should worry about the heterogeneity and time-varying aspect of the output elasticity, this markups calculation should be seen as a first step in characterising the main UK patterns.[20]

Aggregate markups. Many investigators have analysed markups in the US economy, although increasingly more work has centred on other regions of the world. For the US economy, most work has found an increase in aggregate markups, with a range depending on specific modelling assumptions and methodologies. De Loecker, Eeckhout and Unger (2020) find that the increase in their estimated aggregate markup among publicly listed US firms is driven by a reallocation of activity towards high-markup firms, rather than an overall within-firm increase in markups. The increase in markups is shown to come predominantly from the falling share of costs of goods sold to total revenues.[21]

Figure 8. The cost of goods sold (COGS) as a share of turnover, all Historical Orbis firms



Source: Market sector from Historical Orbis using Sample B.

Figure 8 shows the change in the aggregate COGS share across all Historical Orbis firms.[22] We believe this is the first time such an analysis has been performed across such a large range of firms for the UK. We observe a significant fall in the share of variable costs of almost 6 percentage points, particularly in the 1996–2000 period. Figure 9 converts this into a markup using an output to COGS elasticity of 0.85, as is standard,[23] unsurprisingly showing a large

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[19] *We are not too worried about the choice of COGS as a measure of variable input. Relative to other factors of production, such as the capital stock or expenses related to advertising, marketing, innovation, etc., COGS captures the most variable factor of production. Put differently, it is very unlikely that any other factor of production would get us closer to a measure of the markup; so if we fail to find particular markup patterns, it is safe to conclude that we will not find them using other factors of production.*

[20] *We opted not to inject the US-based technology parameters for at least three reasons. First, this has been done by De Loecker and Eeckhout (2018) already, and we already compare the two samples. Second, we already know from De Loecker, Eeckhout and Unger (2020) that it is unlikely to overturn the results. Third and finally, a more definitive conclusion would require us to estimate the production functions for the millions of firms in our data. This is something we are pursuing in future work. We avoid cost-share methods, as these (in the limit) equate markups to profit rates, and that is precisely what we are trying to avoid.*

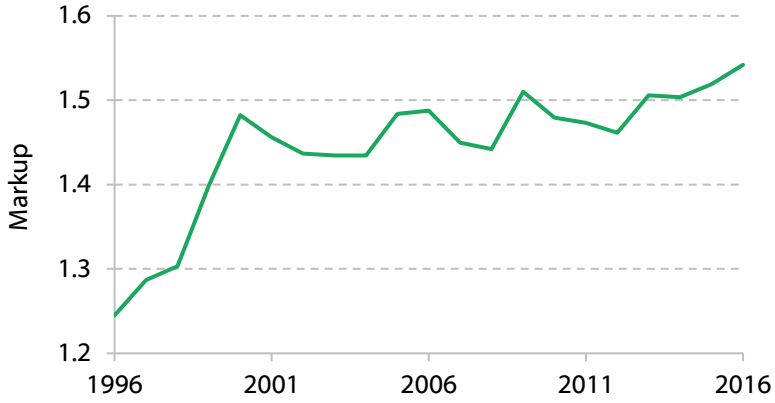
[21] *For a subset of the economy – manufacturing, retail and wholesale trade – De Loecker, Eeckhout and Unger (2020) and Autor et al. (2020) corroborate these patterns using the universe of private firms from the US Census data.*

[22] *Note we are using Sample B in this subsection, which conditions on non-missing sales, employment and COGS.*

[23] *This follows De Loecker, Eeckhout and Unger (2020). Alternative calibrations of the output elasticity will obviously change the level of the markup, but not the trend.*

increase in the aggregate markup. Appendix C discusses markup calculations in more technical detail and Appendix B shows various robustness tests. For example, when we use input weights instead of output weights, we see similar trends, albeit with smaller magnitudes.

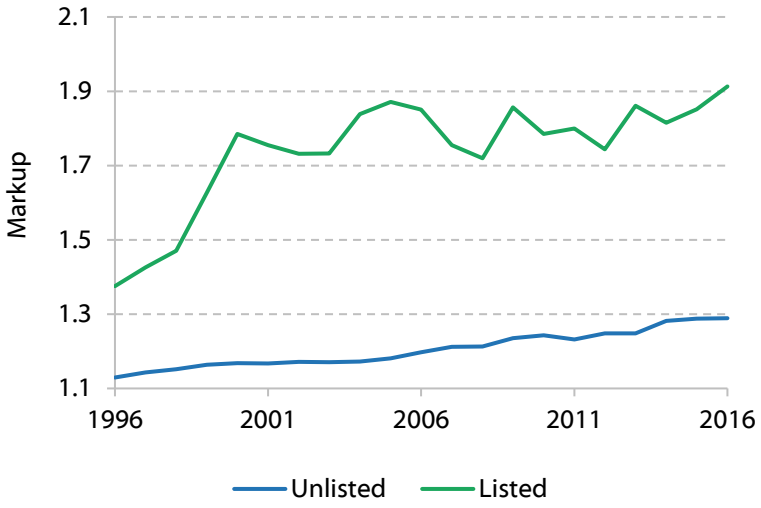
Figure 9. Aggregate markup, all Historical Orbis firms



Note: The markup calculation assumes an output elasticity of 0.85 and markups are weighted by turnover. See Appendix C for markup calculations.

Source: Market sector from Historical Orbis using Sample B.

Figure 10. Aggregate markup for listed and unlisted firms



Note: Markups are computed with a constant elasticity of 0.85 and the means are weighted by turnover. See Appendix C for markup calculations.

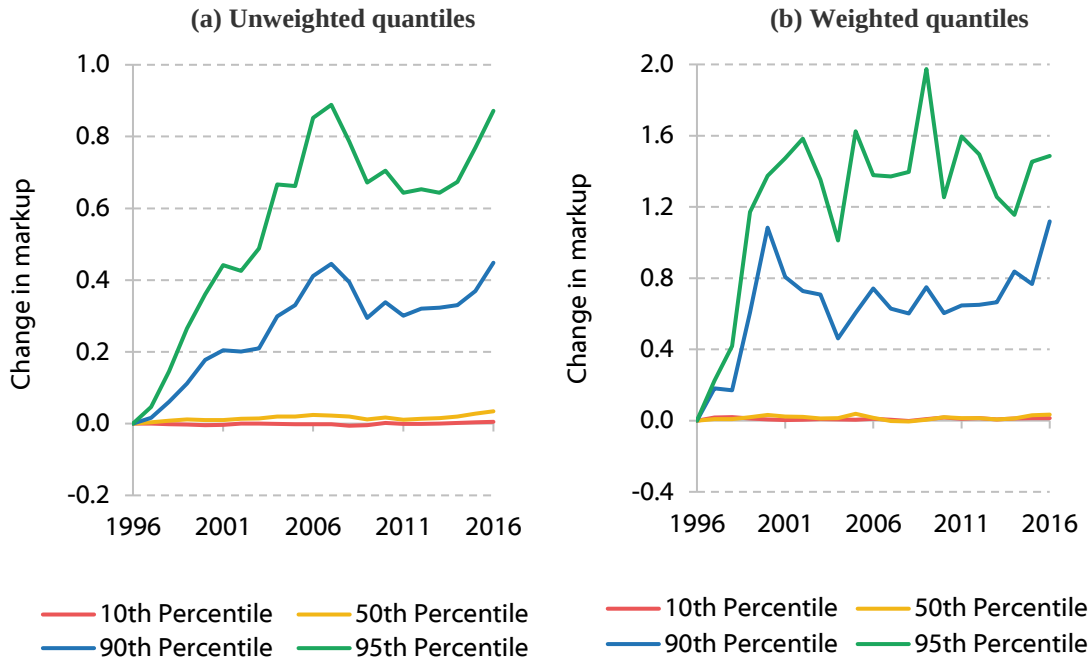
Source: Market sector from Historical Orbis using Sample B.

Figure 10 compares the markups for publicly listed firms and for unlisted firms. Unlisted firms have lower markups than their listed counterparts, which is unsurprising since they are smaller. Markups rise over time for both sets of firms, but the increase is more marked for listed firms and the timing of the changes differs (strongest 1996–2004 for listed and more continuous for unlisted). We can further decompose the unlisted firms between those that are foreign subsidiaries and those based in the UK. Interestingly, the unlisted UK firms have seen faster increases in their markups, whereas the foreign affiliates have been more stable. All this suggests that there may be some interesting differences between the ways multinationals

structure themselves that lead to changes in estimated markups. We also look at markup changes by sector, finding that markups have risen broadly across industries (see Appendix Figure A5).

Markup dispersion. Figure 11 looks at the quantiles of markups (unweighted in the left-hand panel and weighted by revenues on the right). As with firm productivity and wages, there has been an increase of dispersion across firms in terms of markups. The increase in upper-tail inequality is particularly impressive. There has been essentially zero change in markups for firms at the median or below for both panels. By contrast, firms at the 90th percentile have had a 40% increase in the markup and those at the 95th had one twice as large for the unweighted series. The sales-weighted quantiles in Figure 11 show the same pattern, with zero change for the 'median consumer' but an even larger increase at the top of the distribution (note that the scale of the vertical axis is twice as large as for the left panel). The timing is slightly different however, being more focused in the late 1990s.

Figure 11. Distribution of markups, all firms

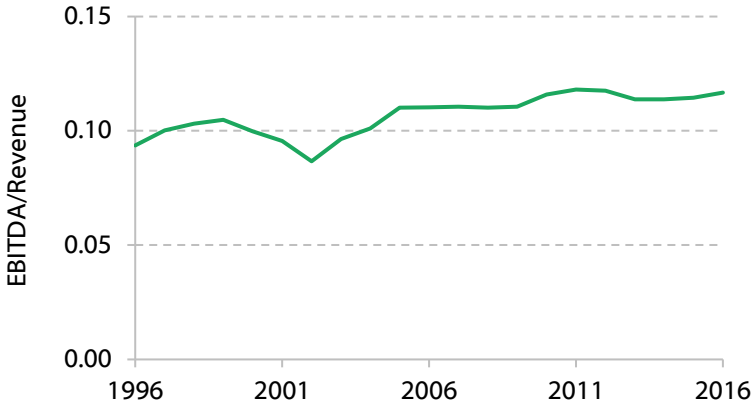


Note: The markup calculation assumes an output elasticity of 0.85. See Appendix C for markup calculations. Weighted quantiles use turnover.

Source: Market sector from Historical Orbis using Sample B.

Profit rates. The markups we have discussed are gross markups, i.e. estimates of the wedge between prices and marginal costs. Rising markups do not necessarily mean an increase in economic profits. For example, there may have been an increase in the importance of fixed costs (intangible capital of software, research, marketing, etc.), so that net markups are actually stable. Measuring fixed costs and economic profits is extremely challenging, of course. One crude measure is simply the ratio of earnings before interest, taxes, depreciation and amortisation (EBITDA) to sales. EBITDA is net of COGS and other expenses (SG&A – selling, general and administrative expenses) that may be more fixed. Figure 12 shows that this ratio has risen by about 2 percentage points from about 9.5% to 11.5% between 1996 and 2016, hinting at the idea that fixed costs account for some, but not all, of the increase in markups.

Figure 12. Profit rates: the ratio of aggregate profit (EBITDA) to revenue



Source: Market sector from Historical Orbis using Sample A (with the additional restriction of non-missing revenue).

The analysis of US data in De Loecker, Eeckhout and Unger (2020) highlights the increase in fixed cost (proxied by SG&A). Although this partly offsets the rise in gross markups (i.e. the higher margins are required to cover these fixed costs), there is still an increase in profit rates even net of these fixed costs. The latter result is consistent with the reported increase in the aggregate profit share in the overall US economy.

Other papers. The finding of increasing markups (and markup dispersion) is consistent with other work on other OECD countries and also on UK listed firms such as De Loecker and Eeckhout (2018), Díez, Leigh and Tambunlertchai (2018) and Aquilante et al. (2019). The only other UK study we are aware of that includes unlisted firms is Competition and Markets Authority (2020), which focuses on Orbis data, but only includes firms with over 250 employees. It also finds increases in markups. If we condition on these larger firms, we also find similar results to those presented here, which is unsurprising as the patterns are driven by the larger firms, as we have shown.

Summary on markups. Aggregate markups appear to be rising in the UK since the mid 1990s using the HO data. The rise is stronger in listed firms, which are larger and more global than unlisted firms, and also appears when looking at profit rates (which should strip out fixed costs). The dispersion of markups is also increasing, with median markups (like productivity) suggesting an important role for reallocation, rather than a general rise in markups across all firms.

Labour share

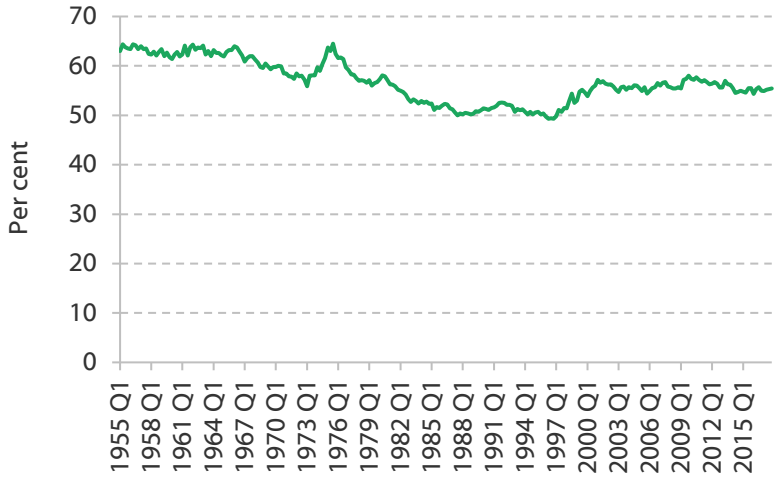
Aggregate labour share. The evolution of the share of labour in output is interesting for many reasons. First, if the economic pie is growing strongly, people may be relaxed if workers are getting a smaller share of it. However, as we have seen, productivity growth has been weak in the UK since the financial crisis. Hence, a labour share fall implies downward pressure on wages or jobs or both. Second, the distribution of capital income is much more unequal than that of labour earnings. Therefore, a fall of the labour share will be a force for increasing inequality across households. Third, the macro stability of the labour share was one of Kaldor's famous stylised facts, which was, as Keynes said, always 'something of a miracle'. The fall in the US labour share since the early 1980s requires revision of this 'stylised fact'. The labour

share has also been falling (albeit at different rates and timings) in most other OECD countries (see Karabarbounis and Neiman (2014), Autor and Salomons (2018) and Autor et al. (2020)).[24]

By contrast, the UK share of employee compensation in value added appears to have a different evolution at the macro level. Figure 13 taken from Dunn, Heys and Siddhu (2018), shows that the UK share of employees' compensation fell from 63% in 1957 to 50% in 1987 where it stabilised until the mid 1990s. It then rose before settling at around 57% in 2001 and has more or less remained there since.

Teichgraeber and Van Reenen (2021) analyse more recent data in greater detail (see Figure 14), focusing on the period after 1980 when the US labour share started falling and before 2020 (to avoid the confounding impact of COVID-19). The blue line is the official ONS series, which adds an estimate of self-employed labour income to employee compensation in calculating the labour share. This measure of the labour share has fallen by 2 percentage points over the period. The share fell the most between 1980 and 1996 under the Thatcher–Major Conservative governments and rose between 1997 and 2010 under the Blair–Brown Labour governments, before falling slightly since then.

Figure 13. Labour share, unadjusted for mixed income

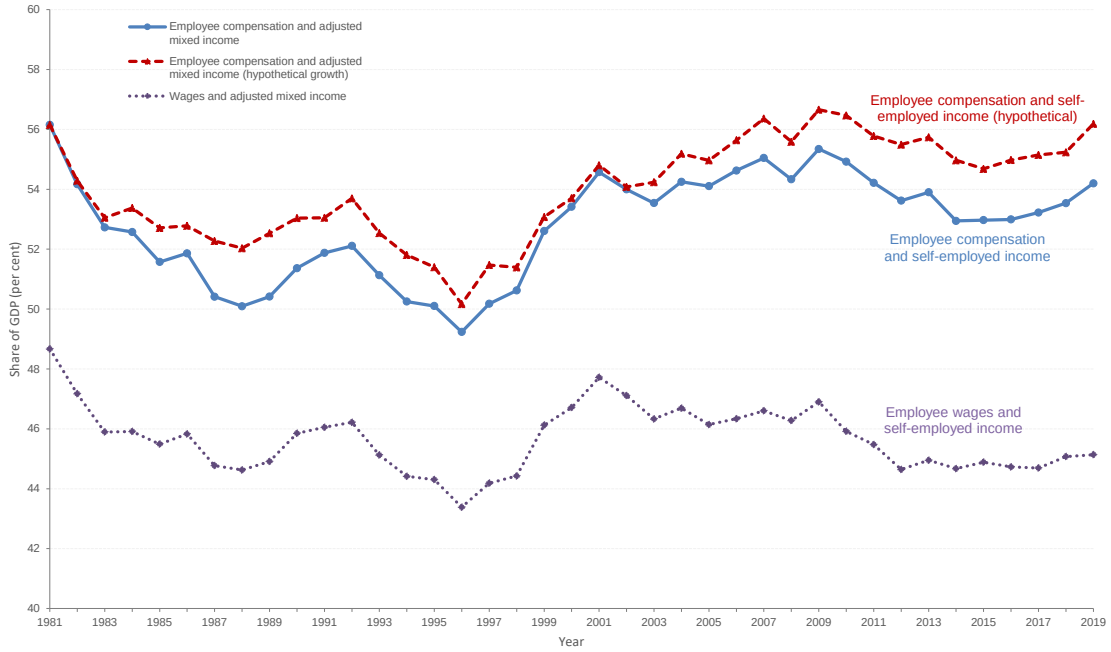


Note: Employee compensation (excluding self-employed and including non-wage compensation) as a share of GDP.

Source: Dunn, Heys and Sidhu, 2018.

[24] *There is some controversy over the non-US trends, with Gutiérrez and Piton (2020) arguing that only the US has seen a clear fall. However, we are somewhat sceptical about this conclusion. First, Gutiérrez and Piton focus on recent versions of KLEMS data that have deteriorated in quality compared with the earlier vintages that do show a fall. Second, their corrections for dropping real estate are problematic – this cannot be done in a consistent way across the KLEMS data. Third, they focus on the four largest European countries. Germany does experience a decline in their data. France and Italy had a decline, but it was primarily in the 1980s rather than in the later period they focus on. Their EU28 graph does show a fall even after their preferred corrections. Finally, Canada, Japan and China also seem to have falls in the labour share. Nevertheless, there is clearly more work to do here.*

Figure 14. Labour share of GDP



Note**:** The solid line with circles (blue) shows compensation and adjusted mixed income (an estimate for self-employed income that can be classified as labour income) over GDP. The dotted (purple) line shows wages and adjusted mixed income over GDP, i.e. it excludes non-wage benefits of employees (employers' pension contributions, employers' National Insurance payments etc.). The red (dashed) line takes the value of the blue series in 1981, and then applies a hypothetical growth rate for the years after. The hypothetical growth rate equals the growth of employee compensation per hour over growth of GDP per hour. This is to approximate how the labour share could have evolved if all workers (including self-employed) had experienced growth of income equal to that of employees.

Source**:** Teichgraeber and Van Reenen (2021) using ONS and OECD data.

This disguises two important changes, however. First, there is the position of the self-employed, those on so-called 'mixed income'.[25] This group has experienced much slower income growth (of about 44%[26]) between 1981 and 2019 than the employed (whose hourly compensation rose by about 80%). Further, the fraction of workers who are self-employed has risen substantially (from about 10% to 16% of the workforce over the same period). Since the self-employed have lower incomes on average than the employed (primarily because of the solo self-employed, who do not employ other workers), this is an additional force depressing the labour share. The dashed red line in Figure 14 shows what the labour share would have been had the self-employed share remained the same and had their compensation per hour grown at the same rate as employees'. It is clear that the share is essentially the same in 2019 as in 1981, implying that all the fall in the official series is due to the changing fortunes of the self-employed.

The second important factor that the earlier analysis abstracted from is that there has been a large increase in 'non-wage compensation' for employees, primarily from employer pension contributions. This could be seen as a *bona fide* element of deferred compensation, but a substantial fraction of this compensation turns out to be corporate payments to deal with the historical under-funding of defined benefit occupational pension schemes (see Bell (2015)). For

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[25] *For a closely related discussion on US data, which show somewhat different trends, see Smith et al. (2019).*

[26] *This income growth number is the sum of compensation and business income, so does not depend on the precise way that a self-employed person takes their income (e.g. in salary versus dividends), which will be heavily influenced by tax rates.*

example, British Airways' 'compensation' includes payments to pilots who have already retired and are obviously not contributing to current output.

The dotted purple line in Figure 14 takes out non-wage compensation from the official series (blue line) and shows a fall of around 3.5 percentage points in this wage share of GDP. We discuss how the labour share trends relate to changes in the markups, technology and monopsony in more detail below.

Labour share: dispersion and further analysis. In Appendix B, we present some further analysis of the labour share in Orbis, the trends by industry and also between-firm dispersion. As in the US, the fall in the labour share is strongest in manufacturing. We also find increases in the dispersion of labour shares across firms, especially when we weight by size and more strikingly in the upper tail. This increased inequality between firms is consistent with our findings on productivity, wages and markups that we have already documented.

Summary on labour share. The aggregate labour share has drifted downwards in the UK over the long run. Since the early 1980s, there has been some fall after adjustments for non-wage compensation and the self-employed, but these are much smaller than in the US. Firm dispersion of labour shares has also risen.

Firm size and industrial concentration

We next turn to inequalities in firm size. In the UK administrative data, there is an increase in the share of turnover in the top 100 UK enterprises between 1998 and 2018. This ignores the firm's industry, and recent years have seen an enormous amount of work measuring industrial concentration, partly in response to concerns of weakening market competition. It is well known, of course, that concentration may be a poor measure of market power, but it is still useful to look at it, in the round.[27] Concentration measures are built from market shares – a firm's sales relative to those of the whole industry. This is non-trivial to estimate for large multi-industry firms, as the HO data do not break down turnover across industries. Appendix A discusses methodological issues, but they are sufficiently difficult that we choose to rely on work by others to summarise what has been happening.

Unfortunately, there is no long time series of concentration in the UK that we can draw on as the ONS stopped publishing these data. Competition and Markets Authority (2020) is the most recent work which tracks the sales share of top firms by four-digit SIC industry (so about 615 distinct sectors) between 1998 and 2018. It finds an increase in average concentration from about 46% to 50% (see Figure 15) using the turnover share of the largest 10 firms (the 'C10'). The increase was mainly in the 2006–11 period around the financial crisis, peaking at 54% in 2011. Similar patterns emerge from alternative concentration measures using the C4, C20 or HHI (Herfindahl–Hirschman Index). Concentration declined somewhat after 2014.

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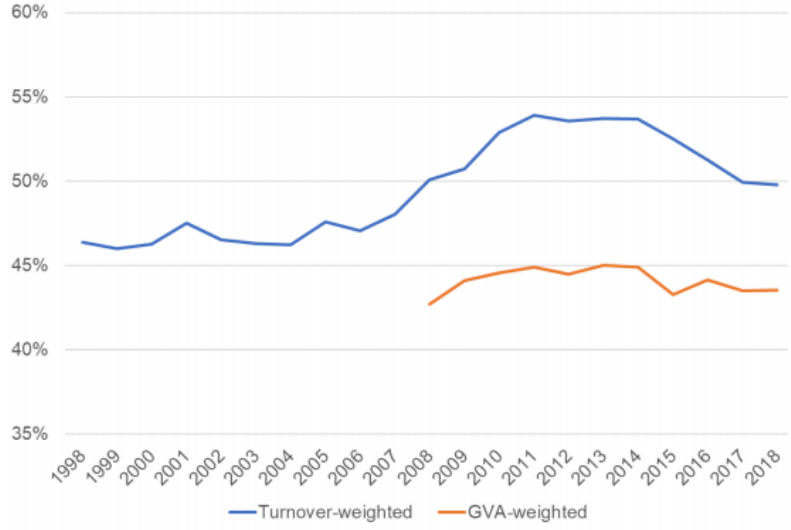
[27] *See Syverson (2019) for a recent treatment. Concentration increases could signal an increase in market power – for example, if entry barriers increase. Alternatively, it could signal a decrease in market power – for example, if consumers become more price sensitive and move towards the more efficient firm with lower prices. Furthermore, a well-known challenge is that concentration measures rely on a product market definition, and therefore production data can potentially provide different patterns from those obtained using consumption data for well-established antitrust markets (defined both in terms of product space and in terms of geography).*

Figure 15. Average C10, whole economy



Source: CMA analysis of ONS BSD data
Note: Excludes non-market sectors such as government services – including fully government-run sectors such as central banking, and those dominated by the public sector, such as education. Turnover-weighted figure excludes Finance and fuel wholesale as they have outsize effects on the aggregate figures, due to having turnovers well in excess of their economic importance. GVA figures exclude Finance and some sectors for which GVA estimates are unavailable, including several primary agricultural product sectors (coverage is similar in business count and total turnover to turnover-weighted).

Source: Competition and Markets Authority, 2020.

The increase in concentration around the Great Recession has also been observed in other UK studies on the BSD data. Bell and Tomlinson (2018) find a growth in concentration focused around the Global Financial Crisis using a subsample of (consistently defined) five-digit sectors over a shorter period of 2003–15. Bahaj, Key and Piton (2019) for the Bank of England also look at the C5 and C20 between 1998 and 2017 within detailed sectors and find a substantial increase (see Appendix Figure A18). BEIS (2020b) also finds concentration increased during the 2006–10 period.

The best effort yet to use company accounts data, rather than just administrative data, to analyse concentration is probably that by Koltay, Lorincz and Valletti (2020) from the European Commission's DG-COMP. They look at concentration in the UK (together with France, Germany, Italy and Spain) between 1998 and 2017. To construct a firm's industry share, one needs a good measure of the denominator (industry sales). The partial coverage of Orbis (particularly of SMEs due to the reporting issues discussed in Section 3) means that it is likely to be better to use sales or gross output from administrative sources. ONS-type industry statistics on sales are publicly available, so these are used as the denominator of concentration in Koltay, Lorincz and Valletti (2020).[28] As noted above, an issue with the numerator for concentration is that company accounts do not generally break down turnover by industry or geography. For example, the consolidated accounts of a multinational will report sales regardless of where the good was produced or sold. To deal with this problem, Koltay et al. use the 'Industrial Passport' data from Euromonitor, a marketing firm that tries to disaggregate firm-level sales by geography, industry and year for major companies using a variety of information in the accounts and specialist trade knowledge. Dividing the private economy into

[28] *This might seem an obvious point, but it has caused a lot of confusion in the literature. Early versions of Gutiérrez and Philippon (2018) claimed that concentration had fallen in EU countries, but, as pointed out by Bajgar et al. (2020), this turned out to be because they were calculating industry shares by summing Orbis firms. Because of improved coverage in the version of Orbis they used (pre-HO), this exaggerated the growth of industry output and led to a misleading fall in the shares of leading firms. When corrected using population industry data, there was a general increase in concentration, consistent with other papers.*

156 ISIC sectors and using this method, they find that concentration increased substantially in the UK by almost 10 percentage points between 1998 and 2018 (see Appendix Figure A19).

Rising concentration in the UK is consistent with the patterns observed in other countries. For example, Autor et al. (2020) construct concentration measures at the four-digit SIC level (676 industries) from the US Economic Census 1982–2012 and find substantial increases, regardless of precise measurement of concentration (as do Grullon, Larkin and Michaely (2019)). Berlingieri et al. (2017) using administrative micro data from a large number of OECD countries (Multiprod) also find a trend towards increased concentration. Koltay, Lorincz and Valletti (2020) find that concentration has risen in the other European countries as well (although less so than in the UK). The ECB's COMPNET team using firm data from the Eurozone countries also find concentration increases (Melitz, 2020).

We reiterate that an important distinction has to be made between concentration in well-defined product markets used in antitrust analysis, and firm concentration in SIC industries (which will typically stretch across different antitrust markets). Both are of potential interest for efficiency as concentration may be relevant for input markets (such as labour) as well as output markets.[29]

Business dynamism and entrepreneurship

The entry rate and share of activity in young firms have declined in the US since the early 1980s (Decker et al., 2014). In terms of absolute numbers, there is no indication of a decline in the start-up rates in the UK, at least since 2000. For example using all 6 million firms in Table 1 earlier, entry rates began at 12% in 2000 and ended at 13% in 2019, with a fall and then a rise. This exceeded death rates of around 10%. Consequently, the total number of firms in the UK economy has risen from 3.5 million to 6 million. However, this is mainly due to the rise of non-employer firms – as noted above, there has been a big increase in the fraction of UK workers who are self-employed and these are mainly 'solo self-employed', employing zero workers. Since the vast majority of self-employed firms stay small or exit, a better measure of entrepreneurship is the share of activity in young firms (see Davies (2021)). The fraction of economic activity (as measured by employees and turnover) in UK firms that are less than 5 years old declined between 2000 and 2010 quite significantly. For example, about 14% of non-financial firm turnover was in young firms in 2000 and this fell to 7% by 2010. Although for employment this had recovered completely by 2018, the share of turnover was still only about 10%.

Masson and Shafat (2020) describe a new ONS administrative data set that tracks job transitions at the quarterly level (the Longitudinal Business Database, LBD). The LBD is constructed from the business register population (IDBR). Comparing the pre- and post-crisis periods (1999–2007 versus 2011–19), they show that job creation has fallen from 5.12% to 4.82% and job destruction has fallen from 4.71% to 4.37%: there are drops, but not large ones. The fall in job destruction is all on the extensive margin of less exit, which raises the concern of increasing numbers of 'zombie' firms. Davies (2021) using the (annual) BSD also finds some evidence of a decline in job reallocation (job creation plus destruction) since 1998.[30] By contrast, Oliveira-Cunha et al. (2021) argue that there is no consistent evidence for falls in this measure of reallocation.

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[29] *For example, Benkard, Yurukoglu and Zhang (2021) argue that, in the US, disaggregated data from some firms suggest that concentration has not risen in most consumer markets as it has in national four-digit SIC industries. However, even if this was the case, the rise in national product concentration could still have implications for input markets.*

[30] *He also finds a fall in the responsiveness of job growth to TFP shocks, which is similar to US work in Decker et al. (2020).*

Overall, different UK data sources and analysis do not paint such a clear picture of what is happening to entrepreneurship and business dynamism as the US. Therefore, this is an area where there is more ambiguity in the UK than in America.

Connecting labour and product markets: a simple framework

Overall, the evolution of the UK business landscape shows much similarity with the US (recall Table 2). One apparent difference, however, is that the employee wage bill share of GDP does not appear to have fallen in the UK as it has in the US. However, when we examined this in more detail, we did find some fall in the labour share between 1980 and 2019 when corrected for self-employment and non-wage compensation. Appendix C offers one simple imperfect competition framework for thinking of how to decompose the changes. There, we show that the change over time (Δ) in the labour share of revenues (S_{it}) of a single firm i at time t can be broken down as follows:

$$\Delta \ln S_{it} = \Delta \ln \theta_{it} - \Delta \ln \mu_{it} + \Delta \ln \lambda_{it} \qquad (1)$$

A fall in the labour share can come from: (i) changes in labour-saving technologies (automation) as indicated by a fall in θ_{it}, the elasticity of output with respect to labour inputs; (ii) increases in firm product market power (markups) as indicated by a rise in μ_{it}, the ratio of price to marginal cost; and/or (iii) increases in employer labour market power as indicated by a fall in λ_{it} (marginal productivity of labour relative to the wage, the inverse 'markdown'). As we discussed above, different authors have suggested all three as possible causes of the labour share fall, and of course these forces can interact. Moreover, at the macro level, we also have to aggregate across heterogeneous firms by size-weighting the equation, so a fall in the share can also come from a reallocation towards large firms which generally have low labour shares. This is the predominant force found by Autor et al. (2020).

Appendix C details how we can quantify the contribution of markups to the fall in the labour share. To summarise, we take equation 1 but assume the technology and monopsony terms are constant across time and firms and then aggregate across firms. We thus ask, holding technology and labour market fixed, how much the labour share would change as we let the markups change as observed. Recall from HO that there is a fall in the share of variable costs in revenues (as measured by the COGS/revenue ratio), which translates into an increase in estimated (COGS-weighted) markups of 0.44% per annum in the 1996–2016 period. Extrapolating this compound growth trend over the entire 1981–2019 period and calibrating to the 1996 labour share of GDP of 43.4% implies a 7.1 percentage point fall in the labour share according to equation 1.[31] By contrast, the actual fall in the labour share was only 3.5 percentage points (see Figure 14), about half as much.

Thus, the markup changes 'over-explain' the fall in the labour share in the sense that we would have expected the labour share to have fallen by an additional 3.6 (= 7.1 – 3.5) percentage points if product market power was the only factor. According to equation 1, the offsetting factors could have been monopsony power (markdowns) and/or technology. Markdowns of wages under marginal products may have become less pronounced due, for example, to the introduction in 1999 of the first UK National Minimum Wage (and its subsequent substantial increases). An alternative explanation is that technologies – which we assume are fixed and common for purposes of calibration – may have changed. This would require the output elasticity of labour to have risen, however, which is the opposite of the usual story of automation causing a substitution away from labour as in Acemoglu and Restrepo (2018, 2020).

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[31] *If we use end-of-period values to calibrate technology, we obtain a very similar predicted fall in the labour share of 8.1 percentage points.*

There are at least four issues, however, with this calculation. First, extrapolating the markup trend backwards to the pre-1996 period where we do not have good Orbis data may be regarded as a stretch. We can, however, use the publicly listed firms in Worldscope, which has good coverage from about 1989 onwards. Although markups are higher amongst these larger firms (26% versus 19% on average), as we would expect, the markup increase is extremely similar to Orbis at 0.43% (instead of 0.44%) per year. Consequently, we get near-identical percentage point changes in implied labour shares using Worldscope even adding an additional 7 years. Second, the short-run time-series fluctuations of the implied and actual labour shares do not match up well. For example, the labour share was at a historical trough in 1996 according to ONS data and rose rapidly between 1996 and 2000, even though our estimated markups rose. Indeed, if we look at the whole 1996–2016 (or 1996–2019) period, the labour share does not fall on any of the measures regardless of corrections. Our view is that equation 1 should be regarded as a long-run trend, rather than something that can reliably match short-run fluctuations. Nevertheless, this issue is certainly worth further investigation. Third, recall that our markup estimates are based on incorporated firms in Orbis, in the market sector and for firms that report COGS and sales (Sample B). The aggregate GDP shares are based on a large number of different sources. In particular, the mixed income data are from non-incorporated firms, so we are implicitly assuming that markups are applicable to those in the mixed income sector. This may be inaccurate and it would be valuable to do more explicit work on the self-employed using administrative data. Finally, we have abstracted away from heterogeneity across sectors, which may be important.

In summary, despite these caveats, we believe that it is reasonable that the rise in markups helps account for a fall in the labour share since 1980. Our rough quantification suggests that there must be some offsetting factors to this pressure, reducing the magnitude of the implied fall in the labour share in the UK.

5. Explanations for the changes

There are many changes to understand and many theories to explain them. In this section, we draw some broad classes of explanations without attempting to be comprehensive. Most of the theories were developed to explain the US business trends. As we have seen, many (but not all) of these same trends are present in the UK data. We broadly group the theories of change into three classes – technology, globalisation and institutions – but clearly these overlap, interact and are not mutually exclusive.

Technology-based theories

Network effects. Tirole (2022) has a detailed discussion on the economics of digital high-tech industries. A key feature of these sectors is the importance of network effects, which generate a tendency for these industries to be characterised by ‘winner takes all’ or ‘winner takes most’ competition. A classic example of network effects is internet search, currently dominated by Google. Consumers want to use a search engine that directs them to the website they want more quickly and accurately. The algorithm providing this will be more effective, all else equal, the larger the data set the company has on the history of consumer search. The more people use a particular platform for search, the more accurate will be the search engine’s algorithm (think of data-hungry machine learning techniques). As the quality of the search engine improves, even more people will tend to use it. Hence, a small initial difference in the quality of two search engines can lead the market to tip to one firm. Once a firm becomes dominant, it may be hard to dislodge if its endogenous advantage (data in this case) is not replicable/accessible by rivals. Other network effects in digital industries include social media platforms (e.g. Facebook), where the value to a consumer of the platform increases when other people use it, and operating systems, where developers will tend to create applications for the most popular platforms (e.g. Apple’s iOS on cell phones or Microsoft Windows on computers).

The growth of the GAFAM (Google, Apple, Facebook, Amazon and Microsoft) has often been linked to these network effects. In addition, the weight of the economy does seem to have shifted more towards these sectors. These are very large and profitable firms, tech titans which seem to have pulled away from both other firms in their industries and the economy as a whole. Whenever the issue of market power, and the likely remedies and implications, are discussed, these companies are usually assumed the targets. However, it is instructive to keep in mind that while the Big Tech have a major impact on the total market capitalisation in the US, high-tech industries employ only about 12% of the workforce (17 million workers in 2014) and contributed 23% of GDP (Wolf and Terrell, 2016). The numbers are even smaller in the UK, more like 7.7% of GDP. While this share is non-negligible and moreover growing rapidly, this still leaves the vast bulk of the economy outside of these sectors. We have shown that many of the trends in productivity, wages, markups and concentration are at play in more traditional sectors of manufacturing, retail and transport. This means that, while there are surely factors specific to the high-tech industry worth studying, we cannot resort to these alone to explain the global phenomena.

Fixed costs: the importance of intangible capital. A rise in fixed costs will mean that low-productivity firms will struggle to survive, creating higher concentration and requiring a higher gross margin from survivors to cover the costs. This helps rationalise some of the trends, but what are the increasing fixed costs? Perhaps the most plausible story links fixed costs to intangible capital – e.g. software, R&D, marketing, training and management practices. Corrado and Hulten (2010) and Haskel and Westlake (2018) have shown that intangible investment exceeds tangible investment in the UK and the US today. In retail, for example, Walmart and other 'Big Box' grocers have made billions of dollars of investment in sophisticated inventory control systems to manage their 'just-in-time' global supply chains. These intangible investments do not typically show up in conventional measures of capital, and are largely fixed costs. Small chains, let alone Mom 'n' Pops, could not possibly make the same kind of investments. Intangibles may also make it easier for firms to expand into new geographical markets (Hsieh and Rossi-Hansberg, 2019) or product markets (Aghion et al., 2019).

One of the main challenges in checking this hypothesis lies in measuring intangible capital. In an attempt to link variable profit margins to expenditures on intangibles, De Loecker, Eeckhout and Unger (2020) correlate the markup with the share of SG&A over sales along the markup distribution over time. The results are quite stark: for firms in the lower part of the markup distribution, not much has happened to this ratio. However, for firms in upper percentiles of the markup distribution, not only did markups rise substantially, so did the ratio of SG&A to sales. Nevertheless, the rise in markups was still higher, suggesting that the return on these activities increased over time, as reflected in rising profit rates (as we showed in our EBITDA analysis in Section 4). At this point, however, the precise mechanism, and which elements are picked up in this accounting variable, are still very much understudied.

Slowing technological diffusion. In a dynamic economy, some firms are innovating and pushing the technological frontier forward and others are copying them and trying to catch up. New waves of firms build upon the innovations of current leaders and try to leapfrog them. This leads to productivity dispersion, but also with a pressure towards convergence through catch-up. If the process of diffusion has become harder, then leaders will pull away from laggards and we will observe increased inequality in size, productivity and markups. Akcigit and Ates (2019) argue that slowing technological diffusion accounts for the US trends better than any other single explanation, especially as it is consistent with slowing productivity growth.

One question, however, is: why should we think that diffusion has slowed? It seems surprising, as we live in a time where information spreads extremely quickly through electronic media and communication is much easier for geographically dispersed people. On the other hand, incumbency advantages (such as the proprietary data underlying internet search discussed

above) may make challenging a leader harder than in the past. Further, firms may be using their intellectual property more effectively to prevent others using their innovations, due to changes in legal standards over patents (e.g. Kortum and Lerner, 1999). Patents have become increasingly concentrated in top firms (Akcigit and Ates, 2019), litigation has grown tremendously (Jaffe and Lerner, 2006) and patent thickets can block potential start-ups. Leading firms increasingly buy up start-ups and acquire the talent, rather than these start-ups becoming larger firms to threaten dominant platforms. The incumbent firms may even kill off the technology post acquisition to prevent cannibalisation of their existing products (see Cunningham, Ederer and Ma (2021), in pharmaceuticals).

Automation. Acemoglu and Restrepo (2018, 2020) argue for the importance of directed technological change in accounting for changes in the labour market. They stress the importance of the interaction between job displacement, which reduces labour demand, and job reinstatement, which increases it. The wage bill is the outcome of these two forces and the authors argue that the fall in the US labour share is largely due to the greater prevalence of 'so-so' technologies such as robots and automated checkouts that (they argue) reduce labour demand without much increasing productivity. Since the adoption of such technologies is most common in large firms, Acemoglu, Lelarge and Restrepo (2020) argue that the reallocation effects generating greater dispersion are driven by these new technologies. There is controversy over whether recent technologies are as 'so-so' as Acemoglu and Restrepo argue. It took decades for organisations to learn how to effectively use information technology (and electricity), so it may be that many new technologies will have larger effects on productivity in the future (e.g. Bloom, Sadun and Van Reenen, 2012).

Globalisation

Since the Second World War, countries have become increasingly economically integrated, with a fall in the costs of trade, communications and the mobility of people. This has been driven by technology, but also by international agreements to a rules-based trading system, WTO rounds of tariff and quota liberalisation, and deep regional economic integration such as the European Union's Single Market. China, in particular, became integrated into the world system following the change in policy after 1980 by Deng Xiaoping.

Although we may be witnessing some stalling or reversal of these trends in recent years with Brexit, Trump's trade wars and the COVID-19 pandemic, globalisation still could be a driver of the changes we have documented. One mechanism described in Autor et al. (2020) is that the reduction in trade costs will mean that firms that are more productive will expand their overall size at the expense of their less efficient rivals. This is generic in heterogeneous firm trade models and leads to increased concentration. Since high-productivity firms tend to have high markups,[32] these reallocation effects push up aggregate markups and depress aggregate labour shares.

An alternative mechanism is that multinational firms can increase efficiency through global supply chains. This will lead to growing productivity differences with laggard firms as there may be a fixed cost to setting these up. This will enable them to grow larger and, if the lower costs are not fully passed through, will enable them to increase markups. There is some evidence on this mechanism in the literature. De Loecker et al. (2016) document rising markups for Indian manufacturing firms facing lower input tariffs on intermediate inputs. It is the incomplete pass-through of a cost reduction that is manifested in larger markups. These effects show up in rising aggregate markups, and rising returns to capital and stock market performance

[32] *There are solid theoretical reasons for this, as discussed in Melitz and Ottaviano (2008). For utility functions obeying Marshall's Second Law of Demand, firms that are more productive will produce more and face a more inelastic part of the demand curve. Thus, they will tend to optimally set higher prices relative to their marginal costs.*

of Indian manufacturing firms.[33] Using US Bureau of Economic Analysis data, Keller and Yeaple (2020) find rising markups for US multinational affiliates and also an association with measures of domestic competition.

Institutions

There are a number of institutional changes that could explain the trends we see.

Antitrust policy. The most prominent story is that there has been a weakening of US competition policy (antitrust) enforcement since the 1970s. Wu (2018) argues that under the influence of the Chicago School of Law and Economics, judges and regulators moved towards a more laissez-faire attitude towards mergers and the activities of dominant firms. This enabled firms to gain higher markups and industries to become more concentrated. The increased common cross-ownership of large companies by institutional investors (such as Vanguard) may have also blunted competitive forces (e.g. Azar, Schmalz and Tecu, 2018). Gutiérrez and Philippon (2018) have argued that weakening investment, productivity and wage growth are linked to the growth of US monopoly power. They contrast the US position with Europe. It is generally accepted that EU antitrust enforcement has not weakened over this period; if anything, the argument is often heard that it has got stronger with a single cross-EU enforcer (DG-COMP) and much political autonomy. Although Gutiérrez and Philippon concede that concentration and markups are not falling in Europe, they argue that the rise is smaller than that in the US. Our sense is that qualitatively, the trends are more similar than different in the UK, the EU and the US.

Regulations. A second institutional argument is that increased regulation may be a factor. An increase in regulatory burden may increase fixed costs as discussed above and help explain the trends. This is emphasised by Philippon (2019). It is unclear that regulations have increased so much over time. Although regulation increased after the Great Recession in finance (e.g. Dodd-Frank) and in healthcare (e.g. the Affordable Care Act), this was in the mid 2000s, whereas many of the trends of increased firm inequality and rising markups began in the early 1980s in the US.[34] Moreover, in the UK and the EU, there has been a downward trend in many kinds of regulation in an effort to increase market competition.

Labour market institutions. There has been a general decline in trade union power, which under some models could restrain markups through rent sharing. Since unions are located predominantly in large firms, their weakening could have helped big firms become more profitable. There is also a concern that monopsony power may have increased. The growth of firm size may have contributed to this – superstar firms could increase their markups over consumer prices and markdowns over the marginal product of labour. Although not an institution per se, there has been a big growth of the outsourcing of low-skilled occupations such as cleaners, caterers, security guards and drivers. These outsourcing firms are very large employers and offer lower wages than direct hires.

One piece of evidence that does not sit well with a monopsonistic explanation is that Rinz (2018) and Crane and Decker (2019) find no systematic evidence of increases in local

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[33] *These results echo the distributional implications of an ever more interconnected global production structure. These effects also clearly suggest that (perhaps local) market power resides in producers in the developing world. Recent work by the World Bank's research department suggested that there may be a systematic link between a country's position in the overall global value chain and profitability. It is clear from the discussion that the evidence is scant, and that more work is needed here, but the results so far seem to indicate that the interface of globalisation and market power is not only a very natural one from a theory point of view, it also seems to play out in the data, and what is of interest to the topic of this Review, it can impact (domestic) inequality by disproportionately rewarding producers, and thus the owners of capital.*

[34] *There was a lot of deregulation under Reagan in the US and under Thatcher in the UK.*

concentration of employment. It is possible that markdowns have increased despite the absence of concentration changes, however. Krueger and Ashenfelter (2018) point to the growth of no-poaching and non-compete arrangements, even for less skilled workers, and the increase in occupational licensing. Further, US job mobility has declined, as has the relative value of the minimum wage. These might add to employer power in the labour market, as Stansbury and Summers (2020) argue.

Although there is much evidence of some degree of monopsony power in US and UK labour markets (e.g. Manning, 2011), there is not much robust direct evidence of *increases* in employer labour market power over time (i.e. markdowns of wages below the marginal product of labour). Lamadon, Mogstad and Setzler (2022) do not find evidence of trends over time in their analysis from the late 1990s onward in the US. Furthermore, with the exception of unions, these institutional trends are very different across countries. For example, the first national minimum wage was introduced in 1999 in the UK, and this has been strongly uprated over time, so now the UK minimum wage is high by OECD standards. Indeed, this may have reduced monopsony power and could be a reason why the labour share in the UK has not fallen by as much as we would expect given our estimated rise in markups (recall the discussion in Section 4 above).

Summary on institutions. In our view, institutional explanations do not seem the most compelling general explanation for the trends, which have broadly taken place across a number of OECD countries. This is not to say that differences in antitrust, and various forms of government interventions, do not play some role in explaining the differences, as they are likely to interact at a more subtle level.[35]

Assessment

In terms of explaining the causes of increasing firm inequality, there are almost too many plausible stories. There is no one obvious 'winner' that stands out. We would instead make some broad points.

Industry heterogeneity. It is likely that there are different stories in different industries. For example, it does seem clear to us that one fundamental reason for the dominance of superstar firms (and their high margins) is the 'winner takes most' nature of many digital sectors due to network effects. Equally, the institutional explanation of weak antitrust enforcement allowing the creation of more market power seems true in sectors such as US hospitals and communications. So seeking a 'one size fits all' explanation of the trends, although attractive in its parsimony, may not be credible.

Purely institutional explanations. As noted above, many of the trends are best documented in the US and explanations have naturally focused on this country. To the extent that these trends have similarities in other countries (which have a welter of different changes and levels of institutional types), one would expect something more fundamental is happening with respect to technologies or globalisation, rather than American institutions. Although there are clearly differences in the rates, timing and magnitudes of change, our sense is that there are greater similarities between the US and other developed nations. Overall, we are therefore sceptical about explanations that rely solely on changes in US institutions, such as declining antitrust

[35] *One such interaction is between trade policy and competition policy. While these are distinct forms of policy, they unavoidably interact and can affect the very outcomes we are studying. The pursuit of free trade is predicated in a large part on increasing competition and encouraging a better deployment of scarce factors of production. However, in practice, countries that are opening up to trade, particularly those in the developing world, often do so without a strong local competitive structure, or at least the resources to enforce a law that would ensure it. It is in that sense that competition and trade policy can act as either substitutes or complements, but they can also counteract each other. Opening up to trade can select out the fringe, leaving a few big firms to dominate the local market, leading to increased concentration and potential for market power. See the discussion of Indian trade policy above in De Loecker et al. (2016).*

enforcement. Add to this that in order to be definitive on the underlying sources, at the very least we should confront this leading candidate with the various stylised facts, and be able to jointly explain them.

Technology. In addition to the clear importance of network effects in the digital sector, our view is that the fixed costs of adopting various forms of intangible capital are also important. There are multiple sources of evidence of the positive correlation between markups/productivity and higher intangible capital intensity (e.g. De Loecker, Eeckhout and Mongey, 2020).

Globalisation. The stronger markup growth for listed firms (which are mainly multinational) compared with unlisted firms in the UK hints that globalisation may have played an important role. This should be an area for future study. The analysis so far seems to suggest that these groups have seen distinct markup trajectories.

6. Policy implications

Given the uncertainty of the causal drivers of the changes in firm inequality, it is hard to give definitive policy recommendations. However, the facts we have documented should help inform policy options and we make four basic points here.

First, we have argued that declining enforcement of competition policy is probably not the main explanation for the trends we have observed, as so many of them have occurred across different countries. Few observers claim that the EU and the UK have had a significant decline in antitrust enforcement (as some argue is the case in the US). Nonetheless, since the UK, like the US, has witnessed a growing dominance of large firms with high markups, this raises concerns about a general rise in market power. Such 'superstar' companies do have some capability to undermine the welfare of consumers and workers, even if they gained their powerful positions primarily through the forces of technological change and globalisation.

So what are the tools for strengthening competition? Most directly, there are many ways to reform and modernise competition policy and we concur with many of the recommendations in Tirole (2022). For example, the standards of proof in merger and acquisition cases when dominant companies (especially in digital sectors) take over start-ups / smaller firms should be shifted towards the merging parties and away from the government agencies. Too often regulators have to provide beyond doubt that the acquisition will do harm, which is extremely hard to demonstrate empirically in high-tech fast-moving sectors. Instead, there should be more burden on the merging parties to reassure agencies that harm is unlikely. While this notion has long been discussed among antitrust scholars, under 'structural presumptions', given the bulk of evidence suggesting a fundamentally different landscape across industries, we believe it should be strengthened (e.g. see Hovenkamp and Shapiro (2017)). Moreover, we also support strengthening the Competition and Markets Authority (CMA), with strong enforcement powers given to the new Digital Markets Unit, including an explicit reference to consider innovation and future competition in their decisions.[36]

Another way to strengthen competition is to reduce regulatory barriers to entry and increase openness to trade and FDI (foreign direct investment). For example, Brexit has significantly increased barriers to trade with the EU by increasing regulatory red tape (non-tariff barriers). Since the forces of economic gravity inevitably imply that the EU will be Britain's largest trading partner for the foreseeable future, the UK should seek to re-join the Single Market alongside non-EU members of the European Economic Area, such as Norway. This would be an effective spur to competition and productivity. If political constraints prevent this (and even

[36] *For a formal response to the Inquiry over the role of the Digital Markets Unit, see Van Reenen (2021).*

better a re-joining of the EU), trade frictions (which are primarily regulatory differences with the EU) should be reduced to the absolute minimum.

Second, we have emphasised that the UK's biggest economic problem since the financial crisis has been the stagnation of productivity that has dragged down average wage growth. Strengthening competition is only one of many possible tools to improve productivity. The conclusions of the LSE Growth Commission (Aghion et al., 2013) still hold true: Britain has too little long-term investment in the critical areas of innovation, skills and infrastructure. Specific policies in these areas are covered in Aghion et al. (2013), Bloom, Van Reenen and Williams (2019) and Scur et al. (2021). However, a general point is that the UK suffers a kind of policy 'attention deficit disorder' – a near-constant shifting, re-branding and elimination of policies as the political and media winds change. Building institutions (such as the Bank of England and the CMA) that have some independence and expertise is a way of reducing policy uncertainty and increasing investment. We welcome the new Infrastructure Bank which joins the Infrastructure Commission, for example, as we need to create a new institutional architecture for long-term decisions over transport and energy (e.g. to tackle climate change). By contrast, the almost overnight abolition of the Industrial Strategy Council in 2021 was a case study in how to waste business effort and create greater unnecessary uncertainty.

Third, a theme of our analysis is that there has been an increase in inequality between firms (e.g. in productivity, wages and markups), especially at the top of the distribution. As noted at the start of this chapter, the welfare implications of increased firm inequality are murkier than those of income inequality between households, but increased firm dispersion is often a sign of increased market frictions. For example, if the gap between the 'best and the rest' is due to slowing diffusion of best practices from frontier firms to followers, this will likely depress aggregate productivity (and wages). Similarly, if widening performance gaps reflect increasing problems facing SMEs in scaling up due to inadequate access to financial, human or managerial capital, this misallocation reduces growth. Strengthening competition may again help reduce distortions (especially if dominant firms are keeping rivals back through deliberate actions) and foster catch-up, but there are more direct policy measures. For example, Scur et al. (2021) evaluate various policies to spread better management practices. They argue that consultancy/mentoring interventions have a better track record than the more classroom-based approach in the government's new £0.5 billion 'Help To Grow' programme. Putting aside some resources – say 5–10% of the total – to pilot and evaluate these interventions alongside the main programme would be extremely valuable.

It is worth emphasising that policies to help catch-up are valuable even if the UK does not have a particularly 'long tail' of low-productivity firms compared with other countries and even if firm dispersion had not grown larger. There is a huge dispersion of firm productivity levels, so cost-effective policies that address market failures, increase diffusion and reduce market frictions can be justified regardless of whether the UK is relatively 'worse' in any cross-sectional or time-series sense (Oliveira-Cunha et al., 2021).

Finally, as we have discussed, there has been a substantial increase in wage inequality since the late 1970s (see Figure 5). One factor influencing wage inequality is institutions, so a possible countervailing force to the power of dominant firms is to strengthen labour. For example, reducing restrictions on the mobility of labour (e.g. non-compete and non-poaching clauses as discussed by Krueger and Ashenfelter (2018)), maintaining and expanding labour standards (e.g. to gig-economy workers as in the 2021 UK Supreme Court decision to give Uber drivers employee rights), providing greater protection for unions, and having decent minimum wages are all ways of trying to strengthen the power of workers. Ultimately, however, improving the human capital of workers (especially at the middle and bottom end of the distribution) is the surest way to raise wages and reduce inequality (Blundell, Jaravel and Toivanen, 2021).

7. Conclusions

Increasing inequality among people is much more concerning than high and growing inequality between firms. Nevertheless, there can be negative effects of higher firm dispersion if this is associated with greater market power, slower productivity (and therefore wage) growth and increased income inequality. Extensive US evidence in recent years has shown that there have been major changes in inequality across firms in a number of dimensions – productivity, wages, markups, firm size and labour shares. These changes have been accompanied by worrying macro trends, such as slowing productivity growth, stagnant median wage growth, rising markups and declining business dynamism.

In this chapter, we have looked into the current state of the evidence in the UK. We focus on a new analysis of a near-population panel of company accounts since 1996: Historical Orbis. Using HO and a range of other evidence from administrative sources at the micro and macro level, as well as critically reviewing the existing literature, we find that the American trends are broadly also present in the UK.

We emphasise that there may be different things driving changes in different industries. We argue that institutional changes are less likely to be the explanation of these changes than more fundamental technological reasons, as we see common changes in the business landscape in the UK and the US. A role for globalisation is also likely, but it is also less explored. Policy wise, it is important to modernise antitrust and improve the power of labour as a countervailing force.

Finally, it is worth highlighting the stagnation of median and average real wages in the UK since 2007. We believe that the major cause of this is near-stagnant productivity growth since the Global Financial Crisis – a phenomenon that has been much worse in the UK than in other advanced nations. Although there has been some fall in the labour share of GDP since 1980, this is less clear than in the US. Slow aggregate productivity growth is perhaps the most severe long-term problem faced by the UK over the last 14 years. Policies to reignite productivity growth through stronger innovation and diffusion are crucial in building a sustainable and equitable economy.

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