



# Income inequality and the labour market in Britain and the US

Richard Blundell <sup>a,\*</sup>, Robert Joyce <sup>b</sup>, Agnes Norris Keiller <sup>a</sup>, James P. Ziliak <sup>c</sup>

<sup>a</sup> University College London, Institute for Fiscal Studies, United Kingdom

<sup>b</sup> Institute for Fiscal Studies, United Kingdom

<sup>c</sup> University of Kentucky, Institute for Fiscal Studies, United States

## ARTICLE INFO

### Article history:

Received 31 October 2017

Received in revised form 15 March 2018

Accepted 2 April 2018

Available online 23 April 2018

### Keywords:

Inequality

Family income

Earnings

## ABSTRACT

We study household income inequality in both Great Britain and the United States and the interplay between labour market earnings and the tax system. While both Britain and the US have witnessed secular increases in 90/10 male earnings inequality over the last three decades, this measure of inequality in net family income has declined in Britain while it has risen in the US. To better understand these comparisons, we examine the interaction between labour market earnings in the family, assortative mating, the tax and welfare-benefit system and household income inequality. We find that both countries have witnessed sizeable changes in employment which have primarily occurred on the extensive margin in the US and on the intensive margin in Britain. Increases in the generosity of the welfare system in Britain played a key role in equalizing net income growth across the wage distribution, whereas the relatively weak safety net available to non-workers in the US mean this growing group has seen particularly adverse developments in their net incomes.

© 2018 The Authors. Published by Elsevier B.V. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>).

## 1. Introduction

Over recent decades, substantial changes in the distribution of incomes in both Great Britain (GB) and the United States (US) have placed increased pressure on government budgets.<sup>1</sup> Declining employment and stagnant wages – each of which have affected both countries, to different extents and at different times – translate into reduced tax collections, while increased eligibility for and generosity of social insurance, means-tested transfer payments and work-based credits result in greater expenditures. The latter trend has been reinforced by the interplay between the labour market and the family, with increased inequality in family earnings and in assortative mating.

The aim of this paper is to describe the relationship between inequality in labour earnings and the evolution of family income inequality. Tony Atkinson was the world leader in driving forward the study of economic inequality and its development over time, see Atkinson (1970, 1982, 1993, 1997, 2005). Many aspects of the work we present here take the lead from Tony's inspirational research in this field – in particular, the role of the tax and benefit system in mitigating earnings inequality and the interaction between the labour market and household income inequality, for example Atkinson (1992, 2000) and Atkinson (2006).

Changes in wage inequality have been at the centre of much empirical research in labour economics. This includes large bodies of work

aiming to identify causal channels (e.g. Bound and Johnson (1992); Katz and Murphy (1992); Card and DiNardo (2002); Bowlus and Robin (2004); Lemieux (2006); Autor et al. (2008); Blundell et al. (2016a, 2016b)) and to describe in some detail the key dimensions of change (e.g. Juhn et al. (1993); Katz and Autor (1999); Gosling et al. (2000); Piketty and Saez (2003); Burkhauser et al. (2012); Machin (2015); Guvenen et al. (2017)). However, there has been little systematic cross-country comparative work, and much less attention to the interaction between the tax and transfer system and family earnings in the evolution of household inequality.

Family income inequality differs from wage inequality for a number of reasons. Family labour income depends also on hours of work and on how hours and wages covary between spouses, meaning the interplay between the intensive margin and jointness of the labour supply decisions, which may be heavily influenced by assortative mating in the marriage market (Blundell et al., 2016a, 2016b). In addition, the tax and transfer system can be a very important bridge between family labour income and living standards, through taxes, work-contingent credits and social assistance transfers. Tax and transfer systems are typically quite nonlinear, especially at low-incomes, and this can lead to very different inferences about levels of household income inequality; and major reforms to these systems can and do have large effects on the income distribution.

We examine the labour market and tax and transfer system in its relationship with household income inequality in Britain and the US spanning the 36 years from 1979 to 2015. The approach we take is descriptive, but informed by structural changes in potentially-selective labour force participation, hours of work, assortative mating and income

\* Corresponding author.

E-mail address: [r.blundell@ucl.ac.uk](mailto:r.blundell@ucl.ac.uk) (R. Blundell).

<sup>1</sup> We refer to Great Britain (Britain) throughout, instead of the more colloquial United Kingdom, because our data does not contain information on Northern Ireland.

insurance provided by the tax and transfer system across the wage distribution. We develop an approach to study how the intensive margin of labour supply, family structure and the tax and transfer system have interacted over time to affect the link between wages and net family incomes right across the male and female wage distributions.

To set the scene we begin by documenting and contrasting trends in male earnings and net (after-tax and transfer) income in each country. We then systematically trace out the path from individual labour market outcomes through to net family incomes, unpacking the underlying components of income inequality in the following sequence: Employment → Wages → Earnings → Family Structure → Family Market Income → Welfare → Gross Income → Taxes and Work-Based Tax Credits → Net Income. We explicitly consider the link between employment and wages with a median selection approach to bound wages in an effort to address selection into, and out of, the labour force, which has likely changed very differentially between the two countries over time (Johnson et al., 2000; Chandra, 2003; Blundell et al., 2007).

In terms of the labour market, taking a relatively long-term view and considering trends since 1979, the basic background facts are that real wages have grown far less in the US than in Britain – and in fact have not grown at all at the median except for college graduates – while employment trends have looked relatively similar. However, over the past two decades, and especially since the Great Recession, employment has been more robust in Britain while wages have been more robust in the US.

Britain has seen a large increase in male earnings inequality, not just during the much-documented 1980s inequality boom, but also since then. The increase over the past two decades was driven by a broadly secular decline in the hours of work of men at lower wage percentiles: inequality in male hourly wages between the 5th and 95th percentile changed little. The hours of work story has been the opposite among British women, among whom increases at the bottom of the wage distribution have reduced earnings inequality. This has not been enough, however, to stop family earnings inequality from rising. In the US, secular trends in hours worked (among workers) have been less pronounced, albeit with considerable cyclical variation around that, but male hourly wage inequality has increased. Meanwhile, employment among less-skilled men in the US fell over the sample period, and since 2000 has even fallen among higher-educated, and remarkably for women of all skill levels after a secular increase in the prior three decades. Using a bounding approach to account for the potential effect of selective entrances and exits from the labour market, we show that – especially since the Great Recession – wage trends among lower-educated groups may be more similar between the two countries than the raw data focused only on workers imply. Nevertheless, the basic qualitative comparisons between the countries prove robust to this bounding exercise.

Even though there were sharp declines in hours of work among men in Britain, and some increase in assortative mating, the British welfare state has stabilized the economic inequality of tax units across the most of the net income distribution over the past two decades. For example, we show that 90/10 net income inequality fell slightly in Britain from 1994 to 2015 even though male earnings inequality increased. In comparison, we show that in the US 90/10 net income inequality rose sharply, suggesting that the US tax and welfare system is less successful at counteracting changes in the labour and marriage markets. The greater stabilization in Britain did come at a considerable fiscal cost, in particular due to large increases in the generosity of tax credits in the late 1990s and early 2000s which led to these credits trebling as a share of GDP from 0.5% in 1997 to 1.5% in 2004.<sup>2</sup>

The paper proceeds as follows. Section 2 gives a brief overview of the key policy context in both Britain and the US. Section 3 discusses the

data we use in the paper, including how we harmonize the measurement of key variables across countries to the extent possible. Section 4 sets out the context of overall changes in net family income inequality in both countries, and how this relates to male earnings inequality. We then unpack the links between these. Section 5 begins with the labour market, including how it interacts with the marriage market, while Section 6 examines the impact of the tax and transfer system. Section 7 then brings these together by systematically tracing the links from wages right through to net family incomes. Section 8 concludes.

## 2. The policy context

During the period considered in this paper there have been a number of key policy changes in both countries that are relevant for our analysis. In Britain there were significant cuts to income taxes during the 1980s, especially for higher earners. The top marginal income tax rate fell from 60% to 40% in 1988, and the basic rate of income tax fell in stages through the decade from 30% to 25%. Since 1994, which – for data reasons – we focus on for much of the analysis, the basic rate of income tax has fallen further in a number of incremental steps to 20%, and since 2011 the zero-rate band has been expanded rapidly. However, fiscal drag and some discretionary policy changes have pulled many more individuals into the higher tax bracket: the number paying the marginal rate of at least 40% has more than doubled since 1994.<sup>3</sup> The net result is that the income tax system has become more progressive in recent years (with the opposite having happened in the 1980s).

Since the late 1990s much of the key policy change in Britain has been on the transfer side. The Labour governments of 1997 to 2010 presided over large increases in the generosity of social assistance and tax credits, in large part as a means of pursuing ambitious quantitative child poverty targets for 2010 and 2020 (Joyce and Sibieta, 2013). The term ‘tax credits’ in Britain is in fact used to describe two very different forms of support: a genuinely work-contingent transfer<sup>4</sup>, currently named Working Tax Credit (WTC), and an additional means-tested element specifically for families with children (Child Tax Credit, CTC) which is available – since 2003 – to low-income families irrespective of work status. The out-of-work safety net was also made significantly more generous for families with children under Labour. Since 2011, however, a broad-based set of cuts to means-tested working-age transfers have been implemented as part of post-recession fiscal consolidation measures. These are clearly evident in the analysis we present later up to 2015, but they continued after that and are set to continue for several more years.

Another important policy change in Britain was the introduction of the National Minimum Wage in 1999. It was subsequently increased in several stages, and by 2015 (the end of our period of analysis) it covered around 4% of employees. It is, however, now being extended much further and is set to cover around 12% of employees by 2020 (Cribb et al., 2017).

Like Britain, the economic landscape of the United States over the past several decades has been characterized by massive changes to tax and welfare policy. The Economic Recovery Tax Act of 1981 and the Tax Reform Act of 1986 jointly broadened the tax base and reduced the number of federal income tax brackets from 16 to four, with the marginal tax rate on the highest income earners dropping from 70% to 28% by 1989 (Auerbach and Slemrod, 1997; Burman et al., 1998; Kniesner and Ziliak, 2002). The subsequent tax changes over the ensuing two decades eventually led to a return to seven marginal tax

<sup>2</sup> See Department for Work and Pensions benefit expenditure tables: <https://www.gov.uk/government/collections/benefit-expenditure-tables>.

<sup>3</sup> See Table 2.1 of HMRC Statistics (<https://www.gov.uk/government/statistics/number-of-individual-income-taxpayers-by-marginal-rate-gender-and-age>).

<sup>4</sup> Eligibility for work-contingent transfers in GB operates via ‘hours rules’: minimum numbers of hours that must be worked by the family in order to qualify (minima which vary by family type). Transfer entitlement is then tapered away once family income exceeds a certain level.

brackets and a top rate of 39.6% by 2009. Although the tax reforms expanded the standard deduction and personal exemption amounts, and thereby removed several million low-income households from the federal tax rolls, there were strong incentives for these families to file in order to claim refundable tax credits for workers; namely, the Earned Income Tax Credit (EITC) and the Additional Child Tax Credit (ACTC).

The EITC was created in 1975 and targeted to low-wage workers (Nichols and Rothstein, 2016). The generosity was expanded several times in the 1980s and 1990s, and by 2014 the maximum credit was \$5460 for a family with two qualifying children and annual earnings under \$17,580. Over 28 million taxpayers claimed the credit that year at a current-year cost of over \$68 billion, or 0.4% of GDP. The non-refundable Child Tax Credit and refundable portion ACTC were established in 1997 and (currently) provide a credit against tax liability of \$1000 for each child under the age of 17. Initially eligibility was restricted to workers with annual earnings in excess of \$10,000 in 2001 (and indexed to inflation thereafter), and most benefits went to the middle and upper-middle class. As part of the 2009 response to the Great Recession, the eligibility limit was lowered to \$3000, thus better targeted the ACTC to part-time and part-year low-income workers. By the 2014 tax year, expenditure on the ACTC program exceeded \$30 billion, or 0.2% of GDP.

Concomitant with falling marginal income tax rates and expanding credits were substantial expansions in the payroll tax, which is used to finance Social Security retirement benefits, disability benefits, and Medicare health insurance for the elderly and disabled. While the rates have not changed since 1991 (15.3% combined employer/employee rate), the base applicable to Medicare tax (2.9 percentage points of the 15.3) was uncapped that year, and the retirement and disability benefit base subject to taxation was indexed to inflation and by 2014 was \$117,000.

Alongside the major changes to tax legislation were wholesale changes to means-tested transfers during the 1990s. The reforms altered significantly the economic rewards to work and to participation in transfer programs, and affected all segments of the low-income population. Some programs retrenched, while others witnessed dramatic growth (Ziliak, 2015). The 1996 Personal Responsibility and Work Opportunity Reconciliation Act abolished the cash welfare program Aid to Families with Dependent Children, which was an entitlement program for low-income and low-asset (single-mother) families with children under age 18, and replaced it with the time-limited, block-grant program Temporary Assistance to Needy Families (TANF). TANF limited eligibility to no more than five years, and less at state discretion, and imposed work requirements and numerous other restrictions on eligibility (Ziliak, 2016). While this program change effectively eliminated out-of-work cash welfare in the US, since 2000 there was huge growth in food assistance spending from the Supplemental Nutrition Assistance Program (aka food stamps), in health insurance coverage for children—first with state-directed Medicaid expansions, then federal creation of the Supplemental Children's Health Insurance Program, and finally the 2014 rollout of the Affordable Care Act—and steady growth of disability benefits both related to work (Disability Insurance) and childhood (Supplemental Security Income). Taken together, inflation-adjusted spending on the major US social insurance and means-tested transfers grew 60% to over \$2 trillion by 2010, or over 13% of GDP (Ziliak, 2015).

### 3. Data

We begin by providing a brief overview of our data sources, followed by a detailed description of how the various labour market and income sources were measured. We endeavoured to the extent possible to harmonize the datasets across countries over the past three and a half decades to provide a consistent and comprehensive portrait of the economic circumstances of individuals and their families in Britain and the United States.

#### 3.1. Great Britain

For the research on Britain, we draw on two distinct sources of data: the 1979–1993 survey years of the Family Expenditure Survey (FES), and the 1994–2015 survey years of the Family Resources Survey (FRS).<sup>5</sup> Both datasets are annual household surveys and are commonly combined in this manner, including in the calculation of official statistics on poverty and inequality. The FES and FRS collect data on various sources of income received and taxes paid close to the time of interview, and all income and tax amounts are based on the self-reported values. A very small fraction of income components (typically less than 1%) suffer from non-response and any missing values are imputed. However, as neither survey identifies the observations and income components that have undergone imputation, we are unable to restrict our sample to those without any imputed information. We restrict our sample to men and women aged 25–55 to focus on the prime working-age population, and thereby abstract from the part of the lifecycle where most human capital investments occur and that part associated with retirement.

#### 3.2. United States

For the US analysis, we use the Current Population Survey Annual Social and Economic Supplement (ASEC) for the 1980–2016 survey years. The ASEC is a stratified random sample of 60,000–90,000 household addresses from the noninstitutionalized population in the US. It serves as the official source of income and poverty statistics and has been the workhorse dataset for research on wage and income inequality. As with the British data, we restrict our focus on men and women aged 25–55. However, there are some important distinctions in the ASEC. First, all information refers to prior calendar year rather than the time immediately prior to the interview, as in the British data. Second, taxes and tax credits are self-reported in the British data, whereas the ASEC does not collect tax information. Instead we run the ASEC data through NBER's TAXSIM simulation program, which assumes 100% take-up among those eligible for tax credits. Third, nonresponse to earnings questions, and to the entire ASEC altogether, has been on the rise (Bollinger and Hirsch, 2006; Bollinger et al., 2017), and the US Census Bureau imputes values to nonrespondents. We drop those with imputed earnings and hours and reweight the ASEC data as described below.

#### 3.3. Measuring labour-market outcomes and incomes

The primary economic outcomes in our analysis are employment, hours, real earnings and wages, and real before-tax gross income, and real after-tax and transfer (net) income.

##### 3.3.1. Employment rate

In the British data, we measure the employment rate as the fraction of the population aged 25–55 employed during the survey week (sometimes referred as employment per capita). The measure is the same in the US, except employment is for any time in the prior year.

##### 3.3.2. Hours of work

In both countries, hours of work refers to usual hours worked per week, where the reference period in Britain is “typical” hours in the current financial year, while in the US it is typical hours in the prior year. The data from Britain distinguishes between paid ‘basic’ and both paid and unpaid overtime hours. The hours measure we use is defined using paid basic and paid overtime hours only in order to more accurately reflect trends in formal labour market arrangements. No such

<sup>5</sup> Prior to 1993 the FES was collected on a calendar-year basis, while from 1993 onwards it was collected on an April–March financial year basis. The FRS began in 1994 with an annual sample of around 20,000 households, roughly double that of the FES, and was also collected on an April–March financial year basis.

distinction is made in the US. Overtime hours in the US primarily only apply to workers paid by the hour, and those workers are eligible to be paid 1.5 times the normal hourly wage.

### 3.3.3. Real earnings and wages

In the British data, information on earnings is obtained by asking respondents the amount they were paid on the pay date closest to interview. Raw responses are converted into nominal weekly amounts and we additionally convert these nominal values to real terms using a modified Consumer Price Index that includes an adjustment for mortgage interest. In the US, earnings are measured for the past year, and deflated by the Personal Consumption Expenditure Deflator. In both cases we use a 2010 base year. Real hourly wages are constructed as the ratio of weekly real earnings and usual hours per week in Britain, and the ratio of real annual earnings to annual hours of work (hours per week times number of weeks worked). We leave each country's earnings and wages in their respective currencies.

For the analysis that relies on wage information, we exclude those with extreme gender-specific real average hourly wages (below 1st percentile; above 99.9th percentile) and adjust the survey weights using inverse probability weighting. Specifically, for each gender and year, we estimate a saturated probit model of the probability of not having an extreme wage using levels and interactions of age, race, education, marital status, and other demographics. We then divide the survey weight by the fitted probability of not having an extreme wage. For the US, we modify the procedure to also account for non-imputed employment and earnings. The reweighting approach results in consistent estimates under the assumption that the excluded observations are missing mean conditional at random. As we describe in the results section, this assumption is relaxed when we bound the wage series with worst-case bounds to account for possible nonrandom selection into employment.

### 3.3.4. Gross and net income

As we are ultimately interested in changes in family-level outcomes, in addition to individual-level employment and earnings we also construct gross and net income at the tax unit level. Tax units in the Britain are defined as an adult, their partner (married or unmarried), and any dependent children in their care. In the US data they are inferred from household relationship pointers and ages of occupants, where unlike Britain, cohabiting partners in the US do not file jointly.<sup>6</sup>

Our measure of gross income includes the earnings of the primary and secondary earner (if present), transfer income and nontransfer nonlabour income such as rent, interest, and dividend income. In the British data, transfers include all cash transfers and work-based tax credits, including the Child and Working Tax Credits, Child Benefit, Housing Benefit, Income Support and unemployment and disability benefits. For the US data, transfers include Social Security, Disability Insurance, Unemployment Insurance, Workers Compensation, Supplement Security Income, Temporary Assistance for Needy Families (cash only), Supplemental Nutrition Assistance Program (food stamps), Earned Income Tax Credit, and the Additional Child Tax Credit. Some of the benefits are recorded in the surveys at the individual level, and others at the family level. For the former we sum them up across all individuals in the tax unit. For both countries we rely on self-reported information when calculating transfer income (in the US, the EITC and ACTC are simulated with TAXSIM). In both the FES/FRS and the ASEC this approach is known to lead to systematically lower spending estimates than those observed in administrative data (Meyer et al., 2015; Brewer et al., 2017). While our main analysis does not account for such under-reporting, we provide additional results that adjust the self-reported benefit income amounts to match totals taken from administrative data and show headline trends are robust to this.

Net income is constructed as gross income less tax payments, which in the British data includes income tax, employee National Insurance Contributions, and Council Tax.<sup>7</sup> As noted previously, tax payments and credits are not reported in the US data and must be simulated. The NBER TAXSIM program receives as inputs the tax unit marital status, ages of members, number of (child) dependents for (refundable) tax credits, earnings, taxable and nontaxable transfers, and other items. It then returns a simulated estimate of federal, state, and payroll tax liability, inclusive of tax credits. For the payroll tax, we just assign the employee share.

Finally, because household size and composition has changed substantially in both countries in recent decades, we equalise gross and net income using a modified OECD scale.<sup>8</sup>

### 3.3.5. Education

For many of our outcomes we split the sample into education groups, which is a standard proxy for skill and/or permanent income. Variables related to educational attainment in the British surveys have changed over time. In order to create a continuous time series we therefore focus on school-leaving age, which is consistently recorded over the entire 1979–2015 period, and use this indicator of education to define four groups: left education aged 16 years or younger; left aged 17 or 18; left aged 19 or 20; and left aged 21 or older. These age categories roughly approximate the four US education groups of less than high school, high school graduate (or General Equivalency Degree), some college (includes community college and associates degrees), and four-year college or more. Importantly, however, those leaving school at age 16 in Britain receive credentials, whereas they do not in the US, and thus the low-educated group in Britain likely has more qualifications than the typical US “dropout”.

Appendix Fig. 1 demonstrates that there has been substantial education upgrading in both countries since 1979, with a reduction in half of the lowest education group. In Britain, 80% of men and women left school by age 16, and this plummeted to 40% by 2015. The comparable percentages in the US were roughly 20 and 10%, respectively. Notably, the most marked growth in both countries is the highest education level, especially among women when 35 (40)% of British (US) 25–55 year olds attained the equivalent of college or more in 2015, double the rate in 1979.

### 3.3.6. Marital status

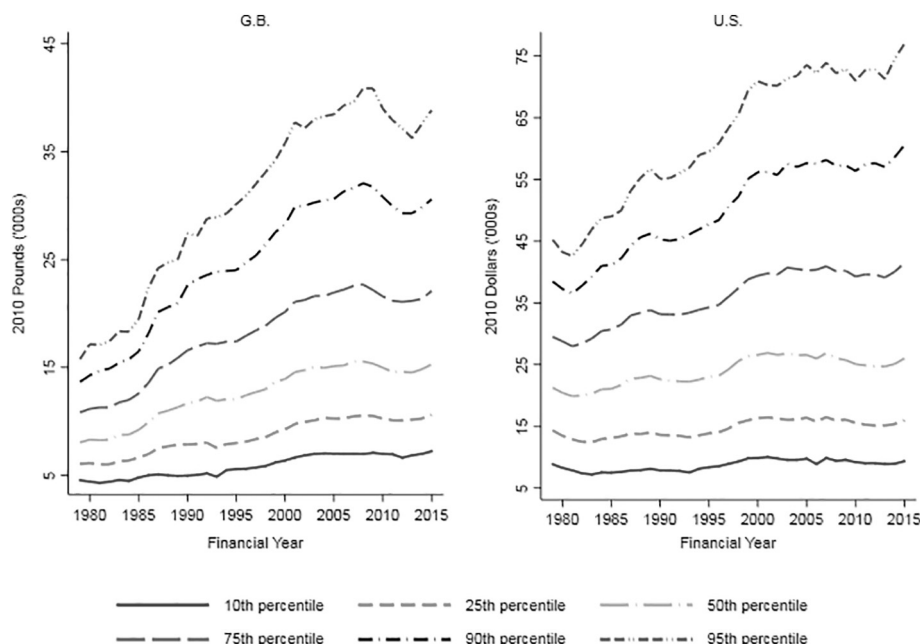
The remaining key demographic outcome that factors prominently in our analysis is marital status. In the British data, couples who are married cannot be distinguished from those who are cohabiting, while in the US data cohabiting couples are treated as unrelated individuals and marriage only refers to those couples in a legally recognized union.<sup>9</sup> Appendix Fig. 2 presents trends in the fraction of men and women married (or cohabiting in Britain) by the four education groups. The substantial retreat from marriage is most evident among the least skilled, especially men in the US. In 1979, the fraction of married US men with high school or less was just under 80%, and greater than the fraction married among those with a college degree. By 2015, the fraction of high school graduates or dropouts who were married was nearly 20 percentage points lower than that of college educated men. Similar

<sup>7</sup> An important institution distinction between the US and Britain is that Britain offers national health insurance, whereas in the US much health insurance is paid for out of net income, which will have the effect of making levels across the countries more comparable.

<sup>8</sup> Equalised amounts are obtained by dividing the unequalised amount by a factor,  $\varphi = 1 + 0.5I[\text{spouse}] + 0.3n_{\text{child } 0-13} + 0.5n_{\text{child } 14+}$ , where  $I[\text{spouse}]$  is an indicator function that equals one if a spouse is present in the tax unit and  $n_{\text{child } 0-13}$  and  $n_{\text{child } 14+}$  give the number of dependent children in the tax unit aged 0–13 and 14 and above, respectively.

<sup>9</sup> Starting in 1995 it has been possible in the CPS ASEC to identify cohabiting partners provided one of the partners was related to the household head. This measure was refined in 2007 to include those unrelated to the head, which resulted in a 20% increase in cohabitation.

<sup>6</sup> The Stata program for constructing the tax unit will be made available at <https://sites.google.com/site/jamesziliak/Home/Research>



**Fig. 1.** Trends in percentiles of tax unit equivalised net income, 1979–2015. Note: Sample is tax units headed by individuals aged 25–55. Individuals with imputed earnings and hours in the US data are excluded and the remaining sample reweighted as described in Section 3.2. Working individuals with hourly wages less than the bottom 1% or greater than the top 0.1% of the gender-specific wage distribution of each country are excluded and the remaining sample reweighted as described in Section 3.3.

patterns hold among US women, and both British men and women, though they are much more attenuated in Britain.<sup>10</sup>

#### 4. Household income inequality

Net income among ‘working age families’ in Britain (denoted as G.B. in all figures) and the US is presented in Fig. 1. It shows strong growth from 1979 to 2015 in household income across the distribution in Britain, and for the top half of the distribution in the US, though relatively flat net incomes in the bottom half, except for the brief window in the late 1990s. The experience in the two countries during the Great Recession, however, was markedly different. Real net incomes fell sharply in Britain, especially in the upper percentiles, while they continued to keep pace with inflation in the US.

Although the top of the income distribution has grown considerably since the mid-1990s in both countries, Fig. 2 shows that the 90/10 ratio of net income inequality has been stable in Britain over this period, while increasing steadily in the US since 2000 (largely due to a rise in the 90/50 not shown in the figure). The British experience of stable 90/10 net income inequality stands in stark contrast to the sharp rise in male (individual) earnings inequality. This suggests the insurance against relatively weak earnings growth provided by family structure and the tax and benefit system may differ substantively from the US where earnings inequality has increased alongside net income inequality. Fig. 2 also highlights that male earnings inequality is much more volatile in the US than in Britain, which as will be seen below, reflects much greater cyclical sensitivity in hours of work, especially among low-income workers.

To verify the trends in net income growth and in net income inequality documented here are robust to potential under-reporting of transfer income, Appendix Figs. 3 and 4 repeat the analysis shown in

Figs. 1 and 2 using a measure of net income that rescales transfer income to match transfer spending totals taken from administrative data.<sup>11</sup> Appendix Fig. 3 shows this adjustment leads to slightly stronger net income growth at the bottom of the distribution in both countries. Appendix Fig. 4 shows 90/10 net income inequality in both countries is slightly lower when one accounts for under-reporting of transfer income, although trends in inequality are broadly similar to those shown in Fig. 2, particularly since 1994 which is the period we focus on in later analysis.<sup>12</sup>

#### 5. The changing labour market and the changing wage distribution

The dramatic differences in Britain and the US in terms of overall after-tax and transfer income inequality, in contradistinction to the rising male earnings inequality in both countries, forms the basis for the ensuing analysis, where we first examine differences in employment and wages in each country.

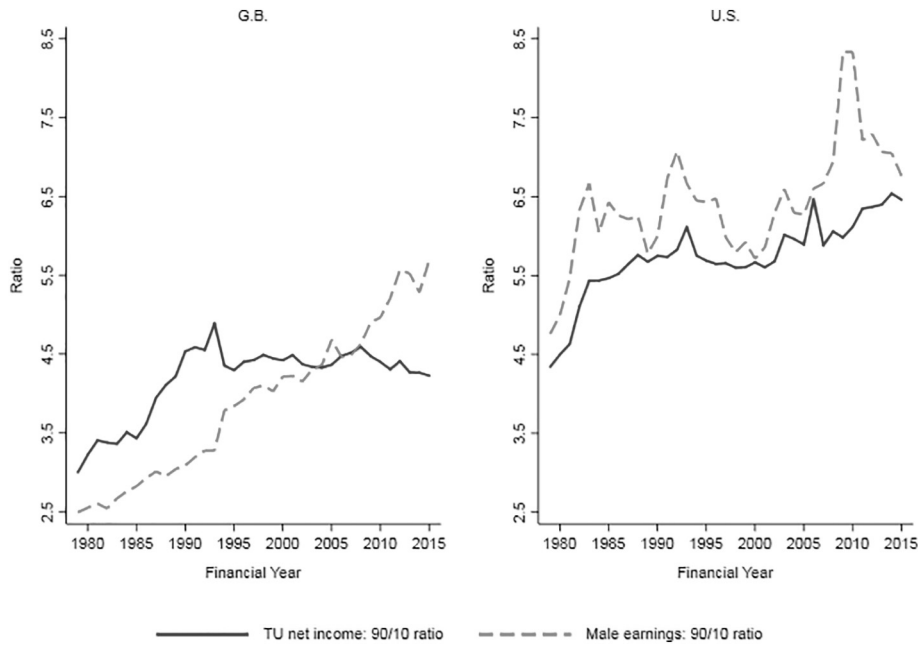
##### 5.1. Employment, hours and wage inequality by gender, education and race

Fig. 3 sets out employment rates over time in both countries, by gender and education level. Comparing levels of employment, perhaps the most striking difference is how much larger the gap between the highest- and lowest- educated is in the US than in Britain – especially for women. Part of this difference is explained by the fact discussed in Section 3.3 that the lowest education group in the US are less likely to

<sup>10</sup> The 1990 discontinuity in the GB series is due to a change in the marital status question in the FES, which increased the proportion of individuals classed as cohabiting.

<sup>11</sup> In the US data each component of transfer income (TANF, SSI, SNAP, EITC, CTC) is rescaled so that total spending on each program measured in our sample matches the spending total taken from administrative data. In the British data we rescale transfer income to match administrative spending totals separately for 3 major benefit categories – housing benefit, disability benefits and tax credits – and all other transfer income. We implement this adjustment in the British data from 1994 onwards only, as separate components of transfer income are not observed prior to this.

<sup>12</sup> The increase in 90/10 net income inequality in the US is 18% from 1994 to 2015 in Fig. 2, while it is 15% in Appendix Figure 4.



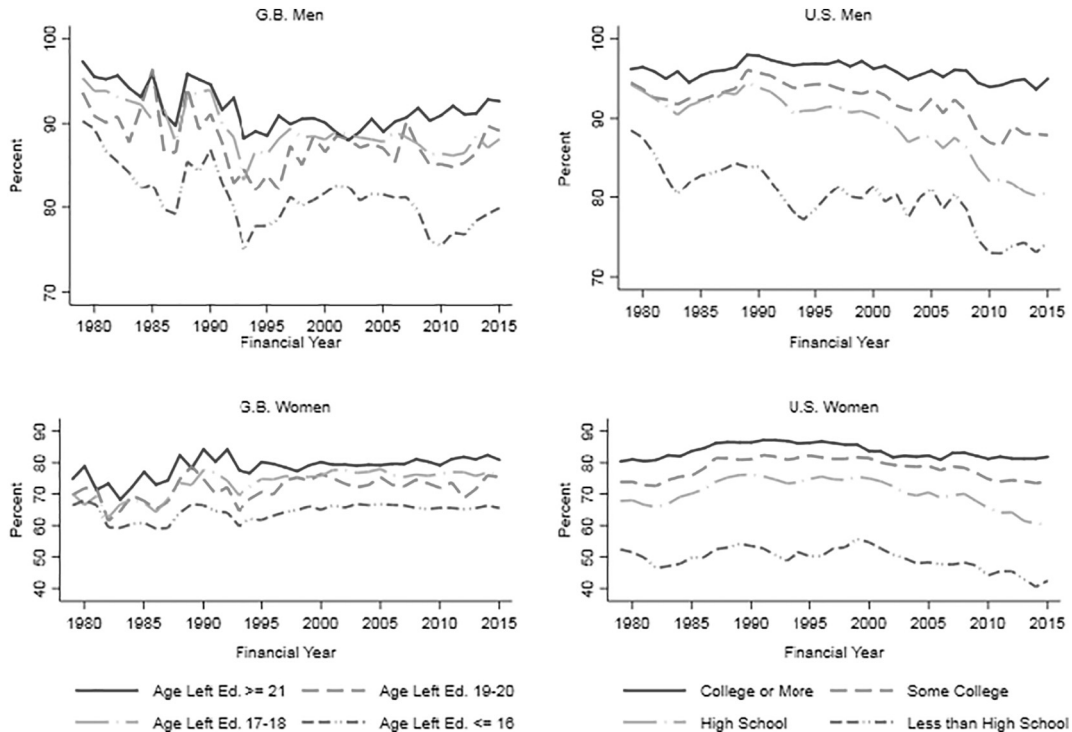
**Fig. 2.** Trends in inequality of tax unit equivalised net income and male earnings, 1979–2015. Note: The net income ratio is calculated on the sample of tax units headed by individuals aged 25–55. The male earnings ratio is calculated on the sample of men aged 25–55 with positive earnings. Individuals with imputed earnings and hours in the US data are excluded and the remaining sample reweighted as described in Section 3.2. Working individuals with hourly wages less than the bottom 1% or greater than the top 0.1% of the gender-specific wage distribution of each country are excluded and the remaining sample reweighted as described in Section 3.3.

have obtained formal educational qualifications than the equivalent group in Britain.

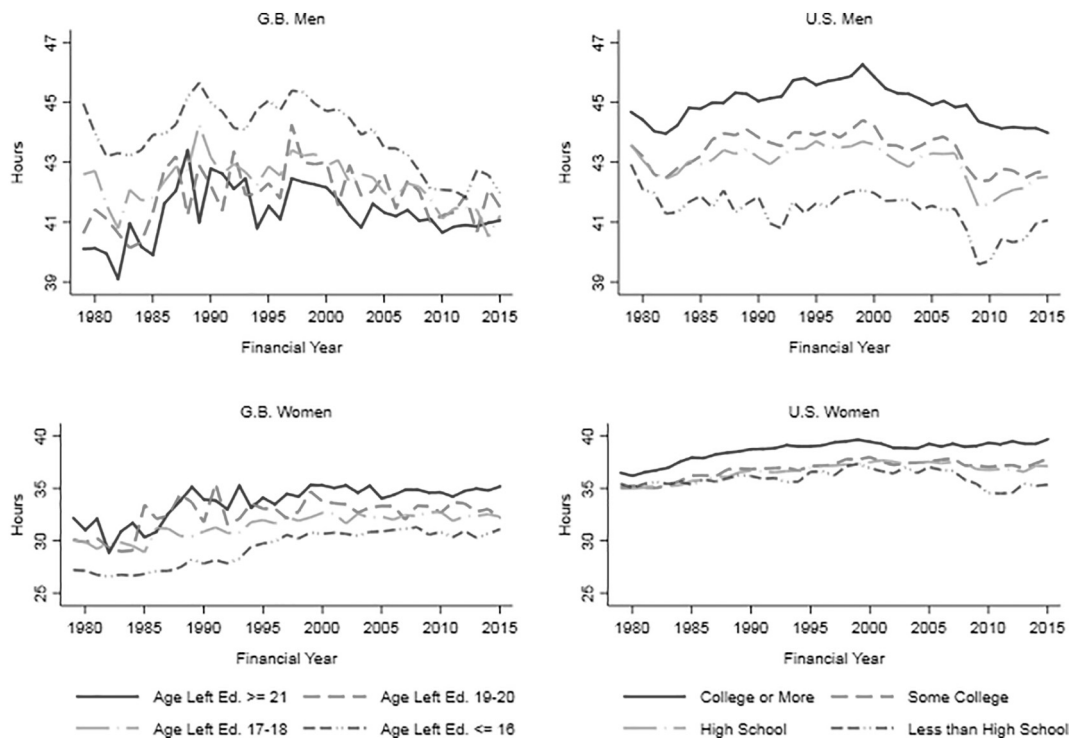
Looking at trends over time, male employment rates in both countries are lower than they were in 1979, especially for the lowest educated. However, in the US this is driven by a broadly secular decline since around 1990. In Britain, by contrast, male employment has been on an upward trend since the early 1990s (punctuated temporarily by the Great Recession), after falling sharply through much of the 1980s

and during the early 1990s recession. The result has been a marked convergence of male employment rates in the two countries over the past 25 years, from a starting point at which male employment in the US had been considerably higher for all but the lowest educated.

Among women, employment was stable or gently rising in both countries during the 1980s, but again it has since been in secular decline in the US – especially for the lowest-educated – while remaining stable or increasing slightly in Britain. Over approximately the past 25 years,



**Fig. 3.** Trends in employment rates by education and gender, 1979–2015. Note: Rates are defined as a percentage of the non-institutionalized population aged 25–55. Individuals with imputed earnings and hours in the US data are excluded and the remaining sample reweighted as described in Section 3.2.



**Fig. 4.** Trends in weekly hours worked by education and gender, 1979–2015. Note: Sample is individuals aged 25–55 with positive earnings. Individuals with imputed earnings and hours in the US data are excluded and the remaining sample reweighted as described in Section 3.2. Individuals with hourly wages less than the bottom 1% or greater than the top 0.1% of the gender-specific wage distribution of each country are excluded and the remaining sample reweighted as described in Section 3.3.

trends in employment have been much more robust in Britain than in the US and this has been especially evident since the Great Recession.

Appendix Fig. 5 documents further heterogeneity in employment trends by disaggregating by race and education groups.<sup>13</sup> This shows the employment rate of less-skilled non-white men in both countries is substantially lower than the rates observed among other groups of men, especially in US. Higher-educated black men have employment rates comparable to high school dropout white men in the US, and the gap between both of those groups and higher-educated white men has expanded in the last decade. Remarkably, there is no race gap in employment for US women, only a gap based on education attainment.

It is not just the extensive margin of employment that has been important in driving changes in incomes and inequality. Fig. 4 documents mean hours of work among workers in the two countries over time, split by gender and education. The figure shows a large difference between the US and Britain in the patterns of male employment at the intensive margin across skill groups with higher-educated men working far more hours than the low-educated in the US and vice versa in Britain. However, this contrast is in part due to differences in the treatment of unpaid overtime in the hours measure used in each country, as discussed in Section 3.3. Specifically, accounting for unpaid hours worked in Britain leads to the same ranking of education groups observed in the US, as unpaid work increases the average hours worked by the highest education group while leaving average hours of lower-educated workers largely unchanged. For women the relationships across skill groups are the same in both countries, with higher educated women working more hours; but US women work considerably more hours than their British counterparts, on average.

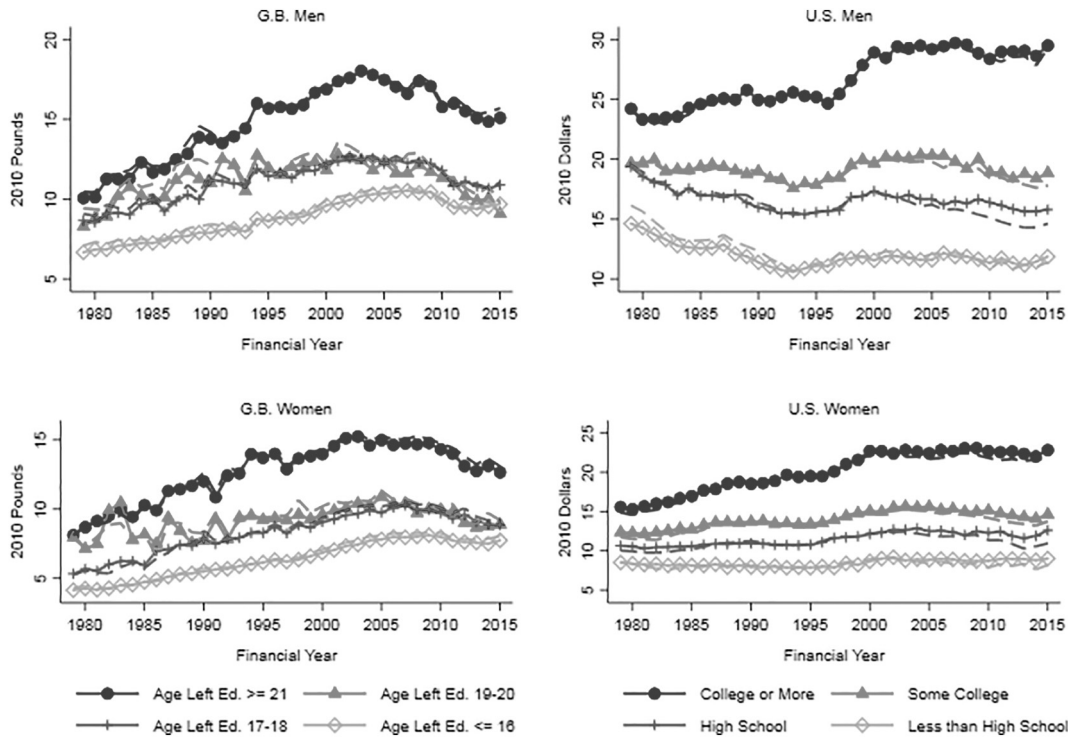
<sup>13</sup> We focus on white/non-white comparisons in Britain and white/black comparisons in the US. In Britain the racial categories are not consistently defined prior to 1994, and the small sample sizes of non-black minority workers led us to pool them in with black workers. We collapse education in Britain to be age of school leaving less than 17 and greater than or equal to 17, and for the US to less than high school and high school or more, in order to maintain sufficient sample size.

Among women, average hours of work have been quite stable in both countries in recent decades, after rising during the 1980s. The one exception is the lowest-educated women in the US, whose hours of work have fallen since the mid 2000s. For men the key pattern has been a large convergence in hours of work across education groups in Britain. This has been driven by particularly large falls in hours among the lower-educated.

Appendix Fig. 6 provides some detail behind this, showing percentage point changes in rates of “mini-jobs” (less than 16 h per week), part-time work (less than or equal to 30 h per week) and especially long hours of work (greater than 45 per week) between 1994 and 2015 across the hourly wage distribution. This highlights that reductions in hours of work among British men are in fact particularly concentrated in the bottom quintile of the hourly wage distribution and have been driven by both a reduction in the prevalence of long hours and an increase in the prevalence of part-time work. There has also been a sharp fall in the prevalence of “mini-jobs” among women in the bottom quintile of the wage distribution in Britain.<sup>14</sup> By contrast, the hours changes among men and women in the US have been far more uniform across the wage distribution.

Following from these changes in employment, Fig. 5 shows how median real hourly wages among those in paid work have developed for the different education groups. The significant contrasts in employment trends between the two countries suggest the observed wage trends may be in part driven by trends in the selectivity of the workforce. To account for this, we implement a modified version of the median selection model (see, e.g. Johnson et al., 2000; Chandra, 2003; Blundell et al., 2007) which bounds wage trends by assuming that all changes in employment rates are the result of entrances and exits at the bottom of

<sup>14</sup> This is likely related to the introduction of the Working Families Tax Credit (WFTC) in 1999, which made eligibility contingent on working at least 16 h a week thereby creating strong financial incentives for single parents working low numbers of hours to increase their labour supply above this threshold (Blundell and Shephard, 2012).



**Fig. 5.** Trends in real median hourly wages by education and gender with worst case bounds, 1979–2015. Note: Sample is individuals aged 25–55 with positive earnings. Individuals with imputed earnings and hours in the US data are excluded and the remaining sample reweighted as described in Section 3.2. Individuals with hourly wages less than the bottom 1% or greater than the top 0.1% of the gender-specific wage distribution of each country are excluded and the remaining sample reweighted as described in Section 3.3. Dashed lines represent median wages under a worst case bound scenario described in Section 5.1.

the within-group wage distribution.<sup>15</sup> The bounded series are indicated by dashed lines.

The US has seen a remarkably long period of real wage stagnation, stretching back over most of the period since 1979, with the only clear exception being a short period during the boom of the late 1990s. In fact, for men it is only college graduates among whom median real wages are currently any higher than in 1979. The bounded series confirm that accounting for trends in selectivity would only make this conclusion stronger, due to large employment declines among lower-educated men over this period. In Britain, wage growth was considerably more robust until the early 2000s.

The more recent comparison is different. Since the mid 2000s, and especially the Great Recession, Britain has seen marked declines in median hourly wages across most groups (but less so among the lowest educated). These wage trends tend to be worse than seen among similar groups in the US over the same period. It does, however, turn out to be quite important to assess employment and wage trends, and the link between them via selection, in a coherent framework. The potential for wage trends among less educated US men to have been flattened by selection (due to falling employment) in recent years is significant, and

the bounded series show falls in wages more in line with their British counterparts.<sup>16</sup>

Nevertheless, overall Figs. 3–5 show a stark difference in the nature of the impact of the Great Recession on the US and British labour markets. Employment has proven more robust in Britain, on both the extensive and intensive margin, particularly through the pace with which employment rates recovered after the initial shock. By contrast much more of the adjustment in Britain has come through lower real wages, especially for the high educated. These developments resulted in the post-recession decline in top net incomes in Britain as shown in Fig. 1, while they reinforced pre-existing trends towards higher inequality in the US.

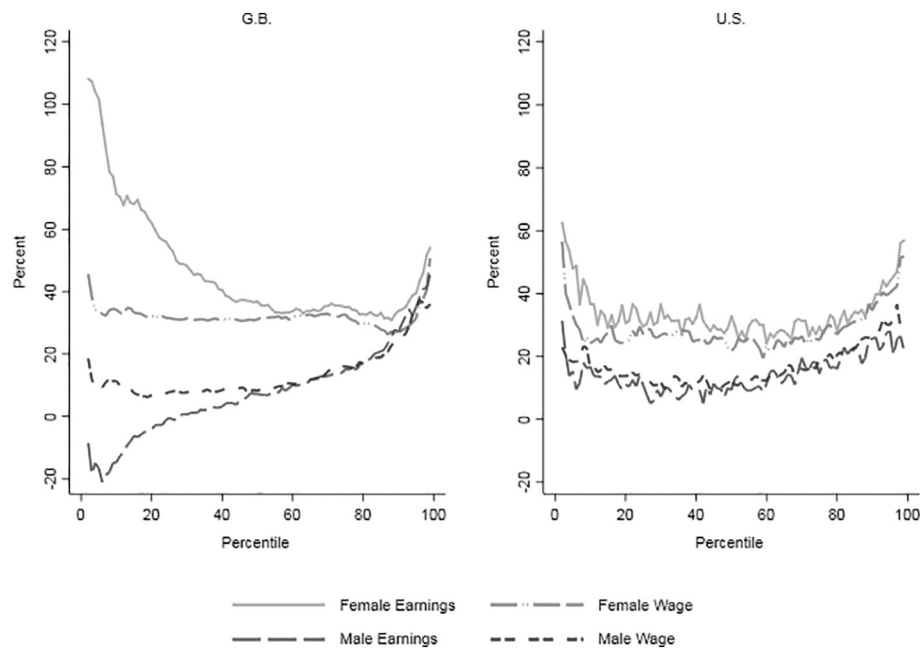
In combination, these trends in wages and hours of work have led to increased male and reduced female earnings inequality in both countries. This is depicted in Fig. 6, which highlights just how influential intensive margin trends have been in Britain as the growth in male (female) earnings is far greater towards the top (bottom) of the distribution than growth in wages. In the US, however, the close alignment between growth in wages and earnings across the distribution suggests that changes in earnings inequality are primarily due to changes in wage inequality, rather than trends in employment on the intensive margin.<sup>17</sup>

<sup>15</sup> The specific bounding procedure is as follows. In years where the employment rate is greater than the rate in a reference year, workers are re-classified as non-workers, starting with the lowest-wage worker first, until the employment rates align. In years where the employment rate is below the rate in a reference year, randomly selected non-workers are re-classified as workers and assumed to earn less than the 1st percentile of the gender-year wage distribution until the employment rates align (following the median selection rule, the only assumption required is that they earn less than the median). In either case, median wages among the workers are then re-computed. This has the effect of increasing the measured median wage when within-group employment is higher than in the reference year, and vice versa. Fig. 5 takes 1994 as the reference year, as this aligns with the period that we later focus on.

<sup>16</sup> Appendix Fig. 7 repeats the analysis shown in Fig. 5, disaggregating by race and education. This reveals the wage gap of less skilled white and black men in the US closed greatly by the mid 1990s, though the bounded series suggest this is affected by differential labour-force withdrawal. After accounting for employment selection, the bounded median wages of less skilled black men in the US fell nearly 50% from 1979 to 2015.

<sup>17</sup> Appendix Fig. 8 shows the same series as Fig. 6, but with 1979 as the initial period. In the US, real hourly wages and earnings growth of men below the 60th percentile are shifted down compared to Fig. 6, showing no growth over the last 35 years. There is likewise a downward shift of about 20 percentage points in GB men in the bottom 20th percentile of wages.





**Fig. 6.** Changes in wages and earnings by percentile and gender, 1994–2015. Note: Sample is individuals aged 25–55 with positive earnings. Individuals with imputed earnings and hours in the US data are excluded and the remaining sample reweighted as described in Section 3.2. Individuals with hourly wages less than the bottom 1% or greater than the top 0.1% of the gender-specific wage distribution of each country are excluded and the remaining sample reweighted as described in Section 3.3.

To assess the relative importance of wage and hours trends more formally, we decompose the change in the log of individual weekly earnings into components that are attributed to changes in the variance of log hours and log wages and the covariance between log hours and log wages.<sup>18</sup> Table 1 reports the results of this decomposition separately for men and women in each country over three periods: 1994–2015, 1994–2007 and 2007–2015.

The first two panels of Table 1 confirm that male earnings inequality has risen in both Britain and the US over the 1994–2015 period, with the rise in Britain almost three times as large as that in the US (an increase of 0.103 compared to 0.035). One reason for this difference is that earnings inequality among British males rose consistently over the entire period, whereas in the US it was largely unchanged between 1994 and 2007 before increasing during the period after the financial crisis. This reflects Fig. 2, which showed a secular increase in the British male earnings 90/10 ratio compared to a far more cyclical trend in the US 90/10. The right-most three columns of the table show that increases in the variance of wages and the covariance between hours and wages are both important drivers of the rise in male earnings inequality in Britain, accounting respectively for 49.7% and 44.7% of the overall increase in the variance of earnings. Although the covariance between hours and wages has had a substantial impact on US male earnings inequality, the variance of wages is more important and accounts for over two-thirds of the increase in the variance of earnings over the 1994–2015 period.<sup>19</sup>

In contrast to the rise in male earnings inequality, the third and fourth panels of Table 1 show falls in female earnings inequality across countries. The magnitude of the change is again greater in Britain than the US (a reduction of 0.105 compared to 0.02), and is primarily due to reductions in inequality that occurred in the pre-recession 1994–2007 period. In both countries, these reductions have been driven by falls in the variance of weekly hours. In Britain this has been reinforced

by a reduction in the covariance between hours and wages, whereas in the US hours and wages among women have become more positively correlated.

In summary, something has happened in Britain in recent decades which goes against the conventional wisdom that male employment at the intensive margin is relatively fixed. The breakdown of this rule has had first order effects on earnings inequality in Britain. In a comparative context it tempers the conclusion that one would reach when

**Table 1**  
Decomposition of the change in variance of log earnings.

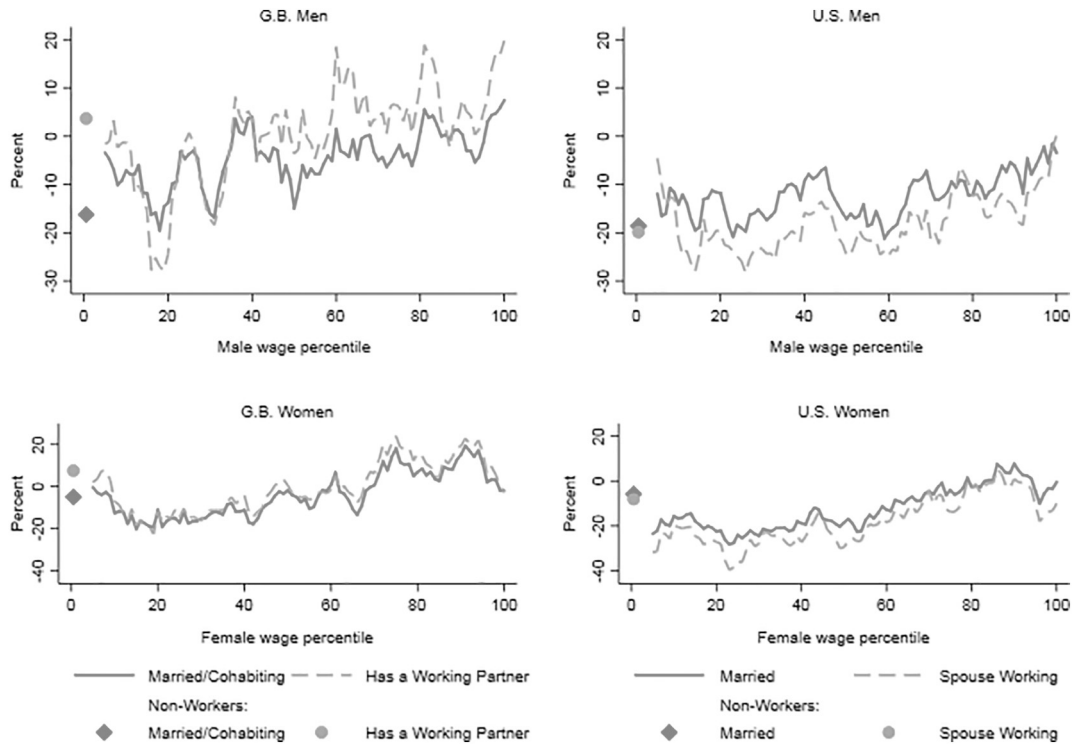
	Variance of log earnings at start of period	Change in variance of log earnings	Contribution to change		
			Variance of log hours	Variance of log wage	Covariance of log hours and log wage
<b>GB Men</b>					
1994–2015	0.166	0.103	5.5%	49.7%	44.7%
1994–2007	0.166	0.050	7.0%	42.8%	50.2%
2007–2015	0.215	0.054	4.1%	56.2%	39.7%
<b>US Men</b>					
1994–2015	0.267	0.035	–4.1%	68.5%	35.6%
1994–2007	0.267	0.009	–	–	–
2007–2015	0.277	0.026	9.8%	85.9%	4.3%
<b>GB Women</b>					
1994–2015	0.440	–0.105	58.3%	22.1%	19.6%
1994–2007	0.440	–0.090	58.6%	7.6%	33.8%
2007–2015	0.350	–0.015	56.7%	106.6%	–63.3%
<b>US Women</b>					
1994–2015	0.336	–0.020	121.8%	17.9%	–39.6%
1994–2007	0.336	–0.032	75.1%	12.1%	12.8%
2007–2015	0.304	0.012	–2.9%	2.3%	100.5%

Note: Sample is individuals aged 25–55 with positive earnings. Individuals with imputed earnings and hours in the US data are excluded and the remaining sample reweighted as described in Section 3.2. Individuals with hourly wages less than the bottom 1% or greater than the top 0.1% of the gender-specific wage distribution of each country are excluded and the remaining sample reweighted as described in Section 3.3. Columns 4–6 are suppressed for changes in the variance of log earnings that are less than 0.01.

<sup>18</sup> This decomposition uses the result that:

$\text{Var}(\ln(y)) = \text{Var}(\ln(w) + \ln(h)) = \text{Var}(\ln(w)) + \text{Var}(\ln(h)) + 2\text{Cov}(\ln(w), \ln(h))$ , where  $y$  and  $h$  denote weekly earnings and hours respectively, and  $w$  denotes hourly wages.

<sup>19</sup> The change in the variance of log earnings among US men from 1994 to 2007 was essentially zero, which resulted in extreme contributions of log hours and wages. Thus, we omit those outlier contributions.



**Fig. 7.** Changes in marriage/cohabitation and working partners by wage decile, 1994–2015. Note: Growth rates are plotted as 5-pt moving averages across the wage distribution. Sample is individuals aged 25–55. Individuals with imputed earnings and hours in the US data are excluded and the remaining sample reweighted as described in Section 3.2. Working individuals with hourly wages less than the bottom 1% or greater than the top 0.1% of the gender-specific wage distribution of each country are excluded and the remaining sample reweighted as described in Section 3.3.

focusing on the extensive margin alone, which is that male employment has been on a worse trajectory in the US with a particular problem among the lowest skilled. The British story becomes more reminiscent of the US story once the intensive margin is incorporated. Belfield et al. (2017) have shown that the increase in part-time work among low-wage British men has occurred among single men and those in couples, and those with and without children. Explaining the origins of this change, and in particular whether it represents a demand-side or supply-side shift, is a key challenge for future research given its implications for welfare and potential possible policy responses. A satisfying explanation would need to account for why Britain has not seen similar concurrent changes at the extensive margin, and why the adjustments in this respect have been the opposite of those in the US.

5.2. Marriage and assortative mating

We now make the important move from individual labour market outcomes to family-level outcomes. A key part of this link is the pattern of assortative mating, which is examined in Figs. 7 and 8. For each country and gender we rank by percentile of individual hourly wages and plot changes in spousal characteristics within each percentile group, comparing 1994 with 2015. In Britain, but not the US, we are able to observe non-married cohabiting partners – though for parsimony we use the term “spouse” to cover any cohabitation between partners. Although this introduces an inconsistency in measurement between countries, long-term non-marital cohabitation is comparatively less common in the US.

Appendix Fig. 2 showed that living as part of a couple has generally become less common across education groups in both countries, while Fig. 7 shows that these changes are pervasive across the majority of the wage distribution. It also shows that this change has tended to be more pronounced for people in the bottom half of the gender-specific hourly wage distribution, and even more pronounced among non-working men (as indicated by the dots on the left-hand side of each panel). Changes in the probability of having a working spouse exhibit a similar

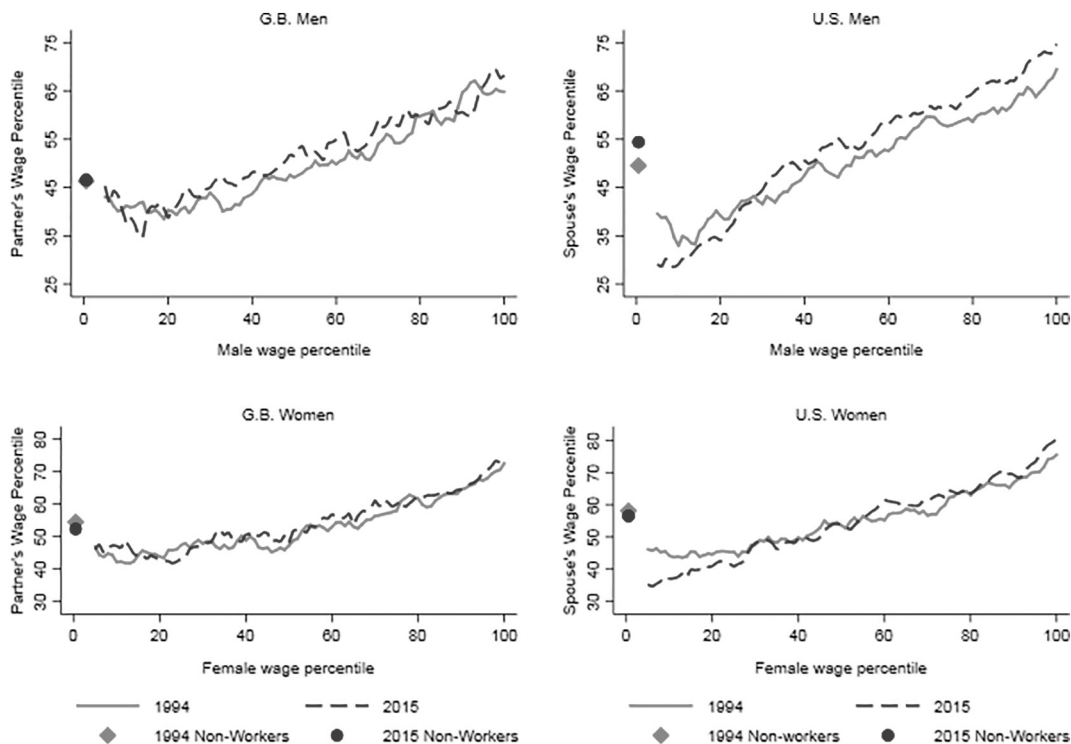
gradient across the wage distribution. The gradient here is especially strong for women. In Britain the probability of having a working spouse has tended to decline in the bottom half of the female wage distribution and to increase in the top half. In the US, it has declined throughout essentially the entire distribution, but by more towards the bottom.

Fig. 8 examines how the within-family correlation between wages has changed since 1994, plotting the average wage percentile rank of spouses by own-wage percentile (for those in each percentile group who have a working spouse). For both countries and genders, there is a clear positive correlation: people further up the individual wage distribution tend to have spouses who, if in work, are also further up the wage distribution. In the US, but not Britain, there is also clear evidence of an increase in this form of assortativeness as the gradient has become steeper over the past two decades.<sup>20</sup>

Table 2 quantifies how the assortativeness of marriage has affected tax unit earnings inequality since 1994. We focus on dual-earner couples and decompose the change in one-half the squared coefficient of variation in total earnings in the couple into changes in three components: inequality in earnings of the main earner, inequality in earnings of the second earner, and the covariance between earnings of both members of the couple.<sup>21</sup> As well as presenting results for two-earner couples in the ‘baseline’ sample used for earlier analysis (selected

<sup>20</sup> If one also accounted for extensive margin changes, it is likely that both countries would display greater increases in assortative mating than implied by Fig. 8 as the figure is plotted for the sample of individuals who have a working spouse, and Fig. 7 shows that the probability of having a working spouse has declined most for low-waged workers and non-workers.

<sup>21</sup> The advantage of one-half the squared coefficient of variation, known as  $I_2$ , is that it is exactly decomposable into its component parts (Cowell, 2011). Define couple earnings as  $Y = y_i + y_j$ , with mean  $\mu$  and variance  $\sigma^2$ . One can show that  $I_2(Y) \equiv \frac{\sigma^2}{2\mu^2} \equiv \frac{\sigma_i^2}{2\mu_i^2} \left(\frac{\mu_i^2}{\mu^2}\right) + \frac{\sigma_j^2}{2\mu_j^2} \left(\frac{\mu_j^2}{\mu^2}\right) + \frac{cov(y_i, y_j)}{\mu_i \mu_j} \left(\frac{\mu_i \mu_j}{\mu^2}\right)$ . Table 2 presents the level of inequality in 1994 and 2015, the change in inequality, and the fraction of the change attributed to each of the three components



**Fig. 8.** Mean wage percentile of spouse based on partner's location in wage distribution. Note: Mean wages of partners and spouses are plotted as 5-pt moving averages across the wage distribution. Sample is individuals aged 25–55 who are married (GB and US) or cohabiting (GB only) and who's partner is working. Individuals with imputed earnings and hours in the US data are excluded and the remaining sample reweighted as described in Section 3.2. Working individuals with hourly wages less than the bottom 1% or greater than the top 0.1% of the gender-specific wage distribution of each country are excluded and the remaining sample reweighted as described in Section 3.3.

according to the criteria discussed in Section 3), Table 2 shows results for dual-earner couples in the middle 90% of the tax unit earnings distribution to highlight the extent to which trends observed in the baseline sample are driven by the tails of the distribution.

Table 2 shows inequality in total earnings among dual-earner couples has increased in both Britain and the US. In the British case, the increase is predominantly due to an increase in earnings inequality among the higher-paid member of the couple. Since main earners are overwhelmingly male, this result mirrors the rise in male earnings inequality documented above. Increases in the covariance between main and secondary earner pay have also acted to push up tax unit earnings inequality,

particularly in the non-extreme section of the distribution, which indicates that two-earner couples in Britain have become increasingly assortative over the last two decades. The US results show tax unit earnings are more unequal than in Britain. Comparing the trimmed and untrimmed samples in the US reveals that increases in inequality among main earners has been entirely driven by the tails of the distribution: trends in main-earner inequality have actually acted to reduce tax unit earnings inequality among the middle 90%.<sup>22</sup> Trends among secondary earners have acted to increase total earnings inequality in the US – due to both an increase in I2 inequality in their earnings and an increase in their share of total tax unit earnings – whereas they have slightly reduced inequality in Britain. Finally, Table 2 shows that increases in assortativeness have made a greater contribution to rising inequality in the US than in Britain, which mirrors the pattern shown in Fig. 8.

**Table 2**  
Decomposition of the change in squared coefficient of variation of tax unit earnings among 2-earner couples, 1994–2015.

Sample	I2 of tax unit earnings at start of period	Change in I2 of tax unit earnings (1994–2015)	Contribution to change		
			I2 of earnings of primary earner	I2 of earnings of secondary earner	Covariance of primary and secondary earnings
GB					
Baseline	0.168	0.065	72.6%	–1.2%	28.5%
5th–95th percentiles	0.066	0.018	49.8%	–1.6%	51.7%
US					
Baseline	0.275	0.091	33.4%	22.4%	44.2%
5th–95th percentiles	0.084	0.013	–14.9%	56.9%	58.1%

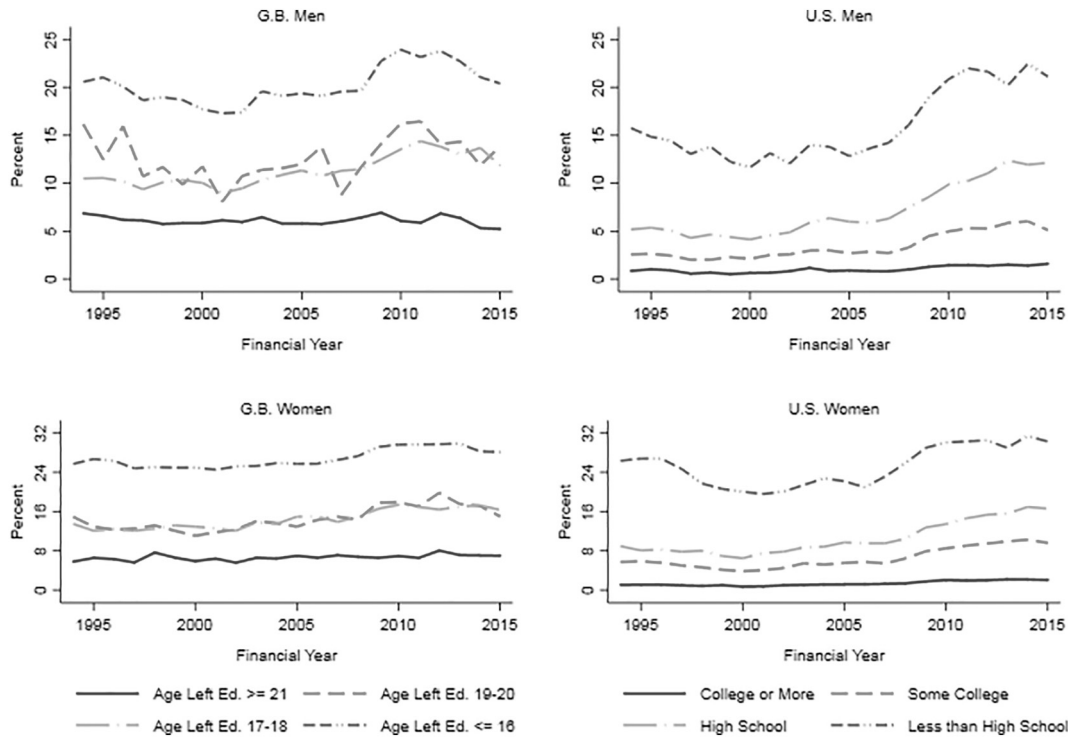
Note: Sample is individuals aged 25–55 with positive earnings who are married (GB and US) or cohabiting (GB only) and who's partner is working. Individuals with imputed earnings and hours in the US data are excluded and the remaining sample reweighted as described in Section 3.2. Individuals with hourly wages less than the bottom 1% or greater than the top 0.1% of the gender-specific wage distribution of each country are excluded and the remaining sample reweighted as described in Section 3.3.

**6. The tax and welfare system**

Another key bridge between individual labour market outcomes and family incomes is the government transfer and tax credit system. It makes sense to analyse this when moving to the family level: eligibility for such transfers is typically assessed at that level and so, at least where resources are pooled within families, transfer program participation measured at the individual level is not as meaningful.

Fig. 9 documents trends in the generosity of the transfer systems of both countries by plotting the average share of family gross income that comes from the transfers and in-work tax credits by gender and education. The figure makes evident the greater generosity of the British welfare system across the education distribution in comparison to the US system, at least until most recently, with transfers and in-work tax credits accounting for a higher share of gross income among men and

<sup>22</sup> This result is due to a fall in the share of tax unit earnings accounted for by the main-earner, rather than a reduction in inequality in main-earner earnings. I<sub>2</sub> inequality among main earners in the US increased in both the trimmed and untrimmed sample, which is consistent with the rise in male earnings inequality discussed in Section 5.1.



**Fig. 9.** Trends in safety net income as a share of gross income by education and gender. Note: Sample is individuals aged 25–55. Individuals with imputed earnings and hours in the US data are excluded and the remaining sample reweighted as described in Section 3.2. Working individuals with hourly wages less than the bottom 1% or greater than the top 0.1% of the gender-specific wage distribution of each country are excluded and the remaining sample reweighted as described in Section 3.3.

women of all education levels in Britain. This is in spite of the fact that, as discussed above, the lowest education group in the US is likely to be far less skilled than the lowest education group in Britain. The figure also shows the average generosity of the welfare system has tended to increase over the past 20 years in both countries, particularly among the lower educated in the US.<sup>23</sup> The impact of the Great Recession on transfer income is also clearly shown. The increases in average welfare receipts in Britain that occurred in the years immediately following the financial crises have since been offset owing to the post-recession fiscal consolidation, which began in 2011 and included cuts to many transfer programs. The dramatic increase in average transfer generosity in the US emerged in response to the Great Recession – increasing average payments by 50% among the least skilled, but also more than doubling among those with some college – and unlike Britain, have remained elevated through the six years following the official end of the recession.

### 7. From wages to household income inequality

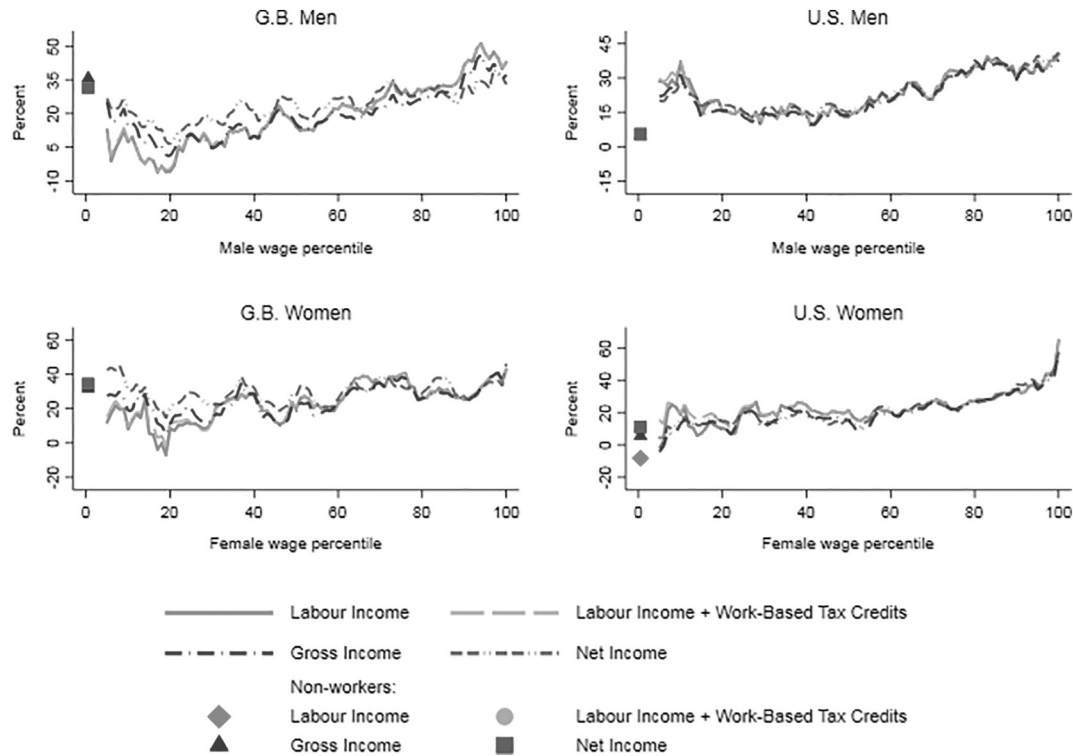
Bringing together the individual labour market outcomes, assortative mating and trends in welfare income, and adding in taxation, we can then trace the links from individual wages right through to net family incomes. To illuminate this, in Fig. 10 we rank people according to their position in the gender-specific hourly wage distribution and, keeping that ranking fixed, examine changes in different measures of income over the 1994–2015 period. The figure also shows growth in the

different measures of income for non-workers which, as documented above, now account for a greater share of the working-age US population than in 1994. We start with family labour income, cumulatively add in work-based credits and then all other transfers (to make “gross income”), before subtracting direct taxes (to make “net income”). Family incomes are equalised throughout this exercise in order to account for changes in family size and structure.

The broad pattern in family labour incomes is one of increased inequality between higher- and lower-wage individuals, with the exception of the bottom male wage quintile in the US. These patterns are in line with the trends already documented in male earnings inequality (male earnings remain the dominant source of family labour income, on average) and the supporting role played by increases in assortative mating. However, important differences emerge between Britain and the US when looking beyond labour income. Transfers and taxes have had significant effects on trends in inequality between high- and low-wage people in Britain, but virtually no discernible impacts on those trends in the US. Work-contingent transfers actually have little to do with this, as they remain only a relatively small part of the overall transfer system in Britain (even for people in work). But increases in the generosity of the transfer system more generally, most importantly through CTC (most of which goes to families in work), have pushed the rate of growth in family gross income at the lower end of the wage distribution above the rate of growth in labour income alone. Direct tax cuts have had a further, similar impact towards the bottom, as the zero-rate income tax band has been increased sharply since 2010.

Another striking point of contrast between Britain and the US is the experience of non-workers (represented by the dots on the left side of each panel). In Britain their net family incomes have grown robustly over the past 20 years, and more quickly than for the majority of the wage distribution. Unsurprisingly this is again due to increases in the generosity of the transfer system, particularly for families with children, both through CTC and through increases in the rates of out-of-work transfers. In the US, by contrast, non-workers have fallen further behind those in work over the past 20 years and in fact have seen barely any

<sup>23</sup> The discontinuity discernible in 2003 among low-educated men in Britain reflects the introduction of Working Tax Credit (WTC) and Child Tax Credit (CTC). As explained in Section 2, these two ‘tax credits’ are transfer payments rather than a refundable tax credit, such as the EITC. The 2003 reforms extended entitlement to in-work credits to adults without dependent children and replaced both an earlier work-contingent benefit and a conventional tax credit (the confusingly named Children’s Tax Credit). As the Children’s Tax Credit is not counted as a transfer payment the 2003 discontinuity in Fig. 9 somewhat overstates the generosity of the WTC/CTC reforms. A version of Fig. 9 including the value of the Children’s Tax Credit is available from the authors upon request.



**Fig. 10.** Changes in equivalised gross and net income by fixed wage percentile, 1994–2015. Note: Income growth rates plotted as 5-pt moving averages across the wage distribution. Sample is individuals aged 25–55. Individuals with imputed earnings and hours in the US data are excluded and the remaining sample reweighted as described in Section 3.2. Working individuals with hourly wages less than the bottom 1% or greater than the top 0.1% of the gender-specific wage distribution of each country are excluded and the remaining sample reweighted as described in Section 3.3.

income growth at all, although the figure does suggest that growth in welfare income has mitigated to some extent the reductions in labour income among non-working US women.

Appendix Figs. 9 and 10 repeat the analysis of Fig. 10 separately for singles and couples and those with and without children. These additional figures reveal that growth in total labour income has been more unevenly spread across the wage distribution among couples, re-emphasising that changes in the assortativeness of marriage have been an important driver of income inequality over the last two decades. The equalizing effect of changes in transfer income is most pronounced among those with dependent children, which is to be expected as the major welfare policy reforms in both countries have explicitly targeted this group.

How have the individual-level trends shown in Fig. 10 impacted overall inequality? Table 3 addresses this by decomposing the level of one-half the squared coefficient of variation in total tax unit net income

**Table 3**  
Decomposition of the squared coefficient of variation of net tax-unit income.

	1/2 of total net income	Contribution of labour income	Contribution of other income	Contribution of trans/credits	Contribution of taxes
GB					
1994	0.094	0.150	0.005	−0.014	−0.047
2007	0.099	0.156	0.005	−0.013	−0.050
2015	0.092	0.147	0.005	−0.013	−0.047
US					
1994	0.116	0.172	0.008	−0.006	−0.059
2007	0.117	0.169	0.010	−0.005	−0.057
2015	0.128	0.189	0.009	−0.007	−0.063

Note: Sample is tax units headed by individuals aged 25–55. Individuals with imputed earnings and hours in the US data are excluded and the remaining sample reweighted as described in Section 3.2. Working individuals with hourly wages less than the bottom 1% or greater than the top 0.1% of the gender-specific wage distribution of each country are excluded and the remaining sample reweighted as described in Section 3.3.

into components that are attributable to labour income, other income, transfers and credit income and taxes.<sup>24</sup> The table shows that net income inequality in both countries have been driven by trends in labour income inequality. The top panel of the table shows the fall in net income inequality observed in Britain between 1994 and 2015 is primarily due to reductions in labour income inequality that occurred after 2007. Although the British panels of Fig. 10 show labour income growth has been unequal across the wage distribution in Britain, this has been offset by increases in employment which have driven down labour income inequality in the entire population (including non-workers). In the US, by contrast, the lower panel of the table shows net income inequality was slightly lower in 2007 than in 1994 but then increased in subsequent years. The trends in both these periods mirror trends in US labour income inequality and are consistent with the unequal pattern of labour income growth shown in the US panels of Fig. 10.

Overall, Table 3 shows the gap between net income inequality in Britain and the US has widened over the last two decades. The squared coefficient of variation in net income was around 23% higher in the US than in Britain in 1994, whereas in 2015 it was almost 40% higher. The most recent comparison shows that inequality in labour income is higher in the US and is offset to a far lesser extent by transfer and credit income.

## 8. Conclusions

Both Britain and the US have witnessed secular increases in 90/10 male earnings inequality over the last three decades. Up until the 1990s this was accompanied by similar increases in 90/10 inequality in net household incomes in both countries but since then trends have

<sup>24</sup>  $I_2 = \sum_{f=1}^4 S_f$ , where  $f$  = labour income, other income, transfers and credits, and tax payments, and  $S_f \equiv \rho_f \frac{\sigma_f}{\sigma_y} I_2$ . The term  $\rho_f$  is the correlation coefficient between income factor  $f$  and total net income  $y$ , and  $\sigma_k$  ( $k = f, y$ ) is the standard deviation of factor  $f$  (total net income  $y$ ). See Shorrocks (1982) for derivation.

diverged with inequality in net family income declining in Britain while continuing to rise in the US. This paper has sought to shed light on the reasons for this divergence, taking inspiration from Tony Atkinson's extensive work on inequality, which emphasized the importance of accounting for the interplay between inequality in the labour market, the tax and benefit system and household income inequality.

Since 1979, there have been sizeable changes in male and female employment in both countries. These employment changes have primarily occurred on the extensive margin in the US, with employment declining across gender and education groups from around 1990. In Britain, by contrast, the biggest changes have occurred on the intensive margin, with male workers experiencing declines in average hours of work that have been steepest for the lower-educated and most pronounced in the bottom quintile of the wage distribution.

The impact of these trends in employment and hours on family-level income inequality has been mediated through several channels. First, changes in individual-level earnings inequality will also be influenced by changes in wage inequality. We find that wage growth has been relatively equal across the main part of the gender-specific wage distributions of both countries, although a novel worst-case bounding approach suggests that reductions in employment in the US may have attenuated growth at lower percentiles of the US wage distribution. As a result, the intensive margin changes observed in Britain led to a sharp reduction in female earnings inequality but a sharp increase in male earnings inequality.

Second, the link between individual-level earnings and family-level labour income depend on changes in family composition and marital sorting. Focussing on the period since 1994, we find that both in Britain and the US, reductions in marriage have been greatest among low-wage workers and non-workers. In addition, the US has experienced an increase in assortative mating in terms of the correlation between wage percentiles of both members of a couple. The result of these trends has been an increase in inequality in family labour income among men and women in both countries.

The most important final link from family labour income and net income is the tax and benefit system. Indeed, we find that the divergent trends in net income inequality in Britain and the US are largely due to the different policy regimes. Specifically, increases in the generosity of transfer payments in Britain under successive Labour governments between 1997 and 2010 boosted net income growth among low-wage workers and non-workers thereby equalizing growth rates in net income across the main part of the wage distribution. Policy changes on this scale have not occurred in the US with the result that the pattern of net income growth of US workers overall largely matches the pattern of family labour income growth.

Differences in welfare policy are also key to understanding the differential fortunes of non-workers between countries. In Britain, many transfer payments are not contingent on work and therefore non-workers have witnessed relatively strong net income growth in comparison to workers. In the US, by contrast, a major part of the country's 'safety net' is the EITC and welfare that is targeted at non-working families has undergone successive reductions in generosity. As a result, non-workers in the US have seen the largest average falls in their net income, which is particularly worrying given this group now accounts for a greater share of the working-age population than in previous decades.

In summary, changes in labour market outcomes in Britain and the US have undoubtedly influenced changes in net income inequality in both countries over recent decades. However, the impact of labour market trends has differed between countries both owing to differences in the nature of the trends themselves and the way they have been mediated by the tax and benefit systems of each country. A key difference between Britain and the US we have highlighted is the margin of employment that has been the source of greatest adjustment. In particular, the intensive margin of British male labour supply has become increasingly flexible over the past 20 years with low-wage male workers in particular experiencing large reductions in hours of work. This is in

contrast to the US where the greatest change has been the reductions in extensive margin employment, which is somewhat puzzling given the very low level of transfer income available to non-workers in the US. Explaining the reasons for this difference is a key challenge for future research given its implications for welfare and potential possible policy responses.

## Acknowledgments

Prepared for the Special Issue of the *Journal of Public Economics* to honour the contributions of Tony Atkinson. We thank the editor and anonymous referees for their helpful comments. Data from the UK Households Below Average Income dataset and Family Resources Survey were made available by the Department for Work and Pensions. These data are available from the UK Data Archive (see Goodman and Webb, 1995 and Department for Work and Pensions, 2017). The Labour Force Survey is produced by the Office for National Statistics, and these data are available from the UK data archive. Support from the UK Economic and Social Research Council through the Centre for the Microeconomic Analysis of Public Policy (CPP) at IFS, grant reference ES/M010147/1, is gratefully acknowledged. Any errors and all views expressed are those of the authors.

## Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.jpubeco.2018.04.001>.

## References

- Atkinson, A., 1970. On the measurement of inequality. *J. Econ. Theory* 2, 244–263 (September).
- Atkinson, A., 1982. "The comparison of multi-dimensional distributions of economic status" (with F Bourguignon). *Rev. Econ. Stud.* 49, 183–201.
- Atkinson, A., 1992. Towards a European social safety net. *Fisc. Stud.* 13, 51–53.
- Atkinson, A., 1993. What is happening to the distribution of income in the UK? *Proc. Br. Acad.* 82, 317–353.
- Atkinson, A., 1997. Bringing income distribution in from the cold. *Econ. J.* 107, 297–321.
- Atkinson, A., 2000. The welfare state, budgetary pressure and labour market shifts. *Scand. J. Econ.* 102, 445–462.
- Atkinson, A., 2005. Top incomes in the UK over the 20th century. *J. R. Stat. Soc. Ser. A* 168, 325–343.
- Atkinson, A., 2006. In: Farina, F., Savaglio, E. (Eds.), "From Earnings Dispersion to Income Inequality" (With A Brandolini) in *Inequality and Economic Integration*. Routledge, pp. 35–62.
- Auerbach, Alan, Slemrod, Joel, 1997. The economic effects of the tax reform act of 1986. *J. Econ. Lit.* 35, 589–632.
- Autor, David H., Katz, Lawrence F., Kearney, Melissa S., 2008. Trends in U.S. wage inequality: revisiting the revisionists. *Rev. Econ. Stat.* 90 (2), 300–323.
- Belfield, C., Blundell, R., Cribb, J., Hood, A., Joyce, R., Norris Keiller, A., 2017. Two decades of income inequality in Britain: the role of wages, household earnings and redistribution. IFS Report. 123 . <https://onlinelibrary.wiley.com/doi/abs/10.1111/ecca.12220>.
- Blundell, Richard, Shephard, Andrew, 2012. Employment, hours of work and the optimal taxation of low-income families. *Rev. Econ. Stud.* 79 (2), 481–510.
- Blundell, Richard, Gosling, Amanda, Ichimura, Hidehiko, Meghir, Costas, 2007. Changes in the distribution of male and female wages accounting for employment composition using bounds. *Econometrica* 75 (2), 323–363.
- Blundell, Richard, Pistaferri, Luigi, Saporta-Ecksten, Itay, 2016a. Consumption inequality and family labor supply. *Am. Econ. Rev.* 106 (2), 387–435.
- Blundell, Richard, Costa-Dias, Moncia, Meghir, Costas, Shaw, Jonathan, 2016b. Female labour supply, human capital, and welfare reform. *Econometrica* 84 (5), 1705–1753.
- Bollinger, Christopher R., Hirsch, Barry T., 2006. Match bias from earnings imputation in the current population survey: the case of imperfect matching. *J. Labor Econ.* 24 (3), 483–519.
- Bollinger, Christopher R., Hirsch, Barry T., Hokayem, Charles, Ziliak, James P., 2017. Trouble in the Tails: What We Know about Wages 30 Years After Lillard, Smith, and Welch. Mimeo.
- Bound, John, Johnson, George, 1992. Changes in the structure of wages in the 1980s: an evaluation of alternative explanations. *Am. Econ. Rev.* 82 (3), 371–392.
- Bowlus, Audra, Robin, Jean-Marc, 2004. Twenty years of rising inequality in U.S. lifetime labour income values. *Rev. Econ. Stud.* 71 (3), 709–742.
- Brewer, Mike, Etheridge, Ben, O'Dea, Cormac, 2017. Why are households that report the lowest income so well-off? *Econ. J.* 127 (605), F24–F49.
- Burkhauser, Richard V., Feng, Shuaizhang, Jenkins, Stephen, Larrimore, Jeff, 2012. Recent trends in top income shares in the USA: reconciling estimates from march CPS and IRS tax return data. *Rev. Econ. Stat.* 94 (2), 371–388.

- Burman, Leonard, Gale, William, Weiner, David, 1998. Six tax Laws later: how Individuals' marginal tax rates changed between 1980 and 1995. *Natl. Tax J.* 51, 637–652.
- Card, David, DiNardo, John E., 2002. Skill-biased technological change and rising wage inequality: some problems and puzzles. *J. Labor Econ.* 20 (4), 733–783.
- Chandra, Amitabh, 2003. Is the convergence in the racial wage gap illusory? NBER Working Paper 9476
- Cowell, Frank, 2011. *Measuring Inequality*. Third edition. Oxford University Press, Oxford, UK.
- Cribb, J., Joyce, R., Norris Keiller, A., 2017. Minimum wages in the next parliament. IFS Election Briefing Note. 205 . <https://www.ifs.org.uk/publications/9205>.
- Department for Work and Pensions, 2017. Households Below Average Income, 1994/95–2015/16. [data collection]. 10th Edition. <https://doi.org/10.5255/UKDA-SN-5828-8> UK Data Service. SN: 5828.
- Goodman, A., Webb, S., 1995. Institute for Fiscal Studies Households Below Average Income Dataset, 1961–1991. [data collection]. Central Statistical Office, Department of Employment, [original data producer(s)]. UK Data Service. SN: 3300 <https://doi.org/10.5255/UKDA-SN-3300-1>.
- Gosling, A., Machin, S., Meghir, C., 2000. The changing distribution of male wages in the U. K. *Rev. Econ. Stud.* 67 (4, 1), 635–666 (October).
- Guvener, Fatih, Kaplan, Greg, Song, Jae, Weidner, Justin, 2017. Lifetime incomes in the United States over six decades. NBER Working Paper 23371.
- Johnson, William, Kitamura, Yuichi, Neal, Derek, 2000. Evaluating a simple method for estimating black-white wage gaps in median wages. *Am. Econ. Rev.* 90 (2), 339–343.
- Joyce, R., Sibieta, L., 2013. An assessment of labour's record on poverty and inequality. *Oxf. Rev. Econ. Policy* 29 (1). <https://academic.oup.com/oxrep/article-abstract/29/1/178/402517/An-assessment-of-Labour-s-record-on-income>.
- Juhn, C., Murphy, K.M., Pierce, B., 1993. Wage inequality and the rise in returns to skill. *J. Polit. Econ.* 101 (3), 410–442.
- Katz, Lawrence F., Autor, David H., 1999. Changes in the wage structure and earnings inequality. In: Ashenfelter, O., Card, D. (Eds.), *Handbook of Labor Economics*. Vol. 3 (Amsterdam: North-Holland).
- Katz, Lawrence F., Murphy, Kevin M., 1992. Changes in relative wages, 1963–87: supply and demand factors. *Q. J. Econ.* 107 (1), 35–78.
- Kniesner, Thomas J., Ziliak, James P., 2002. Tax reform and automatic stabilization. *Am. Econ. Rev.* 92 (3), 590–612.
- Lemieux, Thomas, 2006. Increasing residual wage inequality: composition effects, noisy data, or rising demand for skill. *Am. Econ. Rev.* 96 (3), 461–498.
- Machin, Stephen, 2015. Real Wage Trends. [https://www.ifs.org.uk/uploads/Presentations/Understanding%20the%20recession\\_230915/SMachin.pdf](https://www.ifs.org.uk/uploads/Presentations/Understanding%20the%20recession_230915/SMachin.pdf).
- Meyer, Bruce, Mok, Wallace, Sullivan, James, 2015. Household surveys in crisis. *J. Econ. Perspect.* 29 (4), 199–226.
- Nichols, Austin, Rothstein, Jesse, Moffitt, Robert A., 2016. Earned income tax credit. *Economics of Means-tested Transfer Programs in the United States*. Vol. 1. National Bureau of Economic Research and University of Chicago Press.
- Piketty, Thomas, Saez, Emmanuel, 2003. Income inequality in the United States, 1913–1998. *Q. J. Econ.* 118 (1), 1–39.
- Shorrocks, Anthony, 1982. Inequality decomposition by factor components. *Econometrica* 50 (1), 193–211.
- Ziliak, James P., 2015. Recent developments in antipoverty policies in the United States. In: Scholz, J.K., Moon, H., Lee, S. (Eds.), *Social Policies in an Age of Austerity*. Edward Elgar Publishing, Cheltenham, UK, pp. 235–262.
- Ziliak, James P., Moffitt, Robert A., 2016. Temporary assistance for needy families. *Economics of Means-tested Transfer Programs in the United States*. Vol. 1. National Bureau of Economic Research and University of Chicago Press, pp. 303–393.