Have Productivity and Pay Decoupled in the UK?

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Abstract

In the long-run at the macro level, the growth in real pay of workers tends to follow that of labour productivity. In recent years, however, there have been concerns that this relationship has broken down and that pay has become "decoupled" from productivity, growing much more slowly, and leading to a fall in the labour share. This has been a well-documented phenomenon in the United States (US) since the early 1980s. By contrast, we show that in the United Kingdom (UK), employee mean hourly compensation has grown at the same rate as labour productivity between 1981 and 2019. However, there has been a divergence between median employee hourly wage growth and productivity growth of about 25 percentage points. About three-fifths of this "overall decoupling" is due to increasing inequality (mean wages growing faster than median wages) and one-third is due to the increased non-wage compensation costs, in particular employer pension contributions. However, this analysis relates to employee compensation. The average self-employed worker has seen their income grow by only 50 per cent, compared to 80 per cent for the average employee. Using micro-data, we show that this gap can essentially be explained by (i) the growth in the numbers of "solo self- employed" (who have relatively low incomes), and (ii) a much greater fall in hours worked by the self-employed than for the employed. Finally, if we "correct" the labour share for self- employment and non-wage labour costs, the UK labour share has fallen by about 3.5 percentage points over the last four decades.

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The "decoupling" of wages and labour productivity is a common phenomenon in many rich countries of the world (OECD, 2018; Nolan, Roser, and Thewissen, 2019). In the US for example, labour productivity (GDP per hour) has grown substantially more than worker compensation per hour since the 1980s. This is illustrated in Chart 1 that uses data from Mishel and Bivens (2021) over the same time period that we will use later in the article for the UK. This is closely related to the fall in the labour share of GDP, which has been the subject of a vast literature (e.g. Autor *et al.* 2020). The consensus is that there has been a substantial fall in the US labour share. There is less consensus regarding other countries, but most studies do find a general fall since 1980, albeit with very different speeds and magnitudes (e.g. Karabarbounis and Neiman, 2014).

Pessoa and Van Reenen (2013) showed that UK trends in decoupling looked different from the US in some respects. Using data for the 1972-2010 period, they found that (unlike the US) average employee compensation rose at a similar rate to labour productivity.[2] However, like the US, median wages of employees had risen much more slowly than labour productivity. This article first revisits the question of UK decoupling, using another decade of data through to 2019, the year before the start of the pandemic (in order to avoid confounding longer-term trends with the COVID-19 shock).

In the first part of this article, we still do not find "net decoupling" of labour productivity and employee compensation looking over the period from 1981 to 2019 as a whole. We use "net" to indicate this is the difference from "overall decoupling" when we take into account inequality, non-wage compensation and some statistical factors. However, there has been substantial "overall decoupling" of labour productivity and employee median wages.

In our decomposition analysis we find that most of the divergence between overall and net decoupling (three-fifths) can be explained by an increase in inequality which drove a large wedge between mean wages (whose growth was dominated by the most highly paid) and median wages. A further one third of overall decoupling is accounted by the increase in non-wage benefits (the difference between compensation and wages). Although one might regard non-wage compensation such as employer pension contributions a bona fide element of (deferred) labour compensation, it turns out that in the UK a substantial part of this is because of firms re-financing their past pension commitments (which counts as compensation under Office of National Statistics (ONS) conventions). The other components of overall decoupling, such as the statistical discrepancies between data sources and the consumer versus producer price deflator, are generally small in magnitude and offset each other. The compensation and wage measures in the first part

2 In this article, we follow the standard intuitive definition of defining workers as the sum of employees and the self-employed. This should not be confused with legal definitions. For example, under English law, a "worker" is a person in an employment relationship that confers less rights than an "employee", but has more labour rights than a self-employed person.

of the article only include employees. For a comprehensive analysis of the whole UK economy, it is important to look at the self-employed as well.

The second part of our article examines the self-employed, who have increased from 11.8 per cent of the workforce in 1981 to 15.7 per cent in 2019 - and whose compensation is therefore missing from the employee average compensation and wage series. The self-employed do contribute to GDP, however, so ignoring them is clearly problematic (e.g. Gollin, 2002; Guitérrez and Piton, 2020; Smith *et al*, 2019). This turns out to matter a lot in the UK context. The self-employed as a group appear to have done much worse than the employed in terms of their income trends since 1981 and especially after 2001. In our baseline estimates, we find that the average real compensation of an employee grew by 80 per cent between 1981 and 2019 compared to only 50 per cent for the income of a self-employed person: a 30 percentage point difference.

A difficulty with self-employed income data is to determine what part can be classified as labour income and what part as capital income. The Office for National Statistics divide the overall "mixed income" (income derived from the business they run) of the self-employed into a part which is labour compensation and the residual (capital income). This fraction is a difficult object, as the self-employed have a lot of latitude to determine exactly how they will split their income, and this decision is heavily influenced by tax rules. Nonetheless, we show that however one does this split, the self-employed as a group have been doing very poorly compared to the employed.

Using data from the Family Resources Survey (FRS), we examine employed and self- employed income since the mid-1990s, and show that two factors play a key role in explaining the slower growth of self-employed income. First, there has been a big increase of the share of solo self-employed in total self-employment. This group earns substantially less on average than the non-solo self-employed (i.e. those who employ other people). This compositional shift explains over half of the divergence. The rest of the gap is essentially all explained by hours worked, which have fallen dramatically for the self-employed, but have been stable for the employed.

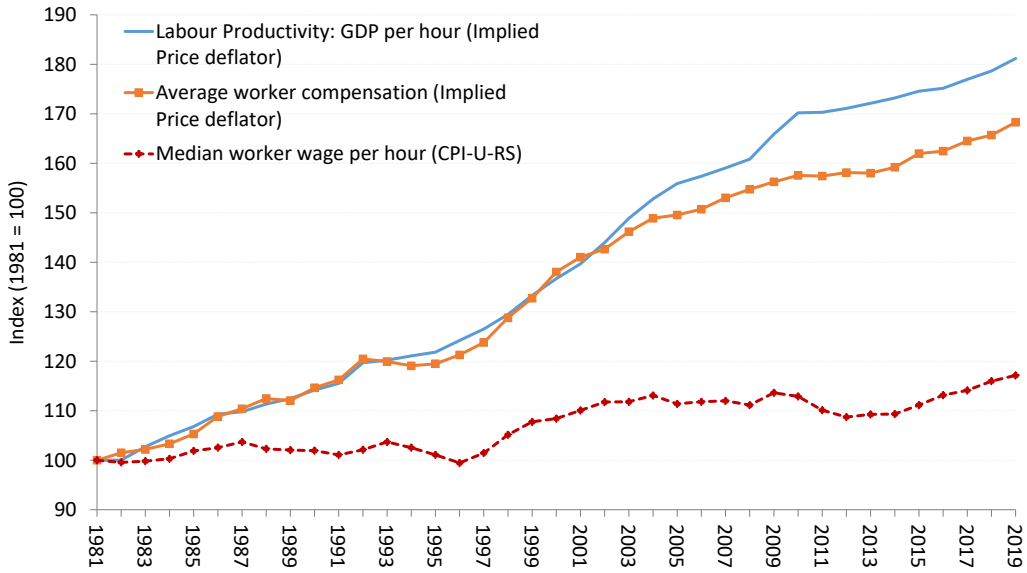
We combine our findings to trace the impact on the labour share of GDP. As our decoupling analysis implies, if the average income of the self-employed had grown at the same rate to that of employees, the labour share of GDP would have been flat for the period from 1981 to 2019. Incorporating the self-employed and taking out non-wage compensation implies a 3.5 percentage point fall in the UK labour share.

The article is structured as follows. The first section provides a short literature review, Section 2 presents the decoupling analysis. Section 3 includes the analysis of self-employed income and the implications for the labour share, Section 4 provides an analysis of potential mechanisms behind our findings. Section 5 concludes.

Literature Review

As noted above, Bivens and Mishel (2015) and Mishel and Bivens (2021) provide the facts on decoupling in US data

Chart 1: Growth of Average Compensation and Labour Productivity in the United States, 1981-2019



Source: Data from Mishel and Bivens (2021).

Note: GDP data come from Bureau of Economic Analysis (BEA). Compensation is approximated via a wage to compensation ratio based on BEA and BLS data and includes all workers (i.e. including self-employed). Hours worked also come from the BLS. GDP and average compensation are deflated by the implied price deflator (we later refer to the difference between these two series as "net decoupling"), and median wages by the CPI-U-RS. "Average" refers to the mean.

since the 1970s. As shown in Chart 1, US labour productivity grew faster than mean compensation (net decoupling) and much faster than median wages (overall decoupling). Apart from studies of individual countries, there are several cross-country comparisons of labour productivity and wage/compensation growth (e.g. OECD, 2018 and Greenspon, Stansbury and Summers, 2021). For example, Nolan, Roser, and Thewissen (2019) find that most countries have experienced decoupling of productivity and median household income growth, but note that divergence is particularly large in the US.

Although one of Kaldor's (1957) "stylized facts" was the stability of the labour share, much recent work documents a fall in the labour share globally and in individual countries over time. An extensive literature discusses reasons behind the fall (see the survey in Grossman and Oberfield, 2021). Karabarbounis and Neiman (2014) argue that rapid falls in the quality-adjusted price of information and communication technology has led firms to shift from labour to capital (although others have expressed scepticism that the labour- capital elasticity could be large enough to generate this). Autor *et al.* (2020) emphasise the fact that median firm labour shares have been stable, and that the aggregate fall in the labour share is due to "superstar firms" (that have low labour shares and high mark-ups) becoming more dominant in the economy. De Loecker, Eeckhout, and Unger (2020) argue for a rise in aggregate mark-ups and market power. Other reasons identified in the literature are exposure to trade with China and international outsourcing (Elsby, Hobijn,

and Şahin, 2013), changing social norms as well as the role of labour market institutions such as unions (Piketty, 2014), and privatisation (Azmat, Manning, and Van Reenen, 2012). Rognlie (2015) looks at the role that housing plays in the fall of the labour share in more detail. More closely related to our focus on the self-employed, Gollin (2002) explains that neglecting the self-employed in labour share calculations can lead to substantial misinterpretations of labour share trends. Guitérrez and Piton (2020) propose different methods to account for the self-employed in the labour share as do ONS researchers (e.g. Dunn, Heys and Sidhu, 2018).

Cribb, Miller, and Pope (2019), Cribb and Xu (2020), and Giupponi and Xu (2020) provide detailed analyses of self-employed income patterns in the UK over the last 20 years. They show that self-employed have experienced particularly large drops in income after the financial crisis. Boeri *et al.* (2020) focus on the self-employed who do not employ other workers ("solo self-employed"). Based on results from large-scale surveys in the UK, US, and Italy, they show that there are substantial differences in working patterns and income between solo self-employed and self-employed who employ other workers. For example, the solo self-employed earn substantially less on average than other self-employed and a higher share of solo self-employed are dissatisfied with the amount of hours and would like to work more.

Decoupling Analysis in the UK

Data Sources

Our data come from multiple sources.[3] Our baseline measure of labour productivity is GDP divided by total hours worked.[4] An alternative output measure would be Gross Value Added (GVA)[5] and we use this as a robustness check in Appendix A1. The core measure of labour compensation is from the ONS national accounts and is defined as wages and salaries plus non-wage benefits. The ONS obtains this information mostly based on tax information from HM Revenue and Customs (HMRC), the UK IRS. Non-wage benefits include employers' contributions to pensions (the main item), national insurance, health insurance (unlike the US, a minor element in the UK due to the NHS) and other benefits.

Our baseline wage data to construct the median wages is from the Labour Force Survey (LFS). Earnings in LFS include basic pay, benefits, tips, and other smaller components and it currently covers about

3 See the online Appendix A for details on data available at http://www.csls.ca/ipm/41/IPM_41_Decoupling_IPM_appendix.pdf

4 The hours estimate of the UK national accounts come from the Labour Force Survey (LFS). We prefer to use hourly measures due to rises in part-time working and longer holidays. These changes would lead to an underestimation of labour productivity when using per worker measures.

5 GDP = GVA + product taxes – product subsidies. Another option would be to take net domestic product (NDP), which equals GDP minus depreciation. However, the ONS only provides such a series from 1987 onwards. When deflating both GDP and NDP by the GDP deflator, growth rates of the two differ by about one percentage point between 1987 and 2019.

6 We follow Pessoa and Van Reenen (2013) and splice LFS with the General Household Survey pre-1992. See Appendix A for details about the sources.

Exhibit 1: Elements of the Overall Decoupling of Productivity and Pay

$$
\begin{aligned}
OD = {} & \Delta ln(prod_{PD}^{ONS}) - \Delta ln(comp_{PD}^{ONS}) && \textit{(i. Net Decoupling)} \\
& + \Delta ln(comp_{PD}^{ONS}) - \Delta ln(meanwage_{PD}^{ONS}) && \textit{(ii. Non-wage Compensation)} \\
& + \Delta ln(meanwage_{PD}^{ONS}) - \Delta ln(meanwage_{PD}^{LFS}) && \textit{(iii. LFS/ONS divergence)} \\
& + \Delta ln(meanwage_{PD}^{LFS}) - \Delta ln(medwage_{PD}^{LFS}) && \textit{(iv. Inequality)} \\
& + \Delta ln(medwage_{PD}^{LFS}) - \Delta ln(medwage_{CPI}^{LFS}) && \textit{(v. Deflators)}
\end{aligned}
$$

40,000 households every quarter.[6] There are well-known issues with standard international surveys like the LFS. First, the earnings and wage data are self-reported so may be incorrect. Second, the LFS has a response rate of about 60 per cent and this has been declining over time, like most voluntary surveys. there are sampling weights that try to correct for non-response bias, but these might be inadequate.

To address these potential issues with LFS, we repeat the entire analysis using the Annual Survey of Hours and Earnings (ASHE) in Appendix B. ASHE is a panel of 1 per cent of employees that are selected randomly by the last two digits of their National Insurance (Social Security) number. Because the data come directly from payrolls of employers, it is likely to be very accurate and there is close to 100 per cent compliance. ASHE does have the disadvantage however, that it has only been conducted from 2004 onwards. For years prior to that, data from the New Earnings Survey (NES) are needed to construct a longer time series. Major breaks in wage data can be observed between 2003 and 2004 in NES-ASHE, and also in subsequent years when the methodology of ASHE adjusted further, bringing in more part-time employees. Note that the ONS wages and salaries series are derived from different sources to the LFS (and ASHE). So some of the divergence between mean and median wages could be from the alternative data sources and we examine this explicitly.

We convert employee wages and compensation to hourly values by dividing the series by employee hours. Employee hours are obtained by multiplying the share of employees in total employment (taken from the UK national accounts which base their estimates on the LFS) with total hours worked. This implicitly assumes that employees and self-employed work the same number of hours per week on average.[7] We use the ONS' GDP deflator and a Consumer Price Index (CPI) respectively to convert GDP and the different wage and compensation measures into real series. Most of our other data series are consistently available from 1981 onwards, but we also present an analysis beginning in 1972 as a robustness check in the Appendix. However, this requires more assumptions to produce longer time series.

7 As we will see in Section 3, this assumption is problematic. In particular, FRS data suggest that self- employed have worked more hours on average than employees in earlier years, and the gap has only closed recently. This would suggest that our results might slightly underestimate growth of hourly employee wages/compensation. However, the bias should be minor and the approach is in line with other work dealing with the limitations around employee hours data in the UK (Pessoa and Van Reenen, 2014; Whittaker, 2019).

We define *"overall decoupling"* (OD) as the difference between growth of labour productivity (deflated by the GDP deflator) and median hourly employee wages (deflated by the CPI deflator). We define *"net decoupling"* (ND) as the difference between growth of labour productivity and mean hourly employee compensation (both series deflated by the GDP deflator).

In the following, we decompose overall decoupling (OD) into different parts. Denoting the change from the base year to year t with Δ, we define OD as:

$$OD = \Delta ln(prod_{PD}^{ONS}) - \Delta ln(medwage_{CPI}^{LFS}) \quad (1)$$

All variables are on a per hour measure, with the subscript indicating the deflator (PD for producer/GDP deflator) and the superscript indicating the data source (i.e. LFS and ONS in our baseline analysis). Labour productivity, $prod_{PD}^{ONS}$, is defined as real GDP (using the GDP deflator, PD) divided by total worker hours (both from ONS). Median wages, $medwage_{CPI}^{ONS}$ are LFS employee median real wages (using CPI). We decompose overall decoupling into five elements as shown in Exhibit 1.

In row (i), $comp_{PD}^{ONS}$ is mean employee compensation of employees and we have defined "net decoupling" as the difference between productivity growth and this measure. In row (ii), $meanwage_{PD}^{ONS}$ are ONS mean employee hourly wages, so this reflects the difference between compensation and wages ("Non-Wage Compensation"). In row (iii), $meanwage_{PD}^{LFS}$ is LFS mean employee hourly wages, so this difference reflects any divergence between the ONS and LFS mean wage series ("LFS/ONS divergence"). In row (iv), $medwage_{PD}^{LFS}$ is LFS median employee hourly wages, so this difference reflects the wedge between mean and median wage growth ("Inequality"). Finally, in row (v), $medwage_{CPI}^{LFS}$ deflates median hourly by the CPI deflator instead of the producer price deflator, so this difference reflects a difference in the measures of inflation ("Deflators").

Decoupling Analysis

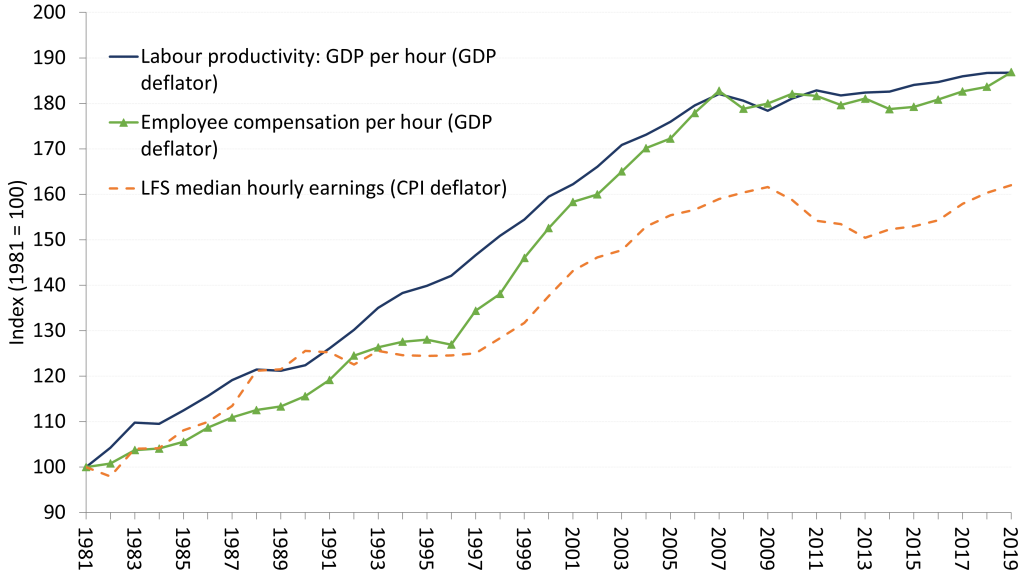
We start by looking at our two baseline measures of decoupling, overall and net, between 1981 and 2019 in Chart 2.

The solid line shows the growth of labour productivity.[8] The line with triangle markers is employee compensation per hour also deflated by the GDP deflator. The dashed line is LFS median earnings deflated by the CPI deflator. It is clear that labour productivity and hourly compensation have grown at a similar rate over 1981 to 2019 as whole, i.e. there has been no net decoupling (i.e. row (i) of equation (1) is a trivial -0.1 percentage points). Both series grew by 82 per cent in the quarter century 1981-2007, and both series have essentially stagnated since the Financial Crisis that began with the collapse of Northern Rock in 2007. In this sense, Britain's major economic problem over the last 14 years has been the dis-

8 It is important to note that our analysis applies to the UK economy as a whole which means that measurement issues in the non-business sector may affect our results.

9 Interestingly, Williams (2021) makes a very similar argument for Canada. He shows that productivity and

Chart 2: Overall and Net Decoupling in the UK, 1981-2019



Source: LFS, ONS, and OECD data (see Appendix for details).

Note: Values are shown as an index (1981=100). Labour productivity is total GDP divided by total hours worked deflated by the GDP deflator. Employee compensation is divided by total employee hours and also deflated by the GDP deflator. LFS median hourly earnings are deflated by the CPI deflator. We refer to the difference between the growth rates of labour productivity and average compensation as "net decoupling", and the difference between labour productivity and LFS median earnings as "overall decoupling".

mal record of productivity which grew by a mere 0.21 per cent after 2007, compared to 2.34 per cent in the pre-crisis period.[9]

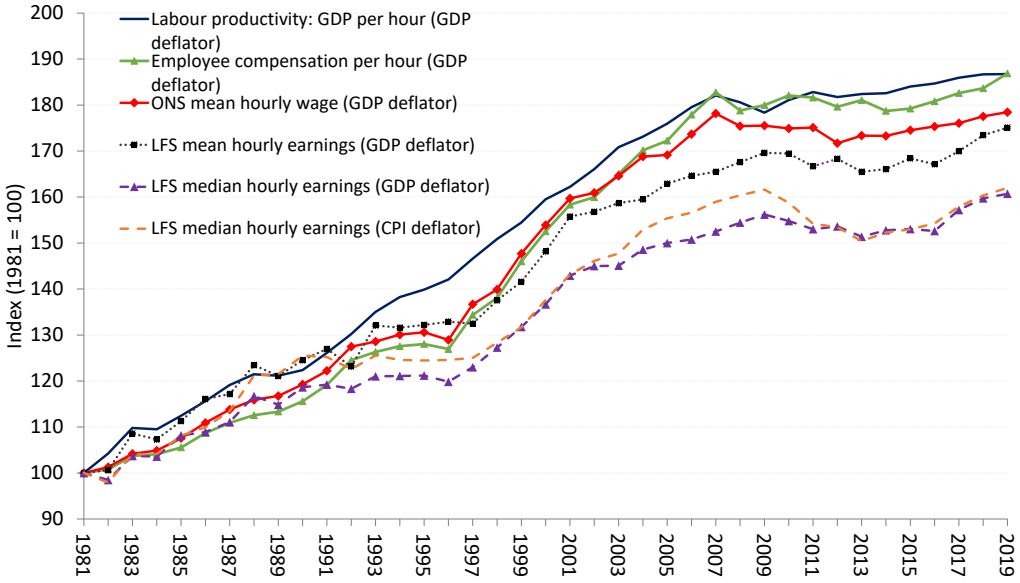
Looking more closely, it is clear that there has been net decoupling of productivity and employee compensation in certain sub-periods. Under the Thatcher-Major Conservative governments through 1996, labour productivity did grow faster than employee compensation, leading to substantial net decoupling of about 16 percentage points. Under New Labour 1997-2007, compensation grew much faster than productivity, making up all the lost ground in the earlier years. Since then, both series have stagnated alongside each other.

The slow growth of UK productivity has been extensively discussed without any clear resolution of the causes.[10] Some part is due to a general slowdown in productivity across the globe (Bloom *et al.*, 2020), especially after the financial crisis, although the slowdown has been particularly severe in the UK. Explanations include measurement problems (Syverson, 2017), a period of learning about new technologies like Artificial Intelligence (Brynjolfsson, Rock and Syverson, 2021), the overhang of financial market frictions (Besley *et al.*, 2020), the growth of firm market power (Philippon, 2019) and/or too much austerity, especially in the years following the crisis which saw large cuts in public investment (Bagaria, Holland and Van Reenen, 2012).

average compensation have grown at similar rates since 2000, but very slowly.

10 See for example Blundell, Crawford, and Jin, 2014; Patterson *et al.*, 2016; Goodridge, Haskel, and Wallis, 2018; Oulton, 2019; Valero and Van Reenen, 2019.

Chart 3: Detailed Decoupling Analysis in the UK, 1981-2019



Source: LFS, ONS, and OECD data (see Appendix for details).

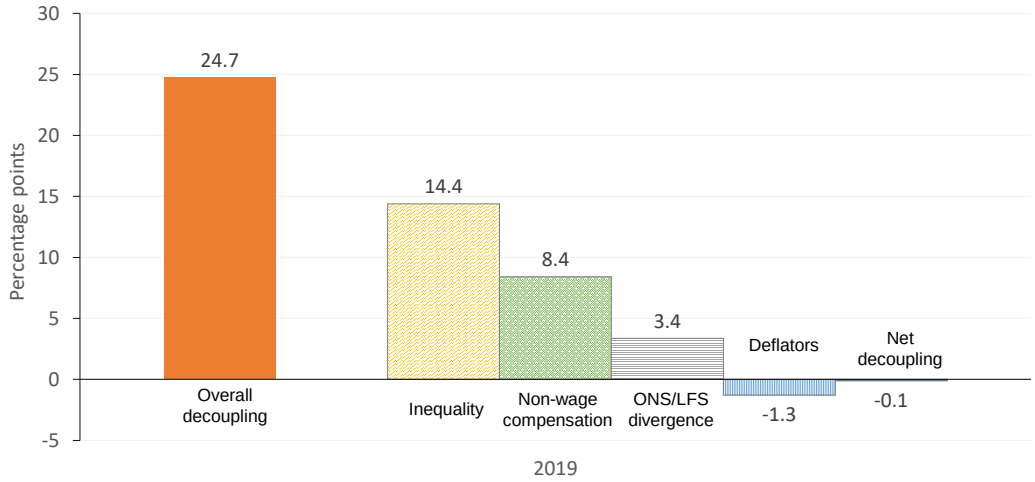
Note: Values are shown as an index (1981=100). Labour productivity is total GDP divided by total hours worked (GDP deflator). Employee compensation divided by total employee hours worked (GDP deflator). ONS mean wage is employee total annual wages and salaries earned by total employee hours worked. This series and LFS mean hourly earnings are deflated by the GDP deflator. For median hourly earnings, we provide one series deflated with the GDP deflator and another deflated with the CPI.

Returning to Chart 2, we can also see that there has been substantial overall decoupling. The increase of labour productivity was 87 per cent whereas median wages rose by only 62 per cent, a difference of 25 percentage points. There have been two periods of big divergence. The first was in 1990-1996 when median hourly wages stagnated (average annual growth of -0.12 per cent), and productivity grew consistently (by 2.52 per cent on average per annum). The second was in 2007-2013 when labour productivity stagnated (average annual increase of 0.03 per cent), but median wages actually fell (by -0.91 per cent on average per annum).

Chart 3 extends the previous Chart to present our detailed decoupling analysis. In addition to the growth of labour productivity, employee compensation per hour, and LFS median hourly earnings deflated by the CPI deflator, it displays the growth of ONS mean hourly wages, LFS mean hourly earnings, and LFS median hourly earnings (all deflated by the GDP deflator) since 1981. This allows us to decompose overall decoupling into different parts (following the methodology presented in Section 2.2) and see where differences between growth of labour productivity and median earnings come from.

To simplify the story, Chart 4 has the decomposition over the whole 1981-2019 period. The first bar shows the size of overall decoupling (difference between the growth of labour productivity and LFS median wages deflated by the CPI), which is 24.7 percentage points. The sum of all other five bars on the right hand side equals this overall decoupling. The biggest share

Chart 4: Decoupling Decomposition in the UK (Cumulative Change Between 1981 and 2019, Percentage Points)



Source: Decomposition of Chart 3 into its components 1981-2019.

Note: Values shown are the percentage point differences between the growth rates. "Overall decoupling" refers to difference between GDP per hour (GDP deflator) and LFS median hourly earnings (CPI deflator); "Inequality" is the difference between LFS mean hourly earnings and LFS median hourly earnings; "Non-wage compensation" is the difference between employee compensation per hour and ONS mean hourly wage; "ONS/LFS divergence" is the difference between ONS mean hourly wage and LFS mean hourly earnings; "Deflators" is the difference between LFS median hourly earnings (GDP deflator) and LFS median hourly earnings (CPI deflator); "Net decoupling" is the difference between GDP per hour and employee compensation per hour.

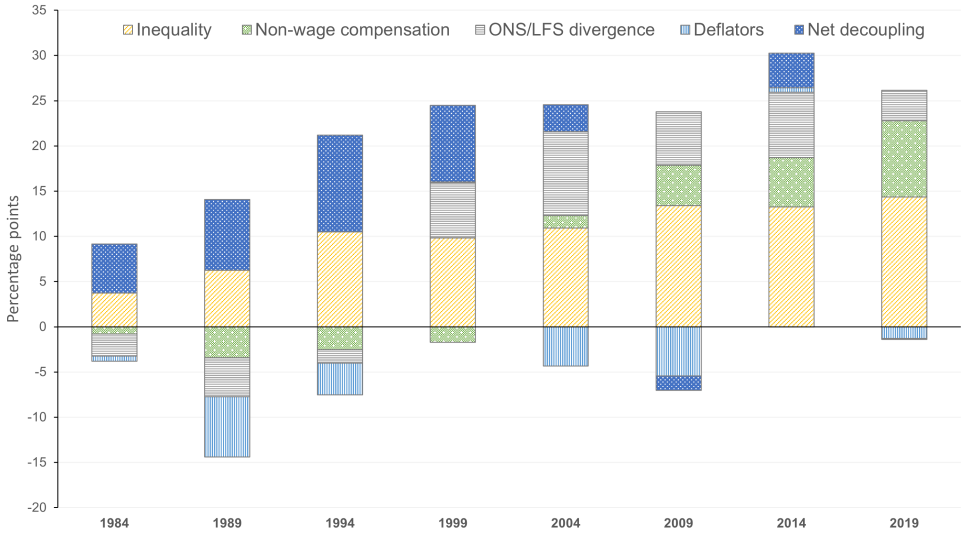
in overall decoupling comes from inequality, contributing 14.4 percentage points to the overall decoupling number. The second biggest contribution comes from non-wage compensation with 8.4 percentage points. Therefore, between them, inequality and non-wage compensation explain more than 90 per cent of decoupling.

There is a divergence between ONS and LFS mean wages of 3.4 percentage points, with the LFS earnings series lagging behind the ONS wage series.[11] Additionally, the CPI has risen faster than the GDP deflator, resulting in a negative contribution of 1.3 percentage points (offsetting parts of the ONS and LFS divergence). This could reflect increasing price-cost mark-ups (see De Loecker, Obermeier, and Van Reenen, 2021). Putting all this together, net decoupling is essentially zero. As shown in Chart 2, average employee compensation has actually grown trivially faster than labour productivity (0.1 percentage point).

Chart 5 illustrates how the contribution of the different components to overall decoupling has changed over time. Each stacked bar represents a selected year within the period from 1981 until 2019. The individual values within a bar sum up to overall decoupling in that year (note that the values in 2019 correspond to that in Chart 4). We observe that the inequality

11 This seems to occur after 1997 (it was the opposite prior to this). One reason for this is that the LFS may not be picking up some of the very high incomes that HMRC tax data finds, because vary rich individuals are increasingly not participating in voluntary surveys (and due to top-coding in LFS, see Appendix A for details). As we discuss in Appendix B, the divergence is the other way around in the ASHE data which probably better reflects high wage individuals than LFS as it is mandatory.

Chart 5: Decoupling Decomposition in the UK (1981 until 2019, differences in selected years)



Source: Decomposition of the decoupling analysis in Chart 3 into its single components.

Note: Values shown are the percentage point differences between the growth rates from 1981 until different subsequent years of selected series. Inequality refers to the difference between LFS mean hourly earnings (GDP deflator) and LFS median hourly earnings (GDP deflator); Non-wage compensation to the difference between employee compensation per hour (GDP deflator) and ONS mean hourly wage (GDP deflator); ONS/LFS divergence to the difference between ONS mean hourly wage (GDP deflator) and LFS mean hourly earnings (GDP deflator); Deflators to the difference between LFS median hourly earnings (GDP deflator) and LFS median hourly earnings (CPI deflator); Net decoupling to the difference between GDP per hour (GDP deflator) and employee compensation per hour (GDP deflator).

component has increased consistently with overall decoupling over time. Strikingly, non-wage benefits have not played a major role until the beginning of the 2000s. Whereas wages grew even faster than compensation until the mid-1990s, compensation overtook wage growth in the beginning of the 2000s. As discussed earlier, we also observe major net decoupling until the mid-1990s, and see it vanish afterwards. The components reflecting the ONS/LFS divergence and the deflator difference have also changed over time. The overall growth of LFS mean earnings has been higher than that of ONS mean wages until the mid-1990s. Since then, the overall growth of ONS mean wages from 1981 onwards is higher than the one of LFS mean wages, reaching a difference of almost 10 percentage points in 2004. The overall growth of the GDP deflator from 1981 onwards has been higher than the growth of the CPI in almost all years, with the difference being almost 7 percentage points in 1989 and approximately zero in 2014.

Table 1 additionally shows average annual growth rates of the series depicted in Chart 3 for different time periods. It becomes clear that the main period of overall decoupling has been 1981-1996. Labour productivity has grown by 2.38 per cent on average per annum, whereas median LFS wages deflated by the CPI deflator have only grown by 1.51 per cent per annum on average. In the 1996-2007 period, both productivity and median wages have seen similarly strong growth rates of almost 2.3 per cent per annum. In the most recent 2007-2019 period, both labour productivity and median wages have almost stagnated.

Table 1: Average Productivity and Pay Trends in the UK for Different Time Periods (Average annual per cent change)

	Labour Productivity	Employee Compensation	Mean Wages ONS	Mean Wages LFS	Median Wages LFS	Median Wages LFS CPI
1981-1996	2.38	1.61	1.72	1.96	1.24	1.51
1996-2007	2.28	3.38	3.00	2.03	2.23	2.25
2007-2019	0.21	0.19	0.02	0.48	0.45	0.17
1981-2019	**1.67**	**1.67**	**1.55**	**1.51**	**1.27**	**1.30**

Note: Shown are average annual growth rates (in percent) of the six different lines of Chart 3 for different time periods (1981-1996, 1996- 2007, 2007-2019, and the overall 1981-2019 period). The first 5 columns use the GDP deflator, the last column (Median wages LFS CPI) the CPI deflator.

In summary, we do not observe net decoupling of labour productivity and compensation in the UK, standing in sharp contrast to the US (Bivens and Mishel, 2015; Mishel and Bivens, 2021; Stansbury and Summers, 2018). However, there has been substantial overall decoupling of labour productivity and median wages over 1981-2019.[12] Almost 60 per cent of this divergence can be explained by inequality (mean and median wage difference), and most of the remaining difference by increases in non-wage compensation.

Bell (2015) shows that 85 per cent of the increase in total non-wage compensation between 2003 and 2013 comes from increases in employers' pension contributions. Firms increased these in the beginning of the 2000s to compensate deficits in defined pension systems. Notably, Adrjan and Bell (2018) find that while firms increased pension contributions to close deficit gaps in pension systems, they were able to lower wages of employees to save cost. This implies that employee compensation was potentially only able to keep up with the growth of labour productivity because of increasing employers' pension contributions. However, this increase has potentially not fully benefited large parts of current employees. With a large part of these pension contributions being used to cover deficits in defined pension systems, it is likely that substantial amounts go to retired employees or a rather small share of current employees. This is why we will take a closer look at the non-wage component in compensation when calculating the labour share of income in Section 3.

Extensions and Robustness Checks

We have conducted a large number of robustness checks and extensions to the analysis. We have relegated these to Appendix B and just summarize the main results here. First, we extend the analysis to another decade looking at the trends 1972-2019 instead of 1981-2019 as in our baseline analysis. The data sources become less reliable as we go further back in time, but the qualitative conclusion that large parts of overall decoupling are driven by inequality and non- wage compensation remain the

12 An alternative way to measure decoupling would be to look at the difference between growth of labour productivity and median compensation. Unfortunately, there is no publicly available data tracking median compensation over time in the UK (nor in the US or most other countries). Since non-wage compensation (especially employers' defined pension contributions) also tends to be very unequally distributed overall decoupling based on median compensation may even be higher.

same. The most notable difference is that the non-wage compensation component is much larger over this longer period and we observe slight net decoupling. Second, we switch from using LFS to using ASHE as our main micro-data source to calculate median wages. We note that the divergence between the ONS and ASHE series is larger than with the LFS and in the opposite direction. Third, we switch from using GDP to Gross Value Added (GVA). Fourth, we look at the sensitivity of the results to changing the ordering of the decoupling analysis. Fifth, we use data from the ONS' latest GDP revision in June 2021 which (implements double deflation amongst other changes).[13] Sixth, we present a more detailed analysis of the differences in price deflators. Finally, we look more closely at the role of non-wage compensation.

The bottom line from these extensions is that although the precise magnitude of the contributions to decoupling change, the qualitative results are robust that (i) there is little or no net decoupling of productivity from average employee compensation; (ii) there has been significant overall decoupling between productivity and median wages, and (iii) growing inequality is the main factor and non-wage compensation the second most important factor accounting for overall decoupling.

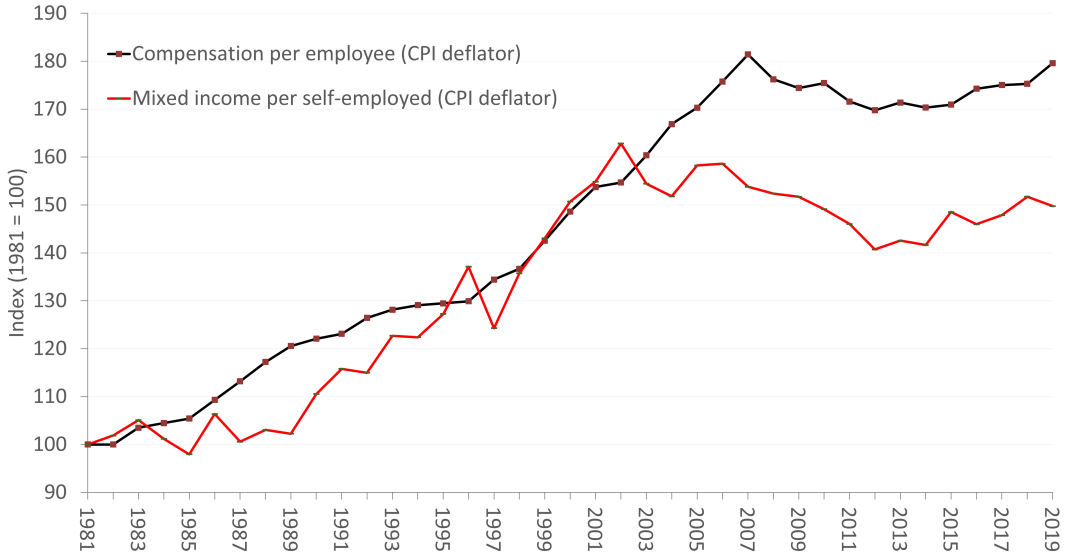
The Self-Employed

Section 2 showed that the UK has not seen "net decoupling" between labour productivity and average employee compensation over the last four decades. In this respect, our analysis suggests stability of the labour share of GDP. However, it is very important to note that we so far focused on employees only when considering trends in wages and compensation. This is in line with many other comparable decoupling analyses in the literature (OECD, 2018; Whittaker, 2019). Nevertheless, since our productivity growth measure uses estimated hours worked and output from all workers, including the self-employed is potentially important. A criticism of our decoupling analysis thus far is not comparing like with like, as we have implicitly assumed that productivity growth for the employed is the same as it is for the self-employed. There is no simple fix for this issue, as accurately measured the contribution of the self-employed to GDP is very challenging (as well as accurately measuring their income and hours worked).

The self-employed are a very heterogeneous group with major differences in income characteristics and working patterns (Datta, Giupponi, and Machin, 2019; Cribb and Xu, 2020; Giupponi and Xu, 2020). In this section we first analyse differences in income and job trends between employees and the self-employed and then trace out their impact on the aggregate labour share and growth of average worker compensation. We then analyse why self-employed income has grown more slowly, distinguishing between solo and non-solo self- employed using micro-data from the

13 This series has not been produced for the pre-1998 period, so we prefer not to use this for our baseline analysis. It essentially makes no difference to the results.

Chart 6: Growth of Average Employee Compensation and Average Mixed Income in the UK, 1981-2019)



Source: Data from ONS and OECD (see appendix for details).

Note: All values are shown as an index, with the base year 1981 equalling 100. Average compensation is employee compensation divided by number of employees, and average mixed income is total mixed income divided by the number of self-employed. Both series are deflated by the CPI. Mixed income is defined as "the aggregate of a variety of flows of value and rewards accrued by unincorporated businesses owned by households, namely sole proprietors. It contains an element of remuneration for work done by the owner or other members of the household that cannot be disassociated from their profit as an entrepreneur. Mixed income excludes imputed rentals from owner-occupied housing, as this is captured elsewhere in the national accounts.[a]

a https://www.ons.gov.uk/economy/nationalaccounts/uksectoraccounts/articles/nationalaccountsarticles/ areviewofhouseholdsmixedincomeestimatesandplansforupcomingimprovements, last accessed on 29 June 2021

Family Resources Survey (FRS).

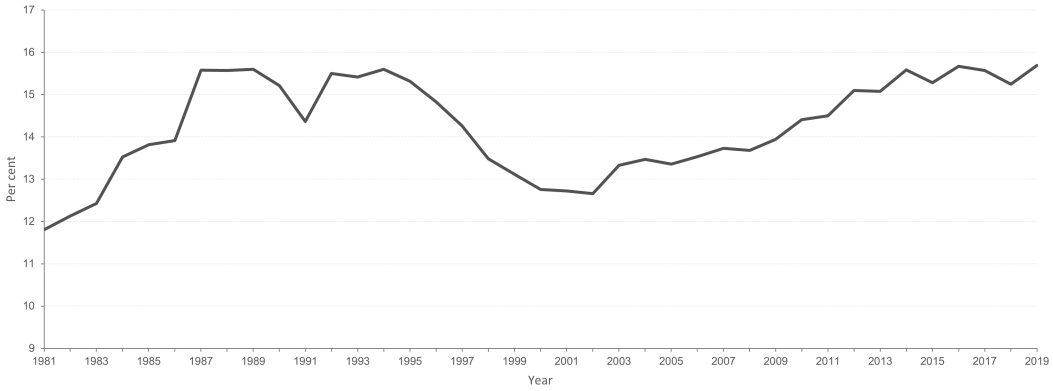
Self-Employment, Aggregate Labour Share and Average Worker Compensation, 1981-2019

Trends in Compensation and Employment by Worker Type

Chart 6 compares the growth of average employee compensation and average self-employed income from 1981 to 2019. Note that this is similar to the compensation measure we used in the previous section, but for now, we switch from hourly measures to per worker measures. As the measure of self-employed income, we take average "mixed income" per self- employed person. Mixed income is defined by the ONS as "the aggregate of a variety of flows of value and rewards accrued by unincorporated businesses owned by households, namely sole proprietors" and is sourced from the UK's national accounts. Note that this includes both labour and capital income of the self-employed and we will examine below different ways to divide

14 See Smith *et al.* (2019) for an extensive discussion of differences between capital and labour income. For example, the self-employed can decide what share of profits from their business to take as wages compared to capital income such as dividends. This decision will usually be heavily influenced by tax incentives, which makes it difficult to distinguish the "true" amount of labour compensation accruing to a self-employed person.

Chart 7: Share of the Self-Employed in Total UK Employment, 1981-2019



Source: Data from ONS (see appendix for details).
Note: Note that the share of employees in a year equals 100 minus the share of self-employed.

mixed income into labour and capital components.[14]

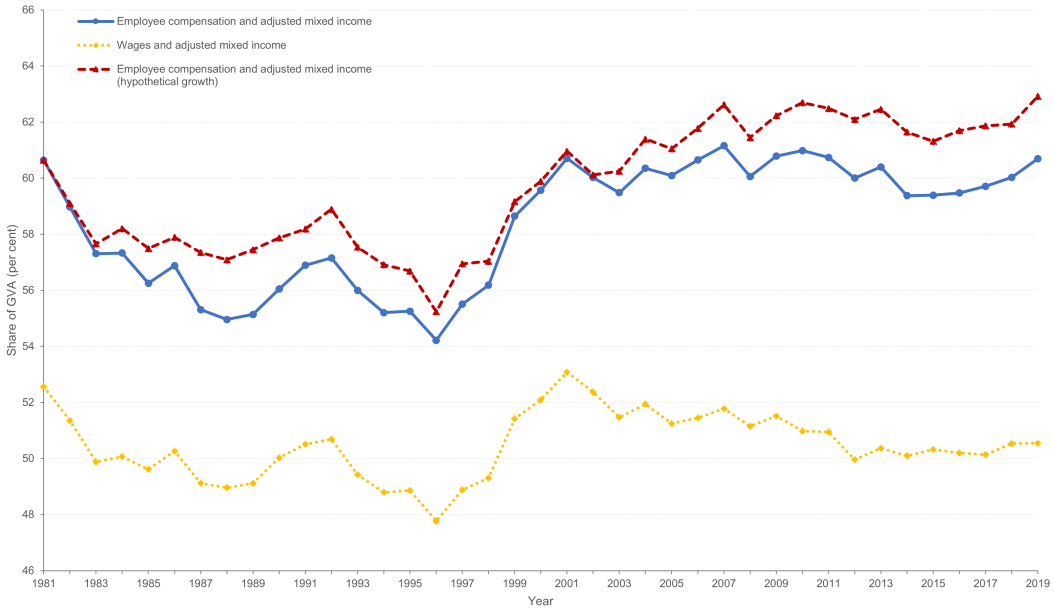
Chart 6 shows substantial differences between the growth of employee compensation and self-employed income over time. Average compensation increased by about 80 per cent and average mixed income by about 50 per cent (1.55 per cent versus 1.16 per cent average annual increase). This amounts to a 30 percentage point difference between the income growth rates of the two groups. Thus, the average self-employed person has done much worse than the average employee over this period. One caveat is that self-employed average income is estimated by dividing mixed income (from HMRC) by the number of the self-employed (from the LFS). Using administrative data and household survey data certainly creates potential measurement error, although our hope is that this is reasonably stable over time. In any case, it is unclear whether correcting for this would lead to an improvement or a further deterioration in the relative position of the self-employed.

There are two periods of big divergences. First, average mixed income growth stagnated in the 1981-1989 period (average annual increase of 0.37 per cent), whereas employee compensation grew by a substantial 2.37 per cent on average annually. Second, between 2002 and 2007, employees' compensation again grew much faster than mixed income. Post financial crisis, all groups suffered, with average mixed income actually falling.

These results become even more important when looking at the changing share of the self- employed in total employment as shown in Chart 7.

The self-employed share increased from 11.8 per cent in 1981 to 15.7 per cent in 2019. Interestingly, the periods in which the share of self-employed has increased (e.g. 1981 until early 1990s) coincide with slow growth of self-employed income in Chart 6, whereas periods that have seen a decrease in the share of self-employed coincide with fast growth of self-employed income (e.g. mid-1990s until early 2000s). This suggests some selection forces – the people entering self-employment may be more marginal individuals, rather than tal-

Chart 8: Labour Share of GDP in the UK, Estimated via Different Methods, 1981-2019



Source: Data from ONS (see Appendix for details).

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 (yellow) line shows wages and adjusted mixed income over GDP, i.e. it excludes non-wage benefits of employees (such as 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 stems from the decoupling analysis in section 2, and 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

ented "entrepreneurs".[15]

Together, Chart 6 and Chart 7 clearly show that not only have the self-employed performed much worse than employees since 1981, but at the same time their share in total employment has increased substantially. Unemployed people often select into self-employment if they are unable to find jobs.

Impact of Self-Employment on the Aggregate Labour Share

What does this mean for the UK's labour share of income? Chart 8 shows different estimates of the labour share of GDP.

The blue line corresponds to the ONS' headline measure.[16] It uses employee compensation and self-employed mixed income that can be classified as labour income (the latter being labelled "adjusted mixed

15 This is consistent with the modern empirical entrepreneurship literature, showing that most self-employed have characteristics more similar to the unemployed than high wage employees. Levine and Rubinstein (2017), for example, emphasise that it is important to distinguish between incorporated and unincorporated businesses. Incorporated businesses generally employ workers, whereas unincorporated businesses are the solo self-employed. Unemployed people often select into self-employment if they are unable to find jobs.

16 The ONS uses GVA instead of GDP to calculate the labour share in official publications, e.g. Dunn, Heys and Sidhu (2018). To be consistent with our previous analysis, we use GDP in this Section and repeat the analysis with GVA in Appendix B as a robustness check. Additionally, we show the labour share series using net domestic product (NDP), defined as GDP less capital depreciation.

income") in the numerator and GDP in the denominator. Following national accounting conventions, call CoE_t = employee compensation in year t, MI_t = self-employed mixed income, and the share of mixed income attributed to labour income α_t . Then, the labour share (the blue line in Chart 8) in year t, Ls_t, is:

$$LS_t = \frac{(CoE_t + (\alpha_t \cdot MI_t))}{GDP_t} \qquad (2)$$

where

$$\alpha_t = \frac{CoE_t}{(CoE_t + GOS_t)} \qquad (3)$$

with GOS_t being the gross operating surplus of corporations. This assumption follows international practice and assumes that in relative terms, the returns to capital and labour of the self-employed are the same as those in the corporate sector. [17] An alternative would be to use the values the self-employed declare as labour income to the tax authorities, but this is likely to be biased as it is heavily influenced by the taxation of the self-employed.

Looking at the "ONS official" labour share (blue line) in Chart 8, we observe a fall of about 2 percentage points between 1981 and 2019 from 56.2 per cent to 54.2 per cent. To examine the extent to which the slow growth of self-employed income contributes to this fall, we construct a hypothetical labour share measure (see Appendix C for details). The red line shows how the labour share would have evolved if self-employed labour income had grown at the same rate as employee compensation per hour.[18] Here, we observe no fall of the hypothetical labour share from 1981 to 2019 (a minimal increase of 0.04 percentage points) as in the net decoupling analysis in section 2. This shows that trends in self-employment were - in an accounting sense - solely responsible for the decline of the labour share over this period.[19]

Next, consider the role of non-wage compensation. The yellow line shows a labour share measure incorporating adjusted mixed income, but just using ONS wages and salaries (thus excluding employers' social contributions). One reason for doing this is that much of non-wage compensation is refinancing of company pension schemes for already retired employees. On this measure, as discussed earlier in this articles, we observe a more substantial fall in the labour share of 3.5 percentage points.[20] We are not arguing that this is the sole "correct" number for the labour share, but rather to highlight the quantitative importance of different assumptions.

As before, we are using adjusted mixed income following Dunn, Heys and Sidhu

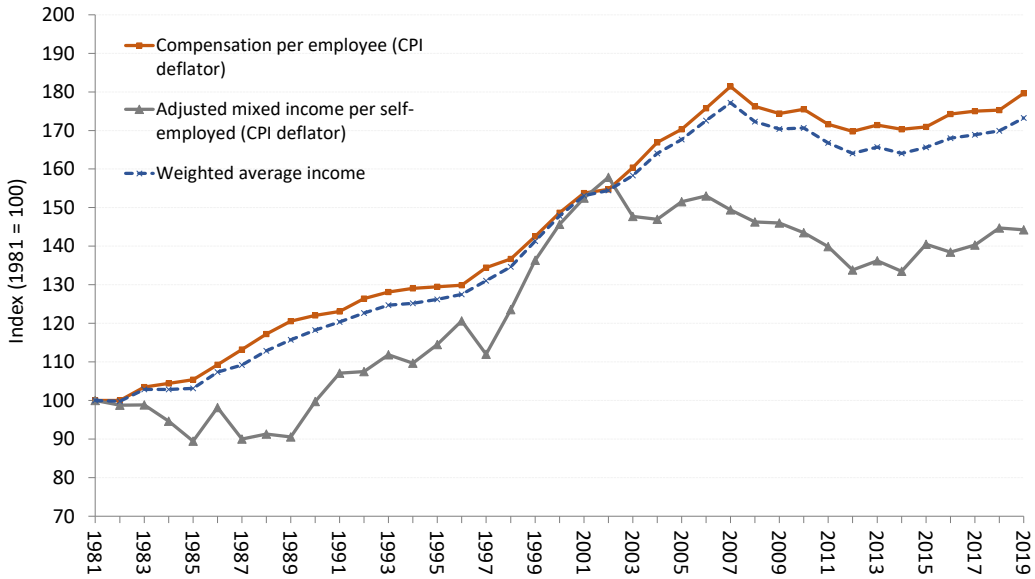
17 Dunn, Heys and Sidhu (2018) have an extensive discussion of this in the UK context.

18 When constructing this hypothetical measure, it is important to bear in mind that the share of self-employed in total employment has increased over time. It is not sufficient to multiply the growth of aggregate employee compensation with aggregate mixed income in the base year. This would ignore that the share of self-employed has increased and would lead to an underestimation of the potential labour share.

19 Note that we are using 1981-2019 and this will not be true for all sub-periods or earlier years as discussed above.

20 Note that this assumes no change in the self-employed' share of nonwage compensation. If we assume this grew at the same rate as employees, this would cause the labour share to be another 0.3 percentage points lower (i.e. a 3.8 percentage point fall).

Chart 9: Weighted Average Worker Income, 1981-2019



Source: Data from ONS and OECD (see appendix for details).

Note All values are shown as an index, with the base year 1981 equalling 100. The dashed (blue) line, weighted average income, is average compensation plus average adjusted mixed income, weighted by the share of employees and self-employed respectively. It can be interpreted as the income of the average worker.

(2018) to obtain the labour component of mixed income.[21] Average employee compensation Y_t^E (solid line with square markers) has grown by 80 per cent much faster than average self- employed compensation Y_t^M (solid line with triangle markers) at 44 per cent generating a 36 percentage point difference. The weighted average worker compensation, Y_c (dashed line), has grown by 73 per cent. The slower growth of self-employed income drags the average worker compensation line below the employee compensation line, but not by a large amount because the self-employed only make up a relatively small part of the total workforce (15.7 per cent in 2019, as shown in Chart 7).

Comparing columns (ii) and (iii) in Table 2, we see that employee compensation is substantially higher than that of the self-employed. In absolute terms, the difference between employee vs. self-employed compensation increases from £8,001 in 1981 (a 58 per cent employee premium) to £19,234 in 2019 (a 97 per cent premium, see column (iv)).[22] Given the fact that the self-employed earn less than the employed on average, some of the slower growth in average worker compensation comes simply from the compositional shift towards the self-employed.

21 Let S_t^E be the share of workers who are employees and $S_t^M = (1 - S_t^E)$ be the share of workers who are on mixed income (self-employed). Then, Y_c is the average income per worker, with $Y_c = S^{E*}Y_t^E + S^{M*}Y_t^M$

22 Part of this difference is explained by the increase employers' non-wage compensation. We analyse this in Appendix C that shows that the difference in growth rates is still evident if we exclude employers' social contributions

The Role of the Solo Self-employed, 1997-2019

What has caused the slow growth of self-employed income? An important distinction is between people who do not employ any workers – the "solo self-employed" and people who employ workers – "employer firms" (Cribb and Xu, 2020). In what follows, we call these two groups solo SE and non-solo SE. The distinction is close to that in the entrepreneurship literature between incorporated and non-incorporated self-employed.[23]

The ONS and LFS data that we used in the previous section do not allow us to distinguish clearly between solo SE and non-solo SE outcomes. The LFS only provides the numbers of self-employed in total employment, but no self-employed income data. To tackle this we therefore turn to the Family Resources Survey (FRS). The FRS is an annual household survey that covers information such as income, wages, savings, investment, and self-employment.[24] It was first conducted in 1993/1994 and in the last year available to us (2019/2020), about 19,000 households were interviewed.[25] Since this is a much smaller sample size (especially for the self-employed with less than 3,000 respondents in 2019) than the LFS, ASHE or ONS data, we use three-year moving averages to reduce sampling variation.[26] In addition, since the data are known to be less reliable in the earlier years, we present results from 1997/1998 (labelled "1997") through 2019/2020 (labelled "2019"). Chart 6 showed that the largest sustained divergence between employed and self-employed was from 2001 onwards, so it makes sense to focus on this sample period.

As noted above, there are many caveats with self-employed data. First, total income may well be under-reported for tax purposes and although FRS is anonymous and individuals cannot be identified for tax purposes (and respondents are told this), this could still be an issue. In particular, if underreporting has increased over time (although it is unclear why this should be the case) this might help explain slower growth in income trends. Second, hours data are particularly hard to verify. For the employed, hours reporting can be from the employer payroll (e.g. ASHE) or from the worker (e.g. LFS) so the aggregate numbers can be cross-checked. But since there is no administrative series for the hours of the self-employed we have to rely on household surveys. Of course, in the FRS everything is self-reported, but the self-employed may find it more difficult to accurately judge their working hours. Third, business owners may be taking less income as compensation and more as "Gross Oper-

23 A similar distinction is sole traders vs. non-sole traders (e.g. Cribb, Miller, and Pope, 2019). Both coincide in the FRS we will use. For more information about different types of self-employed in the UK, see Blundell (2019).

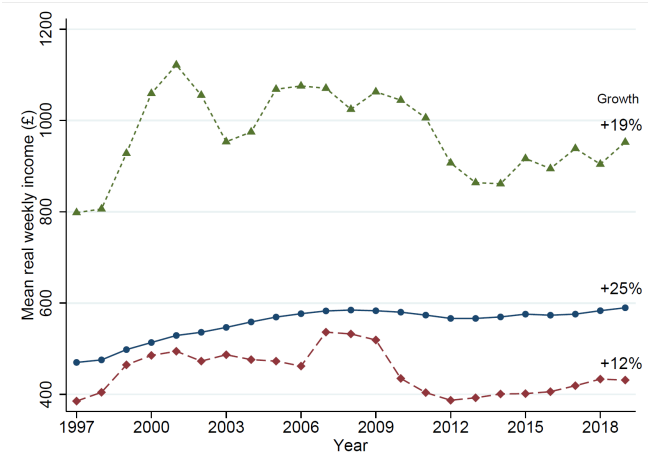
24 https://www.gov.uk/government/collections/family-resources-survey–2, last accessed on 12 June 2021

25 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment$_data/file/874507/family-resources-survey-2018-19.pdf, last accessed on 12 June 2021$

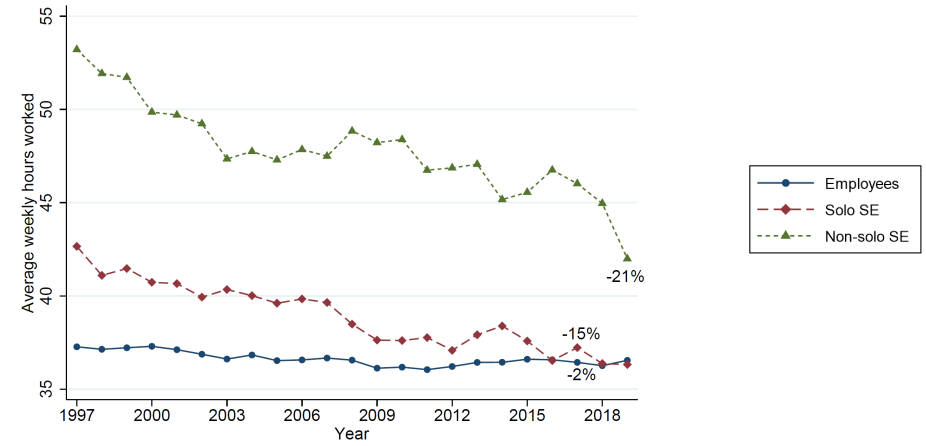
26 A presentation of the corresponding unadjusted data can be found in Appendix C.

Chart 10: Average Weekly Hours Worked, Weekly, and Hourly Income by order type, 1997-2019

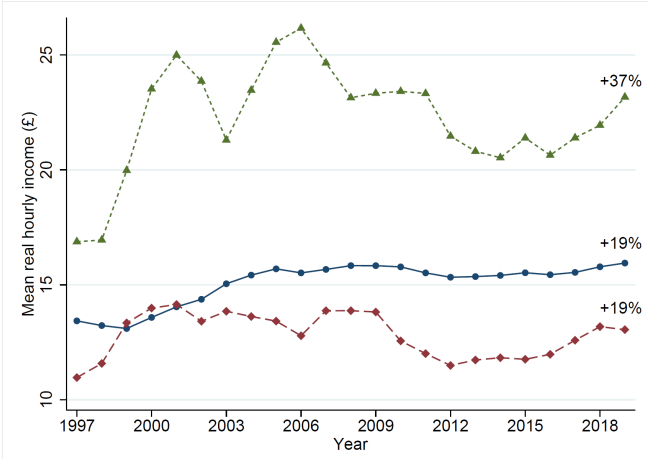
Panel A: Mean Real Weekly Income (2018£)



Panel B: Average Weekly Hours Worked



Panel C: Mean Real Hourly Income



Source: Data from FRS (see Appendix for details).
Note: The number at the end of each line is the growth rate 1997-2019. Panel A: Employee income is gross wages or salaries as shown on their payslip. Income of self-employed is defined as "the total amount of income received from self-employment GROSS of tax and national insurance payments, based on profits where individual considers themselves as running a business, on estimated earnings/drawings otherwise". All data are shown as three year moving averages (except 1997 and 2019, where we use a two- year average). Panel B: Average usual hours worked by a worker on all jobs held excluding unpaid overtime. Panel C: Hourly income divides income (Panel A) over hours (Panel B). All data are shown as three year moving averages (except 1997 and 2019, where we use a two-year average). Income is deflated by the CPI (same CPI deflator as in the decoupling analysis).

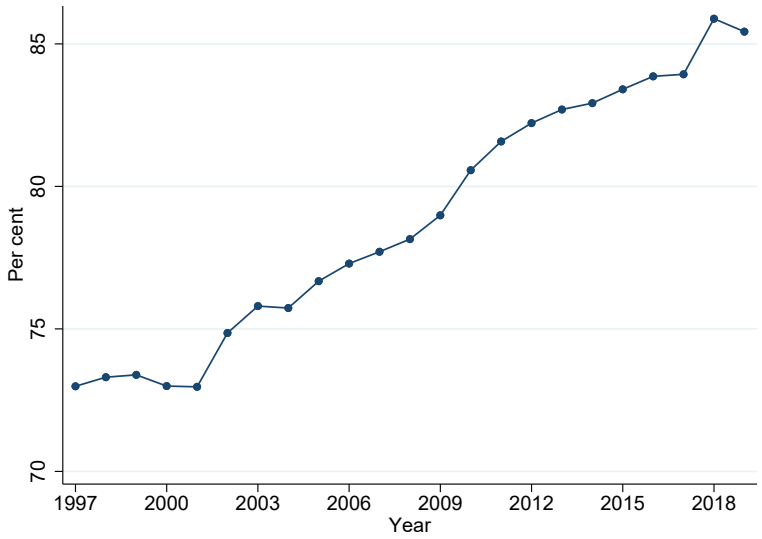
Table 2: Share of Self-Employed in Total Employment and Income Statistics in Levels for selected years

	Share of self-employed in total employment, %	Compensation per employee (CPI), £	Adjusted mixed income per self-employed (CPI), £	Income premium of being an employee, %	Average income per worker (CPI), £
1981	11.8	21,750	13,750	58.2	20,806
1997	14.3	29,235	15,401	89.8	27,262
2001	12.7	33,440	20,967	59.5	31,853
2019	15.7	39,065	19,831	97.0	36,047

Source: Data from ONS and OECD (see appendix for details).

Note: Average income per worker (column (v)) is calculated as the average of employee compensation (column (ii)) and adjusted mixed income (column (iii)), weighted by the shares in total employment of the respective groups (column (i)). Column (iv) has the income premium of being an employee compared with the average self-employed person (mark-up of column (ii) over column (iii)).

Chart 11: Share of Solo Self-employed in Total Self-Employment, 1997-2019



Source: Data from LFS (see appendix for details).

Note: Shown is the share of solo SE in total self-employment from 1997 until 2019. The yearly value is calculated as the average of the four quarters in a year. A corresponding graph with FRS data can be found in the Appendix.

ating Surplus" (Smith *et al.*, 2021). This is why we have focused on all business income (mixed income) for the self-employed so it includes both dividend income and salary. Although these are all concerns, it is not obvious why these measurement issues should have changed over time in such a way to generate the patterns in the data.[27]

Chart 10 shows the FRS information split into three panels. Each panel shows the changes for three workers groups: (i) employees, (ii) solo SE and (iii) non-solo SE for weekly income (Panel A), hours (Panel B) and hourly income (Panel C). In Panel A, and as noted above, employee income has grown by about 25 per cent (from £470

27 In the Appendix we compare trends using the FRS with ONS administrative data. The broad trends are comparable. Employee income growth is nearly identical. Self-employed income has grown more slowly in the FRS than in ONS, however. It is unclear whether this is a problem with the ONS or the FRS, but this caveat should be borne in mind. In what follows, all our comparisons are within the FRS data.

to £590). By contrast, the solo SE have only seen a growth of 12 per cent (£385 to £431) and the non-solo SE of 19 per cent (£798 to £952). Note that most of the growth in weekly income for both self-employed groups occurred pre-2002, consistent with ONS numbers in Chart 6. In terms of income levels, the non-solo SE earn by far the most compared to the other groups. The income of employees is above the solo SE, a gap that grew considerably during and after the financial crisis. In 2019 employees earn about 37 per cent (£160) more than the solo SE per week.

Panel B of Chart 10 shows that in 1997, employees worked the least - about 37 hours per week compared to the solo SE on 42.5 hours and the "Stakhanovite" non-solo SE an enormous 53 hours a week. Whereas there has been little change in hours worked for the employed, there has been a substantial fall for the self-employed, from 42.5 to 36 hours per week (-15 per cent) for solo SE and from 53 to 42 hours per week (-21 per cent) for the non-solo SE. Today, the solo SE now work about the same number of hours per week as employees.[28]

Panel C of Chart 10 shows that in percentage terms, employees and solo SE have seen comparable growth in hourly income of about 19 per cent (albeit from different bases: £11 for solo SE vs. £13 for the employed). Strikingly, non-solo SE have seen by far the highest growth in hourly income of around 37 per cent.

Chart 11 shows that the share of solo SE in total self-employment has increased by more than 12 percentage points over time, from 73 per cent in 1997 to 85 per cent in 2019 (with most of the increase post-2001). Since the solo SE have much lower hourly incomes than the non-solo SE (Panel A of Chart 10), this fundamentally explains most of the slower growth of the self-employed income compared to employee income.[29]

Summary on the Slower Income Growth of the Self-Employed

We summarize our analysis of self-employment in Table 3 based on trends in FRS data. The first three rows show that employee income grew 23.4 (25.5 – 2.1) percentage points more than the self-employed income from 1997 to 2019.

The poor performance of the self-employed may seem surprising as weekly income growth of solo SE was 12 per cent (Row 3) and for non-solo SE was 19 per cent (Row 4). This averages out to a mere 2.1 per cent (Row 5) growth for the SE as a whole through two mechanisms. First, solo SE income is substantially less than non-solo SE income (e.g. in 2019 solo SE earned less than half that of the non-solo

28 Chart 10 shows average hours worked and average income from all jobs that a person has. A person is classified as an employee or self-employed if she works the majority of hours in that job. The fraction of people who perform both employee and self-employee jobs is very small and has not changed much over time (0.95 per cent of all workers in 1997 and 1.02 per cent in 2019). The analysis looks almost identical if we only consider hours and income from the main job type. Corresponding graphs can be found in the Appendix.

29 Note that the data come from LFS, not FRS. We decided to use LFS data to calculate the solo share in total self-employment because of the LFS' larger sample size. We suspect that the LFS estimates should be more accurate. The corresponding charts and results of our analysis with FRS data can be found in the Appendix.

SE: £952 vs. £431 a week). Second, the share of Solo SE in total SE has increased by 12 percentage points as show in Chart 11. If we fixed the fraction of solo-SE at its 1997 level, average SE income would have grown by 15.2 per cent instead of 2.1 per cent and the income growth gap with the employed would fall from 23.4 to 10.3 percentage points. In this sense, the rise of the solo SE explains over half of the slower income growth of the self- employed compared to employees.

A second issue is different trends in hours worked. Although the weekly income change between employed and self-employed was 23.4 percentage points, rows (4)-(6) of Table 2 show that the hourly income difference was only 3.1 percentage points (18.7 per cent for employed – 15.6 per cent for SE). This implies that in hourly terms, the self-employed have not done so badly. 87 per cent ((23.4 - 3.1)/23.4) of the difference in income was due to the big fall in hours worked by the SE. Part of this is related to the compositional shift towards the solo SE who work less hours than non-solo SE, and part of this is the reduction of hours for both types of self-employment (Panel B in Chart 10).

Should this make us more relaxed about the position of the self-employed? It depends whether we think the reduction in hours worked by the self-employed was a voluntary shift to more leisure, or whether it is because the self-employed have been constrained to work fewer hours than they want due to lack of demand. As we will discuss below, it is likely that the solo SE are being constrained to work fewer hours than they would like, so some of the lower hours may be a form of disguised under-employment.[30]

In summary, the declining relative position of the average self-employed worker's weekly income can be explained by these two factors. The majority of the difference is a compositional shift due to the rise in the solo SE. Just about all of the residual difference is explained by the rapidly falling hours worked of the self-employed. Of course, this is just statistical accounting. We now turn to what forces could more fundamentally explain the changing patterns we observe.

Decoupling analysis with self-employed income

The decoupling analysis in section 2 excluded income from the self-employed. This is because estimating the share of labour compensation of the self-employed in mixed income is a difficult task (as discussed above). Bearing this caveat in mind, we now combine results from sections 2 and 3 to include self-employed income in the decoupling analysis. this is reflected by thef black line in Chart 12: it shows average employee and self-employed compensation (the latter being the fraction of mixed income that goes to labour estimated via approach by Dunn, Heys and Sidhu, 2018) per

30 For a general overview of under-employment in the UK, see the ONS' under- and overemployment statistics (sourced from the LFS): url-https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/datasets/underemploymentandoveremploymentemp16 (last accessed on 21 October 2021).

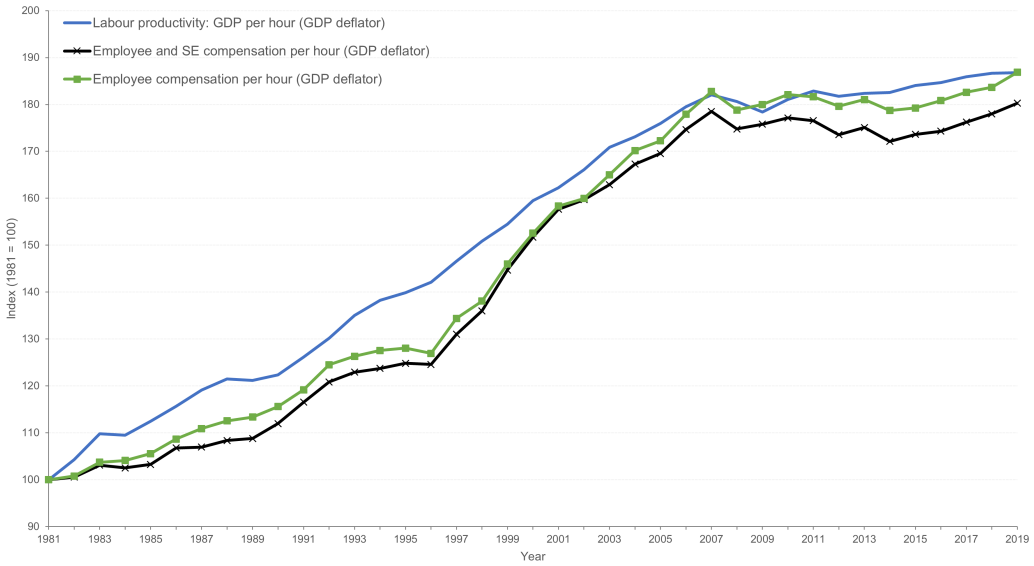
Table 3: Weekly and Hourly Income by Worker Type, 1997-2019 (per cent change)

Growth of weekly income (%)		Growth of hourly income (%)	
(1) Employees	25.5	(5) Employees	18.7
(2) Average SE	2.1	(6) Average SE	15.6
(1) - (2) Difference	23.4	(5) - (6) Difference	3.1
(3) Solo SE	12.0	(7) Solo SE	19.0
(4) Non-solo SE	19.3	(8) Non-solo SE	37.3
(3) - (4) Difference	-7.4	(7) - (8) Difference	-18.3

Source: Data from FRS (see appendix for details).

Note: Shown are growth rates of weekly and hourly income for employees and the average self- employed person (calculated as a weighted average income growth of solo and non-solo self-employed (SE) using their respective shares in employment as weights), growth rates for solo and non-solo SE, and respective differences in percentage points. Growth rates are calculated from two-year averages.

Chart 12: Decoupling Analysis with Self-Employed Income, 1981-2019



Source: Data from ONS (see appendix for details).

Note: Employee and self-employed (SE) compensation per hour is employee compensation plus mixed income that can be accrued to labour income (estimated via Dunn, Heys and Sidhu, 2018) divided by total hours worked in the economy. All series are deflated with the GDP deflator.

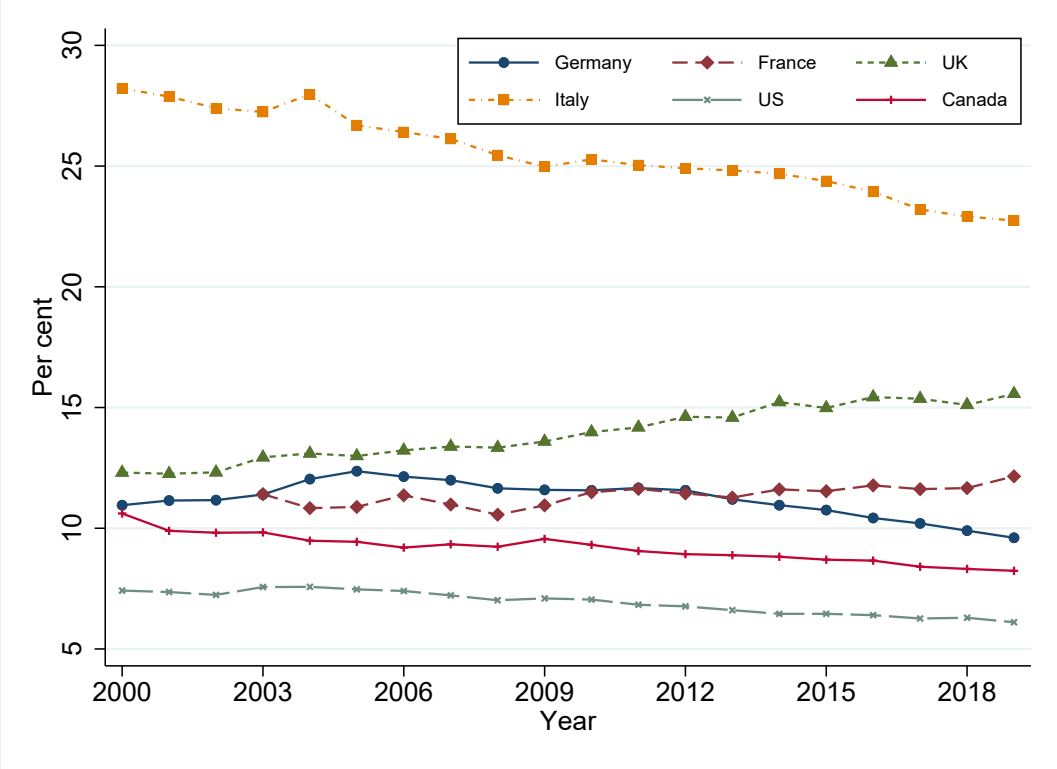
hour worked. Note that this is a per-hour average, so this differs from the per-worker averages we used elsewhere in this section.

Whereas both labour productivity and average employee compensation have grown by about 87 per cent between 1981 and 2019, average employee and self-employed compensation has only grown by 80 per cent. If we re-define net decoupling as the difference between labour productivity and the average employee and self-employed compensation, we obtain net decoupling of about seven percentage points. Thus, in an accounting sense, net decoupling for overall workers is entirely driven by the slower growth of self-employed compensation compared with employee compensation.

Decoupling Mechanisms

Many of the phenomenon discussed in this article are the subject of vast literatures. Increased inequality has been found to be the main reason for overall decoupling between productivity and median wages. The causes of increasing wage disparities

Chart 13: Share of Self-Employed in Total Employment for Selected OECD Countries, 2000-2019



Source: Data from OECD.
Note: Shown are the shares of self-employed in total employment for Canada, Germany, France, Italy, the UK, and the US between 2000 and 2019. The series of France starts in 2003 due to limited data availability.

has been a major topic of economic research in recent decades. Technical change is one major factor (Van Reenen, 2011; Michaels, Natraj and Van Reenen, 2014) which has pushed demand ahead of the supply of skills. Trade may also play a role in reduced demand for the less skilled workers (Autor, 2019). Labour market institutions such as the decline of union power is another major factor (Machin, 2016). The fall of the labour share has also been the subject of a quickly growing literature in the last decade (e.g. Autor *et al.*, 2020; De Loecker, Obermeier and Van Reenen, 2021). Our finding that there has been some fall even in the UK puts it more in line with other countries.

Explaining the Growth of the Self-Employed in the UK

Much less is known about the causes of the changes in the trends for the self-employed. Chart 13 shows trends in self-employment rates for selected OECD countries between 2000 and 2019. Interestingly, the large increase in the share of self-employed seems unique to the UK. In Canada, Germany, Italy, and the US, self-employed shares have fallen since 2000. France has seen a slight increase in the share of self-employed, but not as much and as consistently as the UK. The fraction of

solo SE in total self-employment does seem to be increasing across most countries, although it does seem particularly high in the UK (Boeri *et al.*, 2020).

Chart 13 suggests that some UK-specific factors must help explain the increase in self-employment. One factor could be changes in taxation. Evidence by Parker and Robson (2004), Smith *et al.* (2021), and Garin, Jackson, and Koustas (2021) suggests that tax incentives have a major impact on various decisions of the self-employed. The increased tax burden on employees and employers since the mid-1990s could have been a reason for the increase in self-employment. For example, employers' National Insurance contributions were increased substantially in the 2000s.[31] Adam and Miller (2021) argue that in the UK, lower tax rates for self-employed compared with employees (especially through lower national insurance contributions) incentivise people to become self-employed.[32]

A second reason could be related to self-employment as an alternative to unemployment. Giupponi and Xu (2020) call solo self-employment a "fall-back option" for many people and argue that the rise in solo self-employment puts downward pressure on employee wages. UK welfare benefits have become less generous in real terms since 1981 and the strictness of receiving working age benefits such as Job Seekers' Allowance and disability benefits has toughened (e.g. Blundell *et al.*, 2004; Koenig *et al.*, 2019). This may have pushed more non-workers into self-employment, helping deliver the very high employment rates in the UK, even after the Great Recession. Giupponi and Xu (2020) show that solo SE are the group with the highest share of people wishing to work more hours, suggesting that this group is "underemployed".[33] Additionally, Henley (2021) shows that becoming self-employed in the UK is positively associated with performing bad quality jobs (e.g. long hours, low pay, temporary contract) in prior years.

A third factor could be related to regulation. On the one hand, there has been increased regulation of labour contracts often related to EU rules, which could have reduced demand in the formal sector relative to the self-employed. The UK has a relatively liberal labour market compared to other European countries, a large outsourcing industry and thriving "gig economy" with flexible work arrangements. These push-and-pull factors may have helped the growth of self-employment.

It is important to note though that the gig economy only makes up a small share of self- employed workers (e.g. Boeri *et al.*, 2020 estimate that gig workers only make up 7 per cent of total UK self-employment).

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31 The increase amounted to 36 per cent between 2002 and 2006.

32 They look at the example of a person on gross earnings of £40,000. According to their calculations, the tax of such an employee is £3,300 higher than that of a self-employed person on an equivalent amount. Large parts of the divergence arise due to differences in national insurance (NI) contributions. Including employers' contributions, employees made substantially higher NI contributions.

33 Among non-solo SE, a substantial share (about 17 per cent) wish to work less hours for less pay. Thus, the substantial decrease in average hours worked by both self-employed groups could be in the interest of many non- solo self-employed, but not that much for solo self-employed.

With rising demand for food and grocery delivery services as well as transport providers like Uber, we expect the importance of the gig economy to rise in the future though.

Overall, rather little is known or understood for the pattern of employment and income trends of the self-employed and why they are so different in the UK. We see this as an important avenue for future research.

Conclusions

We have analysed the "decoupling" of aggregate productivity and pay growth in the UK between 1981 and 2019. Real GDP per hour rose by 87 per cent over this period and employee hourly compensation increased by almost exactly the same amount. Consequently, there was no "net decoupling" in the UK, a result that stands in stark contrast to the US where average compensation grew much more slowly than productivity (see Chart 1, Bivens and Mishel, 2015; Mishel and Bivens, 2021; Stansbury and Summers, 2018).

This abstracts from two important factors. First, median employee wages have grown much more slowly than productivity, so in this sense there has been an overall decoupling. About 60 per cent of this decoupling is due to the growth of wage inequality and about 30 per cent is due to an increase in the share of non-wage benefits (in particular employer pension contributions) in overall compensation.

The second important factor is the big divergence in the fortunes of employees compared to the self-employed. Income growth of the self-employed has been substantially lower than that of employees. Using micro-data from the Family Resources Survey over the last two decades, our analysis suggested that the growth of the solo self-employed has been a major factor. The solo self-employed earn substantially less on average than non-solo self-employed and their hourly income growth has been slower. Since their share in total self-employment increased by 12 percentage points, this compositional shift drags down self-employed income growth. A second factor is the sharp reduction in average hours worked by both solo and non-solo self-employed. Some of this may be a welcome choice to take more leisure, but there is also evidence that many solo self-employed would like to work more hours, so it is a less welcome sign of underemployment.

Since the fraction of workers who are self-employed has risen by about six percentage points over the last four decades this has macro-economic consequences. If the compensation of the self-employed had grown at the same rates as that of employees, there would be no fall in the labour share of GDP. Including the estimated labour compensation of the self-employed and dropping non-wage compensation (as a big fraction of this is going to re-finance the pensions of already retired workers) implies a reduction in the labour share in GDP by 3.5 percentage points between 1981 and 2019. The UK may be less dissimilar to other countries like the US than it would initially seem.

Stepping back, the most striking feature of the UK economy is the dismal productivity performance since the Global Financial Crisis. Productivity has stagnated and worker pay has followed suit. Returning

to sustainable income growth requires generating much better productivity growth (Van Reenen, 2021).

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