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Two Decades of Income Inequality in Britain:

The Role of Wages, Household Earnings and Redistribution

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Abstract

We study earnings and income inequality in Britain over the past two decades, including the period of relatively "inclusive" growth from 1997-2004 and the Great Recession. We focus on the middle 90%, where trends have contrasted strongly with the "new inequality" at the very top. Household earnings inequality has risen, driven by male earnings – although a 'catch-up' of female earnings did hold down individual earnings inequality and reduce within-household inequality. Nevertheless, net household income inequality fell due to deliberate increases in redistribution, the tax and transfer system's insurance role during the Great Recession, falling household worklessness, and rising pensioner incomes.

Keywords: Inequality, labour market, household earnings, social security

JEL codes: D31, E24, J3

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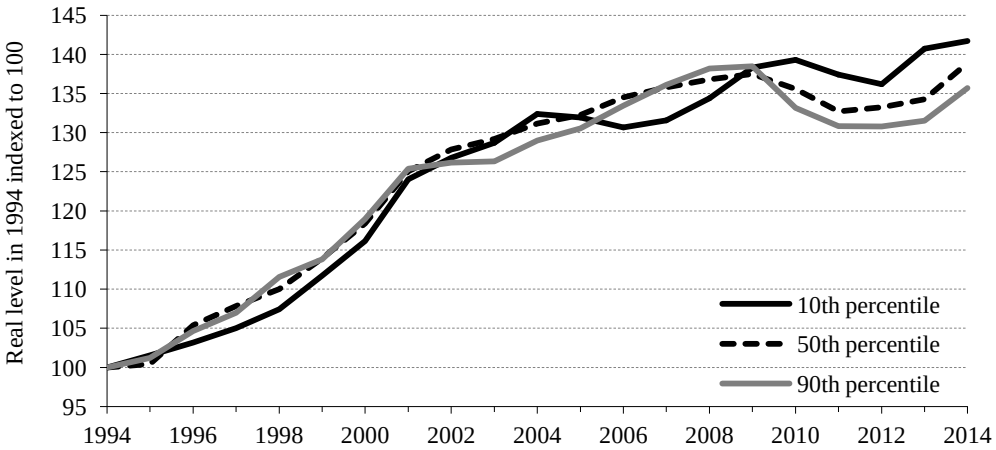
INTRODUCTION

After increasing sharply through the 1980s, income inequality in Britain has fallen across most of the distribution over the past two decades, although incomes towards the very top have continued to pull away. The fall in inequality across most of the distribution largely reflects two episodes: a period of 'inclusive growth' in the late 1990s and early 2000s when inequality fell while incomes were growing strongly (see Figure 1), and the Great Recession and its aftermath. Both of those episodes stood in contrast to trends in income inequality in the United States (which increased over the same periods), despite similar upwards trends in male wage inequality in both countries. This paper provides a thorough account of why income inequality in Britain has behaved in this way, examining the transmission mechanisms between male wages and net household incomes - specifically changes in female wages, hours of work, the combination of individual earnings patterns within households, taxes, and unearned incomes.

Figure 1. Real household incomes in Great Britain at the 10th, 50th and 90th percentiles (1994 = 100)

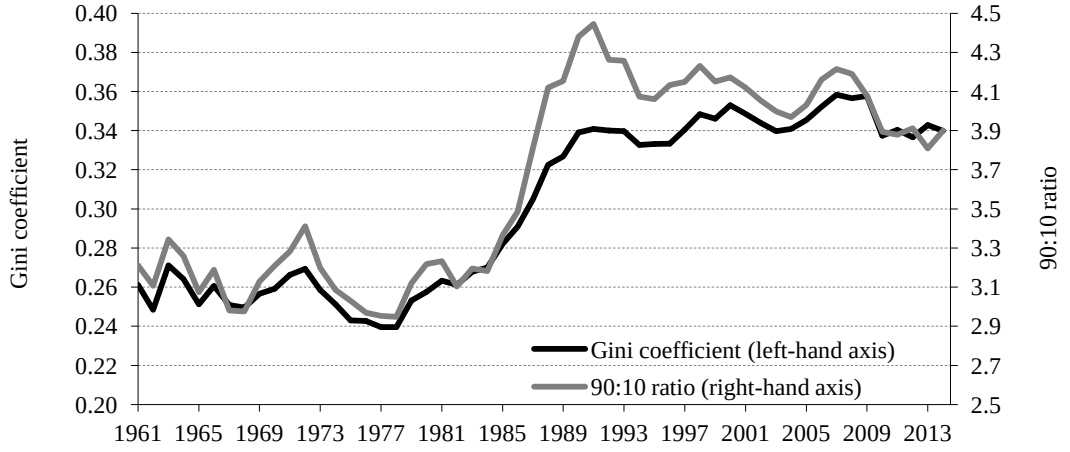


Note: Household incomes have been measured net of direct taxes and state benefits, and are equivalized using the modified OECD equivalence scale. Years refer to financial years.
Source: Authors' calculations using the Households Below Average Income dataset (which adjusts top incomes for under-coverage using replacement values from the Survey of Personal Incomes).

We contribute to a large literature on trends in inequality in recent decades (other work on the UK includes Cowell and Jenkins (1994), Jenkins (1995), Atkinson (1997,1999) and Brewer and Wren-Lewis (2016)). In particular we build on Blundell and Etheridge (2010), who analyse trends in inequality in different economic outcomes in the UK. Their analysis, however, only covers the period up to 2005, whereas one of the main focuses of this paper – and the source of some of the most striking changes – is the Great Recession. Heathcote et al (2010) conduct a similar exercise for the US and Krueger et. al. (2010) summarise similar work for other advanced economies. This paper also relates to a literature which analyses the extent of insurance against labour market shocks provided by the tax and transfer system (e.g. Blundell et al (2008); Dolls et al (2012)) and family labour supply (e.g. Blundell et al (2016)).

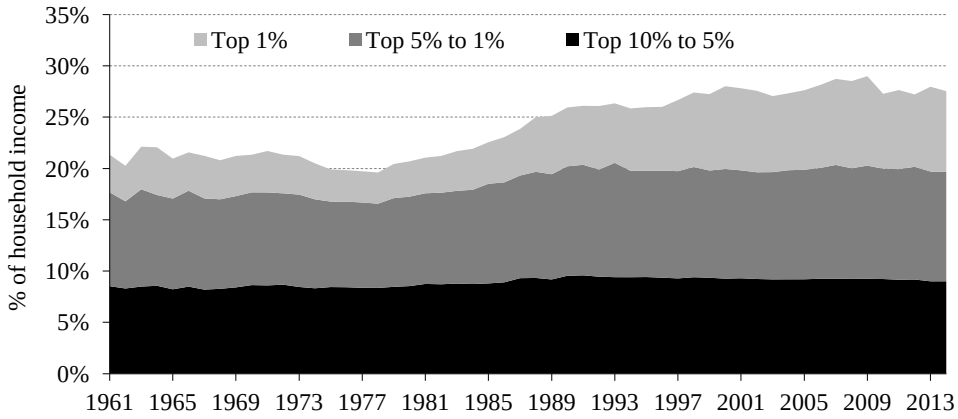
The most dramatic changes in income inequality in recent British history occurred in the 1980s. This is shown in Figure 2, which tracks inequality in net equivalized household income in Great Britain since comparable data began in 1961. The Gini coefficient rose from 0.26 in 1980 to 0.34 by 1990, and the 90-10 income ratio rose from 3.2 to 4.4 over the same period. Inequality also increased markedly in the US over that period (Cutler and Katz (1992)) and, to a lesser extent, in other advanced economies (Gottschalk and Smeeding (1997)). The large literature investigating the causes of this rise in inequality concluded that rising wage inequality was the key driver in the US, with skill-biased technological change typically the favoured major explanation (Levy and Murnane (1992); Katz and Murphy (1992); Bound and Johnson (1992); Autor et al (1998)). In Britain, skill-biased technological change did result in rising wage inequality (Machin (2001)), but the compounding factors of weaker trade unions (Machin (1996), Goodman and Shepherd (2002)) and regressive changes to the tax and benefit system (Johnson and Webb (1993)) also contributed to the increase in income inequality.

Figure 2. The Gini coefficient and 90:10 ratio in Great Britain, 1961 to 2014



Note: The two series in this graph measure inequality in household incomes. Household income is measured net of direct taxes and state benefits, and is equivalized using the modified OECD equivalence scale. Years refer to calendar years up to and including 1992 and to financial years from 1993–94 onwards.
Source: Authors' calculations using the Family Expenditure Survey (up 1993–94) and Households Below Average Income dataset from 1994–95. Top incomes adjusted for under-coverage using replacement values from the Survey of Personal Incomes)

Figure 3. "Top income shares" of household income in Great Britain, 1961 to 2014



Note: Household income is measured net of direct taxes and state benefits, and is equivalized using the modified OECD equivalence scale. Years refer to calendar years up to and including 1992 and to financial years from 1993–94 onwards.
Source: Authors' calculations using the Family Expenditure Survey (up 1993–94) and Households Below Average Income dataset from 1994–95. Top incomes adjusted for under-coverage using replacement values from the Survey of Personal Incomes)

This paper investigates in detail what has happened in the UK since the rise in inequality in the 1980s, and why. The lack of substantial change in the Gini coefficient over the past two decades actually masks two offsetting trends. As Figure 3 shows, the share of income going to the highest-income individuals clearly continued to increase (driven almost entirely by the growth in the top 1% share), at least until the onset of the Great Recession. But income

inequality has actually fallen across the large majority of the income distribution, as indicated by the decline in the 90-10 ratio.

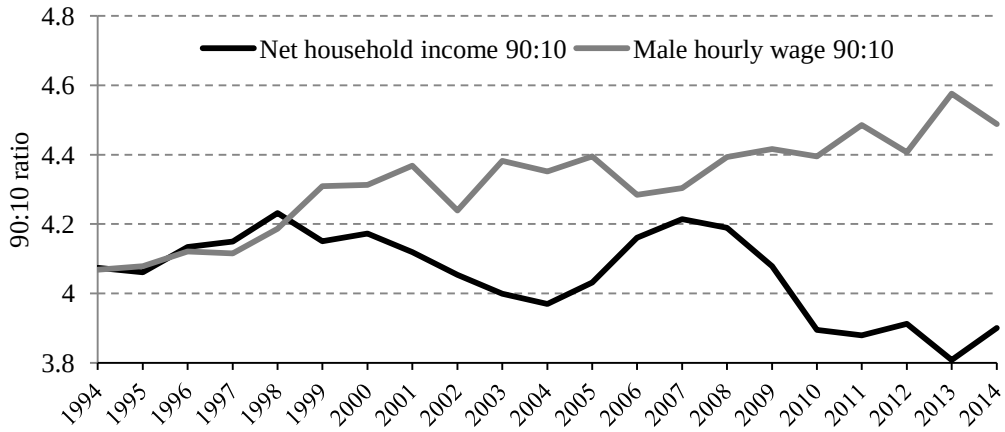
These contrasting trends, of narrowing inequality across most of the distribution but the racing away of the very top (the so-called "new inequality"), have led to two inequality literatures that have been largely distinct. Analyses of broad inequality in earnings, income and consumption trends across the population tend to use household survey data due to the richness of information that they contain on each household (e.g. Aguiar and Bils 2015, Fisher et al 2013, Heathcote et al 2010). Meanwhile a "top incomes" literature documents the increasing shares of total income accruing to the very top in the UK and elsewhere (Atkinson 2005, Atkinson et al 2011, Dew-Becker and Gordon 2005, Piketty and Saez 2006, Kaplan and Rauh 2010), and a related set of work seeks to explain this phenomenon (e.g. Bell and van Reenen 2013 and 2014, Gabaix and Landier 2008, Rosen 1981,). The empirical top incomes literature tends to use administrative data sources because of under-coverage of top incomes in household surveys. Recent work has sought to integrate these literatures by combining data sources (Burkhauser et al, 2016). Continuing in that vein, in a complementary analysis Jenkins (2016) examines how trends in incomes at the very top have affected overall income inequality. Both of those papers show that top incomes have pulled away to an even greater extent than survey-based estimates have captured.

Here though we focus on the other important, and perhaps more surprising, inequality phenomenon – the decline in inequality across the vast majority of the distribution. This does disregard the extreme tails, which seem to drive a significant amount of the public and policy focus on inequality. But it means that we can use rich survey data to analyse the mechanics of inequality change in detail right down to the level of hourly wages. Section I discusses data issues and sample selection choices in more detail. Readers who want to know more about what has happened to incomes at the very top in the UK should see Jenkins (2016).

The fall in the 90-10 ratio in the UK occurred largely in two distinct episodes, which were associated with radically different macroeconomic performance. The first episode, from 1997–98 to 2004–05, coincided with robust growth in GDP, employment and earnings. The second period, since 2007–08, coincided with the Great Recession and its aftermath, with falls in employment, output and (particularly) earnings. These episodes of falling income inequality (across most of the distribution) were very different to trends seen in the equivalent periods in the United States. Meyer and Sullivan (2013) show that after-tax and transfer income inequality (the equivalent measure of income to that used in this paper) rose significantly during the early 2000s and the Great Recession in the US. From 2000 to 2004, the 90-10 ratio rose from 5.3 to almost 5.9 in the US, while it fell from almost 4.2 to under 4.0 in Britain. From 2007 to 2011, the 90-10 ratio rose from 5.8 to 6.3 in the US but fell from 4.2 to 3.9 in Britain.

The difference in trends in household income inequality between the US and UK is not explained by trends in male hourly wage inequality. In both countries, wage inequality for men has continued to rise, with the 50-10 ratio constant or declining but the 90-50 wage ratios continuing to grow (Autor et al (2008); Lindley and Machin (2013)). The fall in income inequality across most of the distribution in Britain therefore represents a divergence in the trends of male wage inequality and household income inequality, depicted in Figure 4. The 90-10 ratio for both male wages and household incomes was 4.1 in 1994, but while the 90-10 ratio in male wages rose to 4.5 by 2014, the 90-10 ratio in incomes fell to 3.9.

Figure 4. 90:10 ratio for male hourly wages and net household income 1994 to 2014



Note: Household incomes have been measured net of direct taxes and state benefits, and are equivalized using the modified OECD equivalence scale. Years refer to financial years.
Source: Authors' calculations using the Households Below Average Income dataset (which adjusts top incomes for under-coverage using replacement values from the Survey of Personal Incomes).

In explaining that divergence, we document a number of facts. Over the last two decades, male earnings inequality in Britain has increased. This is partly because of an increase in male hourly wage inequality, but also because of a rise in the covariance between male wages and hours worked, driven by a fall in the number of hours worked by low-wage men. Female earnings inequality has fallen across the vast majority of the distribution as inequality in the number of hours worked has fallen. Meanwhile the level of female earnings has caught up to a significant degree with the level of male earnings. Taken together, this has led to little overall change in individual earnings inequality (with U-shaped growth across the earnings distribution), primarily because the catch-up of women acted to offset the increased inequality in male earnings. However, the major force holding down individual earnings inequality – the catch-up of women - was largely reducing inequalities within rather than across households. As a result, *household* earnings inequality increased, driven largely by the higher inequality in male earnings. An increased covariance between the earnings of members of couples played a supporting, but smaller, role.

Hence the fall in net household income inequality across the majority of the distribution came despite a rise in household earnings inequality. The operation of the tax and benefit system

for working households was one important reason for this, due to both deliberate increases in redistribution towards poor families with children and the support provided by the benefits system during the large earnings shock associated with the Great Recession. Finally the relative improvement in the position of both non-working households of working-age and pensioners acted to reduce inequality further over the period: partly also a result of tax and benefit reforms, but partly due to rises in private pension income across successive cohorts of pensioners.

The rest of the paper is set out as follows. Section I discusses the data and methodology. Section II explores the patterns underlying changes in inequality in working households' labour income. Section III analyses how taxes, transfers and other unearned income sources for the same working households have contributed to inequality trends. Section IV assesses how and why the inclusion of non-working households and pensioners affect trends in inequality. Section V briefly discusses the prospects for future trends in UK income inequality. Section VI concludes.

I. DATA AND METHODOLOGY

The analysis is based on the UK's Family Resources Survey (FRS). This is a repeated cross-section containing between 20,000 and 25,000 households in each financial year. It aims to capture all the income received by the household, including labour income, the large range of state benefits and tax credits, and other unearned income such as that from private pensions or dividends. It also records direct taxes paid. These data are collected by the UK government's Department for Work and Pensions (DWP) over the period of a financial year (April to the following March).

Since 1994–95, the FRS has been used by the UK government to produce official National Statistics on average household income, income inequality and poverty. This involves the derivation of net income variables from the FRS data (and, to correct for under-coverage of top incomes, replacement values derived from administrative tax return data), which are published as a dataset known as "Households Below Average Income" (HBAI).[1]

The headline measure of income produced in the HBAI datasets is net household equivalized income. This sums all the sources of income received by each member of the household, deducts direct taxes and adds benefits and tax credits, and then equivalises using the modified OECD equivalence scale.[2] Individuals are the unit of analysis: all individuals (including children) are assumed to receive the equivalized household income of the household to which they belong. Descriptions of all the samples and the measures of income and earnings used in this paper can be found in Appendix Tables A1 and A2.

The high quality measures of income components at both the individual and household level make the FRS/HBAI data well suited for our purposes. At the time of writing the FRS/HBAI data are available from 1994–95 through to 2014–15, so our analysis focuses on this period. Given that Northern Ireland was only included in the data from 2002–03 onwards, for consistency we drop all households from Northern Ireland in the data and focus on trends in Great Britain alone, rather than the UK as a whole.

We adjust for inflation using a variant of the Consumer Price Index which includes mortgage interest payments, as in the official HBAI statistics.[3] We have also cross-checked our analysis of weekly earnings and hourly wages using data from the Labour Force Survey, and found very similar patterns.

As explained in the Introduction, our focus is on explaining movements in inequality across most of the distribution and so we disregard the extreme tails. Hence we restrict attention to

wages, earnings and incomes between the 5th and 95th percentiles of their respective distributions. Note that there is a large amount of overlap (in terms the sample that is used) between the middle 90% of the different distributions we use in the analysis.[4]

This trimming has the advantage of removing those parts of the distribution over which we have most reason to be concerned about measurement error. For hourly wages, the fifth percentile in 2014–15 is around £4.70, which was about 75% of level of the National Minimum Wage.[5] Towards the very bottom of the household income distribution there is little relationship between expenditure and income (except within the bottom 1%, where expenditure is actually decreasing in income); and, focusing specifically on the bottom 1%, modelling work has ruled out consumption smoothing as the sole cause of this and hence has favoured mis-measurement as the major explanation (Brewer, Etheridge and O'Dea, (forthcoming).

At the top of the income distribution, survey data including the FRS are known to under-record incomes. Jenkins (2016) shows that during the 2000s this under-coverage in the FRS tended to apply from approximately the 95th percentile (during the 1990s it was primarily the top 1% that was mis-measured). The official HBAI series applies an adjustment to top incomes for this reason, and recent work by Burkhauser et. al. (2016) has suggested a refinement to the adjustment which reveals 'there was a marked increase in income inequality in the early 2000s that survey-based estimates do not reveal' However, these adjustments are based on replacing incomes at the top with cell-mean values from tax return data. This would not be adequate for the purposes of our analysis because we want to drill right down to the components of income, and indeed to hourly wages. We do, however, note where our findings would be different if we included the very top of the distribution.

To quantify the contributions of different factors to changes in inequality we use decomposition techniques. For this purpose we use three distinct decomposition techniques

and three different summary measures of inequality, in order to understand the contribution to inequality of multiplicative and additive components of income, and changes within and between sub-groups of the population. These are outlined in turn below (see Cowell (2011) and Cowell and Fiorio (2011) for more discussion of measurement and decompositions of inequality).

To decompose the change in inequality in weekly earnings as a multiplicative function of hours and wages, we take the variance of (natural) log weekly earnings and use the following identity:

$$var(log(wh)) \equiv var(log(w)) + var(log(h)) + 2cov(log(w), log(h)) \quad [1]$$

where w is the hourly wage and h is hours worked per week.

To decompose inequality in household earnings as the sum of the earnings of the main earner and those of additional earners, we can decompose the I_2 measure of inequality (half the squared coefficient of variation). Denoting household earnings by Y, with mean μ and variance σ^2, and separating it into two additive components so that $Y = y_a + y_b$, with μ_a, and μ_b the respective means and $\sigma_a^2$and σ_b^2 their variances, then $I_2(Y)$ can be decomposed in the following way:

$$I_2(Y) \equiv \frac{\sigma^2}{2\mu^2} \equiv \frac{\sigma_a^2}{2\mu_a^2}\left(\frac{\mu_a^2}{\mu^2}\right) + \frac{\sigma_b^2}{2\mu_b^2}\left(\frac{\mu_b^2}{\mu^2}\right) + \frac{cov(y_a, y_b)}{\mu_a\mu_b}\left(\frac{\mu_a\mu_b}{\mu^2}\right). \quad [2]$$

The first of the three terms captures inequality in the first income source (which in our application is the earnings of the main earner), scaled by a measure of the aggregate size of that income source relative to total income. The second term is analogous for the second income source (which in our application is the earnings of any additional earners). The third term captures the relationship between the two income sources, scaled by a measure of

inequality between the two sources. In combination, these terms help us to understand the role of changes in inequality of each income source and the covariance between them.

Finally, we decompose changes in inequality into those changes in inequality within and between different groups (such as pensioners and non-pensioners). We use the decomposition of the I_0 measure of inequality ($I_0 = \frac{1}{n}\Sigma_i ln\,(\frac{\mu}{y_i})$), also known as the mean log deviation (MLD). Mookherjee and Shorrocks (1982) show that the change in the MLD can be approximately decomposed into the contributions of changes in inequality 'within' groups, changes in inequality 'between' groups, and changes in the population share of each group:

$$\Delta\, I_0 = \Sigma_k \bar{s}_k \Delta\, I_{0,k} + \Sigma_k \Delta s_k \bar{I}_{0,k} + \Sigma_k \Delta s_k \left(\bar{\lambda}_k - \overline{log\lambda_k}\right) + \Sigma_k (\bar{\theta}_k - \bar{s}_k) log\mu_k \qquad [3]$$

where s_k is the population share of group k, $I_{0,k}$ is the MLD within group k, $\mu_k$is mean income (or earnings) in group k, $\lambda_k = \frac{\mu_k}{\mu}$, and $\theta_k = \lambda_k s_k$. In all cases, a bar over a variable indicates an average of start and end period values.

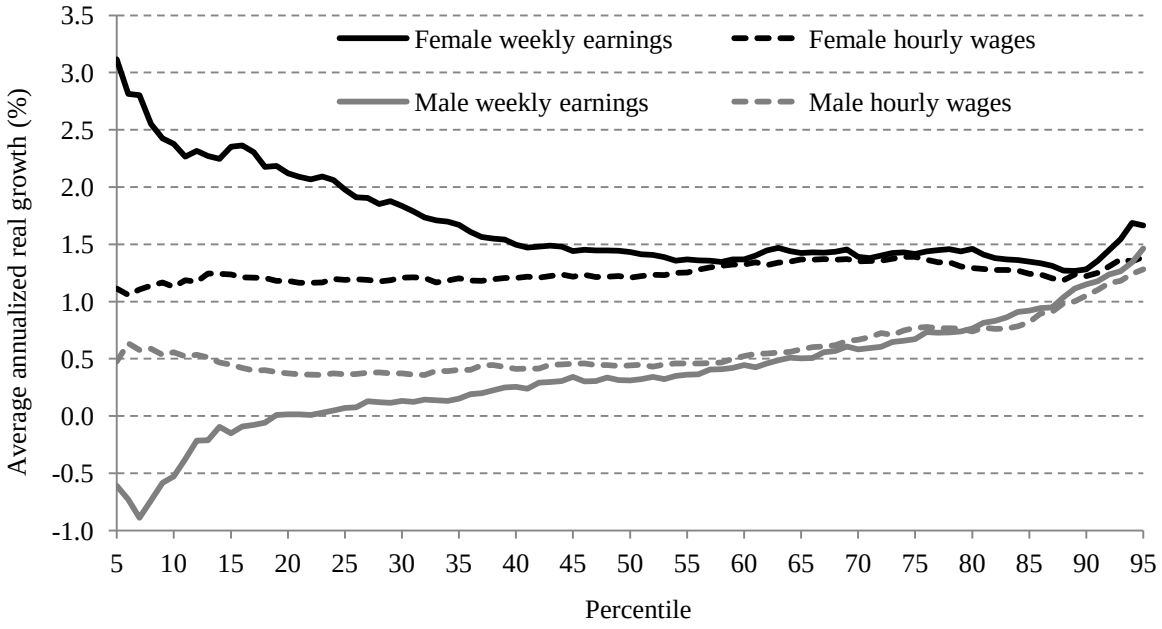
II. THE LABOUR MARKET AND HOUSEHOLD EARNINGS

We start by describing trends in inequality in individual employees' earnings, for men and women separately. We initially restrict attention to the earnings of employees of working age. This means men below 65 and women below 60, in accordance with the state pension ages prior to 2010. Since 2010, the state pension age for women has risen above 60 (see Cribb et al 2016), but we keep the upper age bound fixed so as to limit compositional changes in the sample over time The lower age bound is 16, or 20 if in full-time education and living at home. Of course participation in higher education has increased over the period, which does induce some compositional changes in the workforce over time for the youngest adults.

We exclude the self-employed while we separate the contributions of changes in hours worked and hourly wages, because the measurement and interpretation of hours worked for the self-employed is problematic. We do add in self employment income later in the section and discuss its effects, though it is worth noting that this is likely to be measured less reliably: a large proportion of the self employed report their income for a financial year prior to the survey year, and 30% are unable to provide information from accounts prepared for HM Revenue and Customs.

Figure 5 shows average annualized real growth in weekly earnings and hourly wages for men and women between 1994 –95 and 2014–15, by percentile point. Three points are evident. First, for both hourly wages and weekly earnings, the gap between men and women has narrowed: growth for women has been significantly higher than for men (e.g. at the median, real wage growth averaged 0.5% per year for men and 1.3% for women). Second, there have been increases in wage and earnings inequality for men. Third, there has been a decline in inequality in female weekly earnings, driven by particularly large rises in female earnings towards the bottom of the distribution. The lack of any noticeable impact of the introduction (in 1999) and subsequent increases in the National Minimum Wage on wages towards the bottom of the distribution is consistent with Stewart (2012), and is explained by the fact that the minimum wage is set at a low level – around the 5th percentile of the wage distribution in 2013 (see Low Pay Commission 2014) – combined with a lack of "spillovers" onto higher percentiles of the distribution.[6]

Figure 5. Weekly earnings and hourly wage growth, men and women, 1994–95 to 2014–15



Note: Sample contains male/female working age employees. Source: Authors' calculations using the Family Resources Survey.

To understand these changes more rigorously, we decompose the change in the variance of (log) weekly earnings into that caused by changes in inequality in hours, that caused by changes in inequality in hourly wages and that caused by a change in the covariance between hours and wages. Table 1 does this for men and women separately, for the period as a whole and four sub-periods (1994 to 1997, 1997 to 2004, 2004 to 2007 and 2007 to 2014). In particular, this allows us to look at the period of "inclusive growth" (1997 to 2004) and since the Great Recession (2007 to 2014) separately. All figures are scaled by a factor of 100 for the purposes of presentation.

For men, there have been steady increases in earnings inequality. Increasing inequality in male hourly wages was the most important factor, but an increased covariance between hours and wages has also played a significant role.

Table 2 shows that the increase in covariance between male wages and hours was driven by a decrease in the hours worked by men with low hourly wages. The average hours worked by

men in the second decile of the wage distribution fell by 11.4% between 1994–95 and 2014–15, with a 14 percentage point increase in the proportion working part-time (under 30 hours a week). There was also a increase in hours worked towards the top of the hourly wage distribution (a 3.7% increase over the period for the ninth decile). Hence changes along the *intensive* margin of male labour supply (and potentially demand for that labour since the recession) have played a more important role in explaining recent changes in inequality than one might have expected, given the traditional view that male labour supply varies little along the intensive margin.

Table 1. Decomposition of the change in variance of log earnings (×100)

			Contribution to change		
	Variance of log earnings at start of period	Change in variance of log earnings	*Variance of log hours*	*Variance of log wage*	*Covariance of log hours and log wage*
			Men		
1994-1997	18.18	2.22	0.74	1.02	0.45
1997-2004	20.39	2.82	0.29	1.52	1.01
2004-2007	23.21	0.82	0.06	0.12	0.64
2007-2014	24.03	2.72	0.26	1.99	0.47
1994-2014	18.18	8.58	1.35	4.65	2.58
			Women		
1994-1997	41.34	-1.57	-0.66	1.83	-2.74
1997-2004	39.77	-3.99	-3.64	-1.94	1.59
2004-2007	35.78	-0.77	-0.60	0.28	-0.45
2007-2014	35.01	-1.77	-0.68	-0.08	-1.01
1994-2014	41.34	-8.10	-5.57	0.08	-2.60

Note: Sample contains male/female working age employees earning between the 5th and 95th percentiles of the male/female earnings distribution in the year they are observed. Years refer to financial years. Source: Authors' calculations using the Family Resources Survey.

Table 2. Change in weekly hours and part-time work across the male hourly wage distribution

	Percentiles:										
1994–95 to 2014–15	5th – 10th	10th – 20th	20th – 30th	30th – 40th	40th – 50th	50th – 60th	60th – 70th	70th – 80th	80th – 90th	90th – 95th	All
%Δ in mean hours	-11.4%	-11.4%	-9.0%	-6.2%	-3.7%	-1.7%	-1.3%	0.6%	3.7%	3.3%	-3.8%
Δ in % working part time (ppt)	13.6	14.1	7.6	4.5	3.3	1.8	1.9	2.3	0.5	0.2	4.5

Note: Sample restricted to male working age employees. "All" only includes 5th to 95th percentiles of male hourly wage distribution. Years refer to financial years. Source: Authors' calculations using the Family Resources Survey.

The bottom panel of Table 1 shows that over the same period the variance of log female earnings fell, and that this was primarily driven by falls in inequality in the hours worked by female employees, which occurred in each sub-period shown. This is an intuitive consequence of increasing labour market attachment among women. The proportion of female employees working full-time (at least 30 hours per week) rose from 61% in 1994–95 to 66% in 2014–15. Importantly the fraction of female employees working very low hours (under 16 per week) fell from 14% to 6% over the same period.

When examining men and women together, the changes in inequality in employee earnings are rather different to those when looking at men and women separately. Figure 6 shows the growth incidence curve for individual employee earnings since 1994–95. Changes in earnings inequality overall have been modest, with a U-shaped pattern: growth has been higher in the upper and lower parts of the distribution than in the middle. When looking across the middle 90% of the distribution on which we focus in this paper, the net result is a small fall in inequality according to the MLD - though if we were to include the top tail (up to the 99th percentile) the MLD would suggest an increase.

Table 3 displays a decomposition of the MLD measure of individual earnings inequality into changes within and between men and women (using the methodology described in Section I),

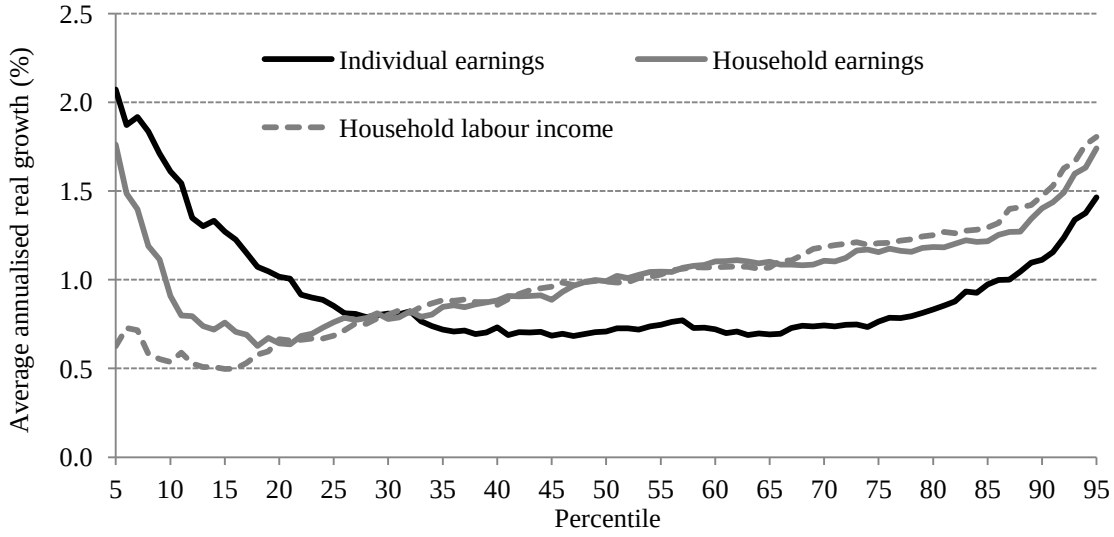
with all figures again scaled by a factor of 100 for ease of presentation. Looking across the middle 90% of the earnings distribution changes in earnings inequality within sexes acted to increase the MLD by 0.78 (driven by men, as we have seen). However, this was more than offset by changes in inequality in earnings between the sexes, which acted to decrease the MLD by 1.26. Hence it is the 'catch up' of female earnings with male earnings that has held down individual earnings inequality in Britain. This is in contrast with the US, where there has been little change in the raw ratio between female and male earnings since the early 1990s, following a significant 'catch up' during the 1980s (Heathcote et. al. 2010).

Table 3. Decomposition of the change in the Mean Log Deviation (x 100) of Earnings by sex

			Contribution to change in Mean Log Deviation			
	MLD at start of period	Overall change in MLD	*Within group inequality*	*Within group - changes in population share*	*Between group - changes in population share*	*Between group inequality*
1994-1997	16.17	-0.08	0.30	-0.05	-0.01	-0.32
1997-2004	16.09	-0.66	-0.07	0.04	0.01	-0.64
2004-2007	15.42	-0.16	0.00	-0.01	0.00	-0.15
2007-2014	15.26	0.46	0.57	0.02	0.00	-0.14
1994-2014	**16.17**	**-0.45**	**0.78**	**0.03**	**0.00**	**-1.26**

Note: Sample contains working age employees earning between the 5th and 95th percentiles of the earnings distribution in the year they are observed. Years refer to financial years. Source: Authors' calculations using the Family Resources Survey.

Figure 6. Growth in individual employee earnings household employee earnings and household labour income 1994–95 to 2014–15



Note: For individual earnings, sample contains working age employees earning between the 5th and 95th percentiles of the individual earnings distribution. For household earnings, sample contains working age adults in households with at least one employee in it, with household earnings between 5th and 95th percentile of the household earnings distribution. For household labour income (which includes income from earnings of employees plus any self employment income) the sample includes working age adults in households with any labour income (5th to 95th percentiles).
Source: Authors' calculations using the Family Resources Survey.

We now make the critical move from individual-level to household-level measures. Figure 6 includes the growth incidence curve for *household* earnings since 1994–95, including all working-age adults in a household where at least one individual is an employee. In contrast with the U-shaped (and mildly inequality-reducing) pattern of changes in individual earnings across most of the distribution, the figure shows that inequality in household earnings has clearly risen across most of the distribution over the last 20 years, with the exception of the bottom sixth of the distribution.

Why has household earnings inequality risen while individual earnings inequality has not? One possibility is that the forces holding down individual earnings inequality have been occurring within, rather than across, households, as women have caught up with men; and that once those within-household changes are washed out when looking at the household level, the increase in male earnings inequality simply leads to an increase in household earnings inequality. Another possibility is that the covariance between the earnings of

individuals in the same household has become more important. Table 4 helps to distinguish these possible explanations. It decomposes the I_2 measure of household earnings inequality (as described in equation (2)) in 1994–95 and 2014–15 into the contributions of inequality in the earnings of the highest-earning individual in the household ('main' earnings), inequality in the earnings of other individuals in the household ('other' earnings), and the covariance between 'main' and 'other' earnings.

Table 4: Decomposing inequality in household earnings into parts affected by distribution of main earners and other earners

	I_2	$= I_2\,(main) \times \frac{\mu^2_{main}}{\mu^2_{all}}$		$+ I_2\,(other) \times \frac{\mu^2_{other}}{\mu^2_{all}}$		$+ \frac{cov(y_{main}, y_{other})}{\mu_{main}\mu_{other}} \times \frac{\mu_{main}\mu_{other}}{\mu^2_{all}}$	
1994–95	0.134	0.120	0.537	0.698	0.071	0.101	0.196
2014–15	0.158	0.155	0.493	0.606	0.089	0.132	0.209
% Change	18%	29%	-8%	-13%	25%	30%	7%

Note: sample restricted working age individuals in households with at least one employee in it, with household earnings between 5th and 95th percentile of the household earnings distribution. Years refer to financial years. "Other earners" refers to the earnings of all employees in the household who are not the individual with the highest earnings. Source: Authors' calculations using the Family Resources Survey.

The increase in household earnings inequality has been driven mainly by an increase in inequality in 'main' earnings. This reflects the fact that most 'main' earners are male, and as discussed above, male earnings inequality increased over the period being examined. Had only $I_2\,(main) = \frac{\sigma^2_{main}}{2\mu^2_{main}}$ changed between 1994–95 and 2013–14, inequality in household earnings would have risen by around 14% (according to the I_2 measure), compared to the 18% increase recorded.

An increasing covariance between the earnings of members of the same household also played a supporting (but smaller) role in increasing household earnings inequality. The table shows that $\frac{\mathrm{cov}(y_{main}, y_{other})}{\mu_{main}\mu_{other}}$ increased by 30% over the 20-year period (dividing by the product of mean main earnings and mean other earnings gives this term the desirable property of

being invariant to general growth in the level of main or other earnings). If only this change had occurred, then (ceteris paribus) household earnings inequality would have risen by 4%.

Given that the increased covariance of individual earnings within households explains only a small portion of the rise in household earnings inequality, the primary reason why individual and household earnings inequality have behaved differently seems to be that the catch-up of women's earnings has primarily decreased inequality within, rather than across, households. Of course this reduction in within-household inequality is an important development in its own right. For couples in the middle 90% of the household earnings distribution, the proportion of household earnings coming from women has risen from under 32% in 1994–95 to 37% in 2014–15.

Finally, Figure 6 also displays the growth incidence curve for total household labour income. This shows that once self-employment incomes (and households with self-employment income but no employee earnings) are included, the growth in labour income towards the bottom of the distribution looks slower. This is the result of two trends. Self-employment incomes at the bottom of the distribution have grown more slowly over the past twenty years than employee earnings for households that have both; and there is a growing group of low-income households whose labour income comes entirely from self-employment (see Tatomir 2015). In summary, adding in self-employment incomes reinforces our conclusion that household labour income inequality has risen.

III. TAXES AND UNEARNED INCOME FOR WORKING HOUSEHOLDS

We have seen that the combined impact of changes in wages and hours for men and women, and how these have combined within households, has been an increase in inequality in labour income across working households over the past 20 years (and even more so once self-employment income is included). Yet we know that net income inequality across most of the distribution (at least the middle 90%) has fallen over that period. We now show that the tax and benefit system is a key explanation for this difference.

We continue to focus on working households so that the sample of households remains the same as at the end of the previous section, although we now include children in working households too, and we equivalise using the modified OECD scale to take account of different household sizes and compositions. We look at changes in the distribution of *gross labour income*, then *gross labour income plus transfers*, which includes any cash transfers (i.e. benefits and tax credits), then *gross income plus transfers*, which additionally includes any other unearned income (such as dividends or property income), and finally *net income*, which deducts direct taxes and is the "headline" measure of household living standards. Note that these measures are all carefully defined in Table A.2.

Figure 7a shows the growth incidence curves for each of these distributions between 1994–95 and 2014–15. Looking at the change in the distribution of gross household labour income, we can see essentially the same pattern that was observed in Figure 6 (the inclusion of children and equivalisation do not have a material effect, as shown in Appendix Figure A.1): stronger growth at higher percentiles of the distribution, with the exception of the bottom 15%.

The figure shows that this increase in household earnings inequality among working households since 1994–95 was largely unwound by the tax and benefit system; and that this unwinding was almost entirely the result of cash transfers, which are targeted towards the

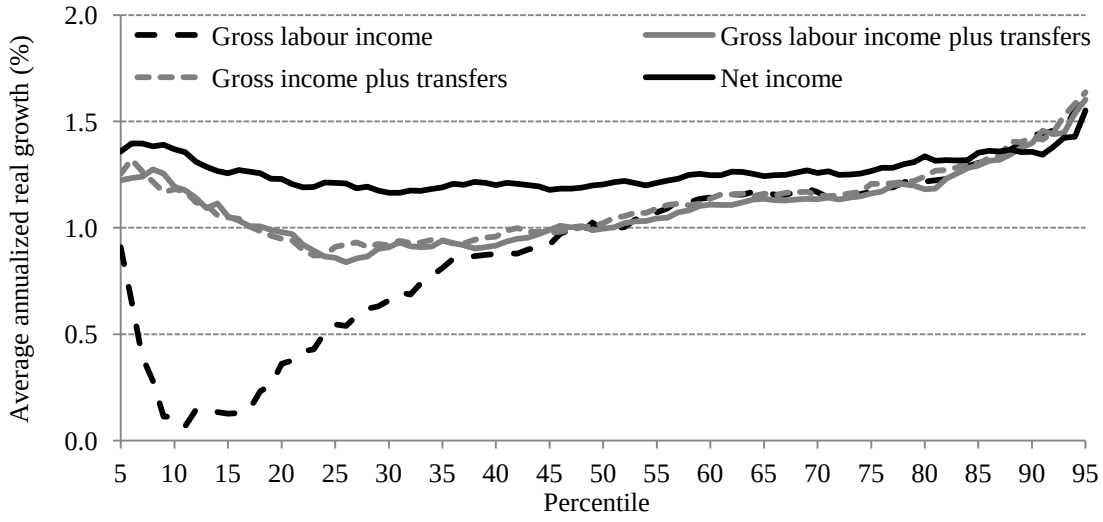
poorer half of working households. Changes in other unearned income have had very little impact on inequality among working households, and while direct taxes were a moderate force for inequality reduction (as would typically be expected due to fiscal drag), their impact on inequality trends was less dramatic.

The role of cash transfers paid to working households in driving inequality trends over the past two decades was largely the result of two very different episodes, shown separately in Figures 7b and 7c. First, there was a large deliberate increase in fiscal redistribution in the late 1990s and early 2000s, whose effects are evident in Figure 7b. This redistribution was particularly focused towards low-income families with children, occurring through the rapid expansion of the tax credit system with the introduction of Working Families' Tax Credit (WFTC) in 1999 to replace its smaller-scale predecessor Family Credit, and then WFTC's replacement with the more generous system of Child Tax Credit and Working Tax Credit in 2003. As a result of these changes, spending on tax credits trebled as a share of GDP between 1997 and 2004, from 0.5% to 1.5%.[7] For more details on these policy changes, see Hills (2013). These policies, and their relationship to the ambitious child poverty targets that the Labour government of the time was pursuing, have been discussed and analysed in detail elsewhere (e.g. Joyce and Sibieta, 2013). The result was that the bottom 40% of the distribution of working households saw larger proportional growth in net income than in gross labour income over the period, while the opposite was true of the top 60%. Note that behavioural effects played a part too: there is evidence that the tax credit reforms significantly increased employment, particularly among lone parents (Harkness and Gregg, 2003; Blundell and Hoynes, 2004).

The second episode that stands out is the period since the Great Recession shown in Figure 7c. While there were some further discretionary increases in the generosity of cash transfers for working households during this period, much of their effect on inequality here can be

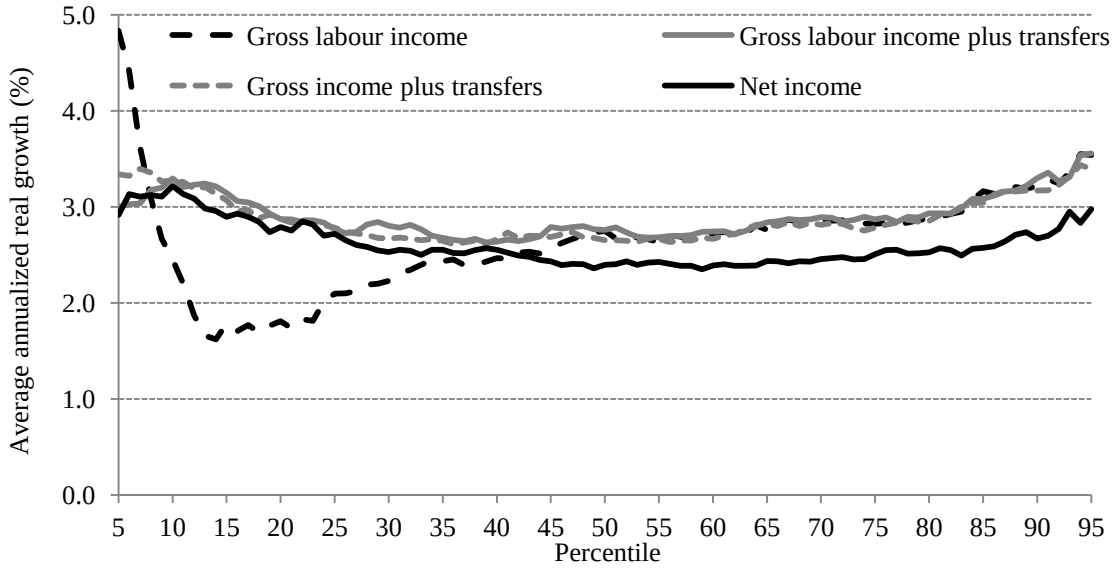
explained by the fact that they act as an insurance mechanism against shocks to earnings. Sharp labour market adjustments associated with the recession in the UK came particularly through falls in real earnings among those in work (rather than the employment rate, which fell from 2007–08 to 2011–12 but grew strongly afterwards). Towards the bottom of the distribution these were cushioned to a large degree by cash transfers: low-earning households get far less of their income from earnings, and far more from price-indexed benefits, than higher-earning households. Belfield et. al. (2015) show that in 2013–14 cash transfers made up nearly 60% of net household income in the bottom decile of the household earnings distribution and around a third in the second decile, but less than 5% across the top half of the distribution.

Figure 7a. Household income growth for working households 1994–95 to 2014–15



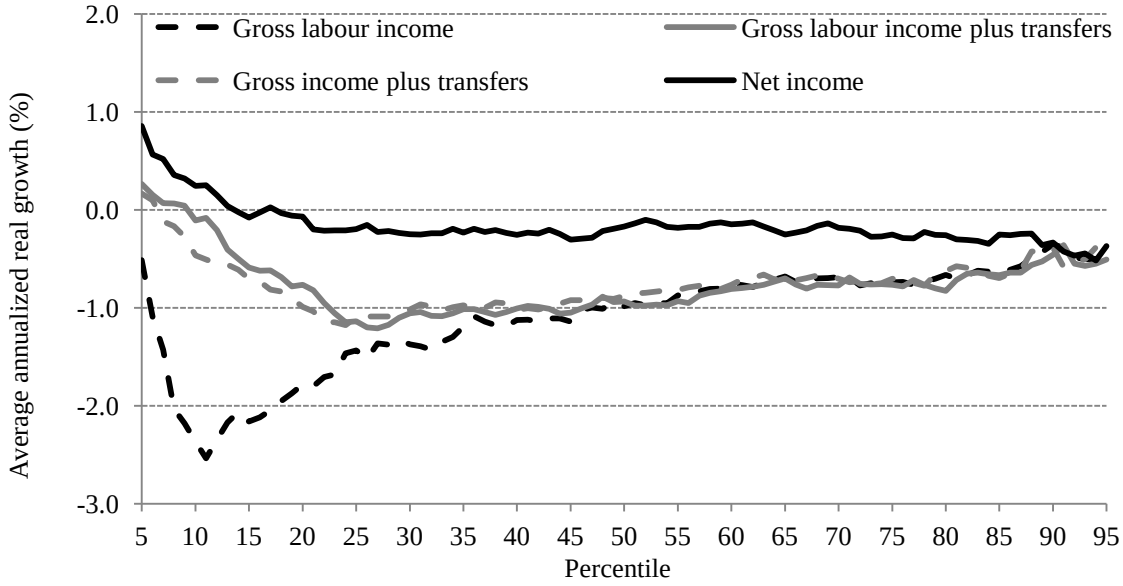
Note: Sample contains all individuals who are not pensioners (including children) living in a household with at least one person in work. All measures of income are equivalized using the modified OECD scale. Source: Authors' calculations using the Family Resources Survey.

Figure 7b. Household income growth for working households 1997–98 to 2004–05



Note: Sample contains all individuals who are not pensioners (including children) living in a household with at least one person in work. All measures of income are equivalized using the modified OECD scale. Source: Authors' calculations using the Family Resources Survey.

Figure 7c. Household income growth for working households 2007–08 to 2014–15



Note: Sample contains all individuals who are not pensioners (including children) living in a household with at least one person in work. All measures of income are equivalized using the modified OECD scale. Source: Authors' calculations using the Family Resources Survey.

IV. NON-WORKING HOUSEHOLDS AND PENSIONERS

So far the analysis has focussed on households of working age who have someone in paid work. Now we show the impact that trends in the incomes of other households have had on overall inequality in net household incomes. We do this in two steps: examining the effect of trends for non-working households of working age, and then including pensioners (defined here as women aged 60 and over and men aged 65 and over).

Table 5 shows subgroup decompositions of changes in the MLD over the past 20 years, focusing only on non-pensioners and splitting them into two subgroups depending on whether or not they live in a working household. The bottom row takes the whole period between 1994–95 and 2014–15. It shows that a narrowing of the gap between working and non-working households (as indicated by the "between group inequality" column) has been a further driver of inequality reduction. The narrowing has occurred largely since the Great Recession, as one would expect given the sharp falls in real earnings alongside the price-indexation of most benefits, which account for most of the income of non-working households. However, the gap also narrowed in the late 1990s and early 2000s (despite fast earnings growth over that period), as generous discretionary increases in benefits had more effect on the mean income of non-working households than the mean income of working households.

Table 5. Decomposition of Mean Log Deviation (x 100) in household income for non-pensioners: working and non-working households

			Contribution to change in Mean Log Deviation			
	MLD at start of period	Overall change in MLD	*Within group inequality*	*Within group - changes in population share*	*Between group - changes in population share*	*Between group inequality*
1994-1997	9.85	0.07	0.36	0.04	-0.21	-0.13
1997-2004	9.92	-0.64	-0.25	0.04	-0.22	-0.21
2004-2007	9.28	0.73	0.58	0.00	0.00	0.15
2007-2014	10.02	-1.00	-0.54	0.01	-0.02	-0.45
1994-2014	**9.85**	**-0.83**	**0.13**	**0.12**	**-0.41**	**-0.68**

Note: Sample contains all non-pensioners between the 5th and 95th percentiles of the non-pensioner household income distribution. Years refer to financial years. Source: Authors' calculations using the Family Resources Survey.

Alongside this narrowing of the income gap between working and non-working households, there was also a fall in household worklessness, particularly in the first decade of the period: the proportion of non-pensioners living in households with no one in work fell from 17.3% in 1994–95 to 13.2% in 2004–05. This trend was particularly marked among lone parent households and, as highlighted above, was caused (at least in part) by behavioural responses to tax credit reforms (see Blundell and Hoynes 2004). The table shows that this fall in household worklessness acted to reduce net income inequality among the non-pensioner population: as the share of the population living in a workless household fell, inequality between workless and working households made less of a contribution to overall inequality (as captured by the penultimate column of Table 5).

Table 6. Decomposition of Mean Log Deviation (x 100) in household income: Pensioners and Non-Pensioners

			Contribution to change in Mean Log Deviation			
	MLD at start of period	Overall change in MLD	*Within group inequality*	*Within group - changes in population share*	*Between group - changes in population share*	*Between group inequality*
1994-1997	9.78	0.08	0.11	0.00	0.00	-0.04
1997-2004	9.86	-0.75	-0.69	-0.01	0.01	-0.06
2004-2007	9.10	0.74	0.77	0.00	0.00	-0.03
2007-2014	9.84	-1.09	-0.89	-0.02	0.01	-0.19
1994-2014	**9.78**	**-1.03**	**-0.70**	**-0.02**	**0.02**	**-0.32**

Note: Sample contains all individuals between the 5th and 95th percentiles of the household income distribution. Years refer to financial years. Source: Authors' calculations using the Family Resources Survey.

Table 6 shows a final set of subgroup decompositions of changes in the MLD, now covering the whole population and splitting that population into pensioner and non-pensioner individuals. Reductions in within-group inequality were important in driving down inequality, but a reduction in income differences between pensioner and working-age households has also played a role – and to a greater degree since the Great Recession. Before the Great Recession the 'catch-up' of pensioners largely reflected a long-running secular increase in private pension provision and in entitlements to state pensions across successive cohorts of pensioners – driven in part by policy change and in part by more complete employment histories during the working-age years for successive cohorts, especially among women (for further details and discussion see Hood and Joyce, 2013 and Cribb et al, 2013b). Since the Great Recession it also reflects the fact that pensioners were typically not directly affected by the sharp falls in real earnings, and in fact their state pension entitlements were made more generous rather than less.

V. FUTURE TRENDS IN INCOME INEQUALITY

There are two reasons to think at least some of the fall in inequality caused by the Great Recession was temporary. First, the most direct driver of the fall in inequality was the fact that the recession was associated with large falls in workers' earnings, which comprise more of household income for higher-income households. Hence, if some of the large earnings shock associated with the Great Recession in the UK was temporary, then the part of the reduction in inequality that it caused will be temporary too. Second, because a significant portion of the shock to national income looks likely to have been permanent, the Great Recession caused (and/or revealed) a large structural deficit in the UK government's public finances which at some stage needed to be addressed – at least, this is the assumption made by the Office for Budget Responsibility (Riley and Chote, 2014), the UK government's official fiscal watchdog. Both the Coalition (2010-2015) and Conservative (2015-) governments have chosen to repair that hole in the public finances partly by reducing the generosity of the benefits system, particularly for low-income families with children. This is itself a (partial) reversal of the increase in support for this group between 1997 and 2004 which, while inequality reducing, seems to have been deemed unsustainable by subsequent governments in light of what we know now about the public finances. Essentially this reflects the fact that insurance against shocks to households' living standards provided by the tax and transfer system structurally weakens the public finances – rather than simply acting as an automatic stabiliser over the economic cycle - when part of the adverse shock is permanent rather than temporary.

However, at the time of writing it seems likely that the UK is experiencing its next macroeconomic shock in light of the referendum vote to leave the European Union. This could have its own set of important consequences for the labour market, tax and benefit policy, and income inequality. This would come whilst the fiscal consolidation to repair the

damage to the public finances done by the Great Recession is still ongoing (though those plans may be changed), and possibly before we have returned to trend output. Given the high degree of uncertainty regarding the macroeconomic outlook and government policy, future trends in income inequality are very hard to predict.

VI. CONCLUSION

This paper has analysed changes in earnings and income inequality in Britain over the last twenty years. Focussing on the middle 90% of the distribution we have shown that household earnings inequality has risen and yet net household income inequality has fallen.

The rise in household earnings inequality has been the product of a complex set of interactions between trends in hours and wages for men and women, but it is largely due to a rise in male earnings inequality. This in turn was driven by an increase in the covariance between male wages and hours (mostly because low-wage men have seen a reduction in their hours of work) and an increase in male hourly wage inequality. Female earnings inequality has actually fallen, as inequality in hours worked has fallen. A big catch-up of female earnings with male earnings has held down individual earnings inequality (despite the increase in inequality in male earnings), and importantly has reduced within-household inequality. But because that catch-up of women largely reduced inequality within households rather than across households, inequality in *household* earnings inequality still increased, due primarily to the inequality-increasing trends in male earnings. An increased covariance between the earnings of adults in the same household also contributed.

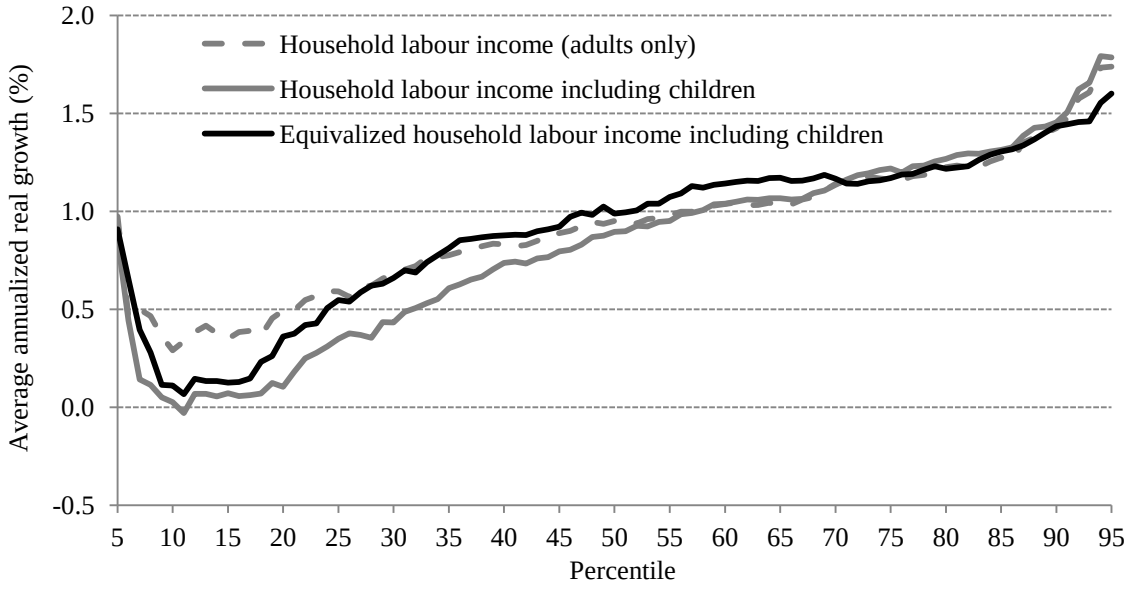
There are several reasons why net income inequality across the vast majority of the distribution has fallen, despite the increased household earnings inequality. Cash transfers for low-earning working households rose relative to earnings - particularly during 1997 to 2004,

which saw large real increases in cash transfers, and since the recession, when transfers grew at least in line with prices and earnings fell in real terms. The increase in the relative generosity of cash transfers also boosted the relative incomes of non-working households of working age, narrowing inequality between them and working households. There was also a reduction in the proportion of people living in workless households. Finally, increases in private pension provision and in entitlements to state pensions has led to a sustained increase in the relative position of pensioners, who were previously a relatively poor group.

Overall, as is well known, changes in inequality since the mid 1990s have been on a smaller scale than the sharp increases seen in the 1980s. But this paper has shown that this was the result of various important and partially-offsetting underlying changes. Male earnings inequality has increased significantly; there has been a large decrease in the difference between the earnings of men and women; there have been large falls in the proportion of people living in workless households; and pensioner income growth has outpaced that of the working-age population. These trends represent key changes in inequalities in their own right, despite the fact that, together, they have led to relatively moderate changes in overall household income inequality.

APPENDIX

Figure A.1. Household income growth for working households 1994–95 to 2014–15



Note: Sample contains all individuals who are not pensioners (including children) living in a household with at least one person in work. All measures of income are equivalized using the modified OECD scale. Source: Authors' calculations using the Family Resources Survey.

Table A.1 Sample Definitions

Term	*Definition*
Working-age	Aged at least 16 (unless they are aged 16-19, living at home and are in full time education) and aged under 65 for men and under 60 for women
Working age Employees	Working-age individuals with strictly positive gross employee earnings
Employed Households	All households which contain at least one employee
Working Households	All households which contain an employee or self-employed adult. Self-employed adults are those with strictly positive self-employment income
Working-age Households	Households containing at least one individual of working-age
All Households	All private households in Great Britain.

Table A.2 Definitions of measures of earnings and income

Variable	*Definition*	*Table/Figures used in*
Hourly wages	Individual gross earnings per hour of employees	Figures 4,5; Tables 1 and 2
Individual (weekly) earnings	Individual gross earnings per week of employees	Figures 5, 6; Tables 1 and 3
Household earnings	Gross earnings from all employees in a household	Figure 6; Table 4
Household labour income	Gross household income from employment or self-employment	Figure 6
Gross labour income	Equivalized gross household income from employment or self-employment	Figures 7a,7b,7c
Gross labour income plus transfers	Equivalized gross household labour income plus state benefits and tax credits	Figures 7a,7b,7c
Gross income plus transfers	Total equivalized household income including state benefits and tax credits (before deducting direct taxes)	Figures 7a,7b,7c
Net (household) income	Total equivalized household income including state benefits and tax credits, after deducting direct taxes	Figures 1,2,3,4, 7a, 7b,7c; Tables 5,6

Table A.3 Sample sizes

	Male employees	*Female employees*	*All employees*	*Employed Households*	*Working Households*	*Working age Households*	*All Households*
1994–95	10,995	10,562	21,557	13,707	14,748	19,275	26,205
1997–98	10,535	9,983	20,518	12,771	13,784	17,481	23,436
2004–05	12,249	12,203	24,452	15,326	16,422	20,625	27,969
2007–08	10,683	10,709	21,392	13,440	14,442	18,120	24,910
2014–15	7,861	7,756	16,587	10,245	11,133	13,690	19,468

Source: Authors' calculations using the Family Resources Survey.

NOTES

1. For methodological details regarding the creation of these data, see https://www.gov.uk/government/collections/households-below-average-income-hbai--2.
2. The equivalence scale expresses all incomes as equivalents for a childless couple. The modified OECD equivalence scale is 0.67 for the first adult in the household, 0.33 for any additional adult or child aged 14 and over, and 0.20 for any child aged under 14.
3. This measure of inflation is produced by the UK's Office for National Statistics for the Department for Work and Pensions. The deflator used in this analysis can be found at: http://www.ifs.org.uk/uploads/publications/bns/bn19figs_2016.xlsx.
4. For example, of the male employees in the middle 90% of the male hourly wage distribution, 98% of them are in the middle 90% of the net household income distribution. The equivalent fraction for female employees is 99%.
5. Analysis using hourly wages often trims hourly wages at a fraction of the minimum wage. For example, Attanasio et al (2015) drop individuals with wages measured to be less than three quarters of the minimum wage in the US.
6. The minimum wage is even less important when understanding changes in household income inequality. The minimum wage does less to boost net incomes towards the bottom of the distribution than in the middle, as those with the lowest hourly wages are not necessarily living in the poorest households and they often lose much of their additional earnings due to the high effective marginal tax rates faced by those on in-work benefits (Elming et al 2015).
7. See https://www.gov.uk/government/collections/benefit-expenditure-tables

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