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## Consumption, income and earnings inequality in Britain

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## ABSTRACT

This paper presents an analysis of the trends in inequality across income, earnings and consumption in Britain since 1978. It documents the episodic nature of inequality growth over this period largely dominated by the inequality 'boom' in earnings inequality of the 1980s. It builds a consistent picture across these key measures of inequality to provide a coherent link between the microeconomic and macroeconomic analysis of the evolution of inequality.

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## 1. Introduction

Inequality growth in Britain over the past three decades has been episodic. This is clearly illustrated in Fig. 1.1 which depicts the evolution of the Gini coefficient for family disposable income. There is a well documented<sup>1</sup> inequality 'boom' in the early 1980s followed by a period of relative stability albeit at a higher level of inequality. Then, in the late 1990s, a further rise in inequality occurred largely concentrated at the top of the income distribution and predominantly on employment income in the financial industry.<sup>2</sup>

This description of inequality growth in Britain refers exclusively to inequality in disposable family income and more specifically to employment income inequality. Economic inequality has many linked dimension – wages, earnings, income and consumption. We ask: what of the relative importance of inequality in the components of labour earnings – wages and hours? What of the differences across gender? What of consumption inequality? And what of after tax income and the role of tax and transfers? These are the questions that motivate this paper. Its aim is to provide a coherent analysis of the trends in these various measures of economic inequality.

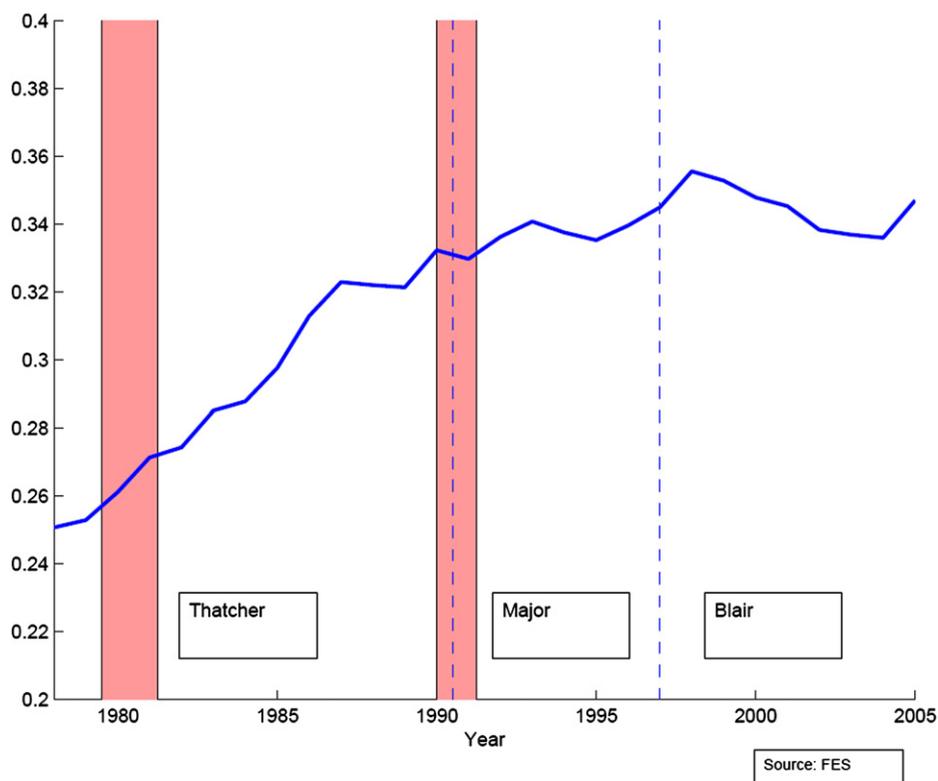
During the 1980s 'inequality boom' the Gini for income rose from around .25 to .34 by the early 1990s, a large increase by any comparison. We show that this increase in inequality occurred across the distribution and in the components of income. It is particularly evident in the earnings distribution, reflecting the change in skill prices over this period. Over the inequality boom period, especially in the early 1980s, there was also a corresponding sharp rise in consumption inequality, although this tailed off earlier than did the growth in earnings and wage inequality.

To fulfil our task we make use of a number of data sources. However, because we want a consistent series for these underlying variables dating back as far as possible we confine our main analysis to two data sources – the Family Expenditure

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<sup>1</sup> See Atkinson (1997).<sup>2</sup> See Atkinson and Piketty (2007) and Brewer et al. (2007b).



**Fig. 1.1.** The pattern of overall inequality in Britain since 1978 – Gini of equivalized disposable income. The thick bands indicate recessions as defined by a drop of GDP for more than 2 consecutive periods.

Survey (FES) and the Labour Force Survey (LFS). The FES has collected data on expenditures, hours, earnings and unearned incomes on a consistent basis for nearly four decades. The LFS, which also has consistent measures of basic labour market variables, is based on a larger sample but has a more limited history of earnings and does not collect data on consumption.

This study follows a large literature on inequality in the UK across various measures; see Atkinson (1997, 1999). We particularly draw on two previous studies. First, Gosling et al. (2000) who document and analyse changes in the wage structure in the UK over 15 years from the late 1970s using the FES.<sup>3</sup> Second, Blundell and Preston (1998) who decompose the income risk faced by different cohorts using FES data on household income and consumption dispersion. Ours is the first study to look closely at the co-evolution over time of wages and hours, through to earnings, to household income and finally to consumption. In addition we present new results on income dynamics for the UK in the 1990s from the BHPS and relate these to our findings from the cross-sectional datasets.

Our discussion is intended to provide a backdrop to a wider literature studying the relationship between income risk, consumption insurance and inequality. The theoretical backbone to this work originated with the analysis of consumption dispersion in incomplete-market economies by Huggett (1993) and Aiyagari (1994). Around the same time Deaton and Paxson (1994) developed a test of the permanent income hypothesis through the empirical analysis of life-cycle profiles of consumption and income dispersion, using data drawn from a number of economies. Subsequently, a burgeoning literature has attempted to explain the empirical phenomena underlying the observed distributional dynamics of consumption and income inequality: including, Blundell and Preston (1998), Blundell et al. (2008c), Guvenen (2006), Heathcote et al. (2004, 2007), Krueger and Perri (2006) and Storesletten et al. (2004). Most of these studies have focused on the US.<sup>4</sup> A central purpose of our study is to provide ‘key facts’ for the UK over the last three decades, which can feed into the (macro)economic analysis of distributional dynamics.

We set the scene in the next section by documenting the broad macroeconomic and labour market background for the UK economy over the period since the late 1970s. We then present some details of the data sources used and their ability to match basic aggregate trends. Our attention turns to the analysis of underlying earnings inequality. We note that the pattern of inequality over the 1980s inequality boom, as in the US, can be explained by changes in the labour market, in particular to changes in the level and durability of shocks to earnings and changes in female labour supply. We further consider the

<sup>3</sup> Blundell et al. (2007) show these inequality trends to be largely robust to changes in employment levels and potential for self-selection biases documented in Blundell et al. (2003).

<sup>4</sup> Exceptions are Attanasio et al. (2002), Blundell and Preston (1998) and Blundell et al. (2007), which feature in the discussion below.

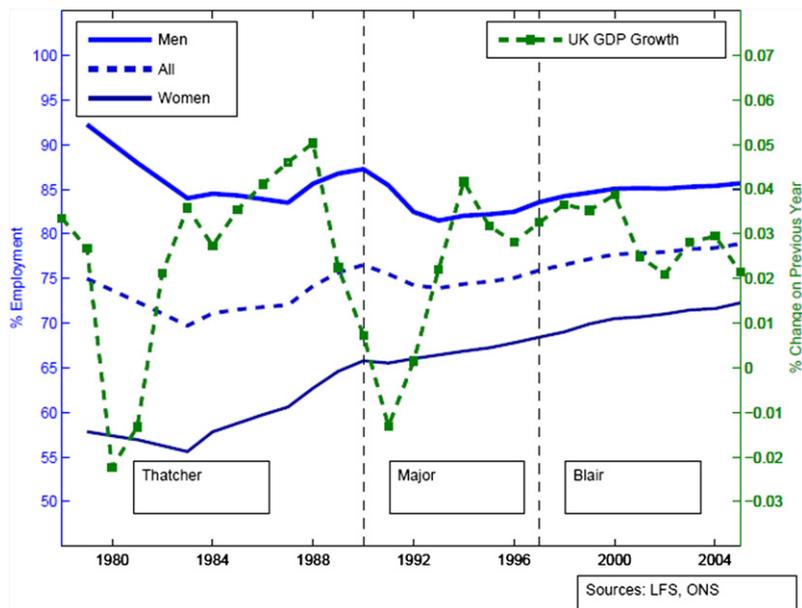


Fig. 2.1. Overall employment and growth rates.

components of income and earnings and the covariance structure between hours and wages for both men and women. We document a recent strengthening in the relationship between male wages and male hours.

One pivotal feature of this study is the examination of income and consumption inequality over the past three decades. We note the divergence, especially in the late 1980s, between income and consumption inequality. This was originally documented in Blundell and Preston (1998) for the UK and is similar to the findings for the US reported in Cutler and Katz (1992). Blundell et al. (2008c) follow up this study for the US and find that the divergence can be explained by initial growth in the variance of permanent shocks which was then replaced by a continued growth in less persistent shocks in the late 1980s. Indeed, using consumption and income inequality data for the UK, Blundell et al. (2008b) provide strong evidence of a spike in the variance of permanent shocks to income in the early 1980s. Unfortunately, we do not have panel data on income for the 1980s in the UK and are not able to examine the durability of income and earnings shocks during the inequality boom. However, we are able to examine the dynamics of the various definitions of income and earnings since the early 1990s using the British Household Panel Survey.

Before concluding we finish with a brief discussion of the 'new inequality' and the rapid rise in top incomes during the late 1990s.

## 2. Macroeconomic conditions and data overview

### 2.1. Employment, growth and macroeconomic conditions

The sharp recession in the very early 1980s in Britain is clearly evident in Fig. 2.1 by the strong negative real GDP growth rate in 1980 and 1981. This was followed by a severe drop in employment rates for both women and men. Male employment rates have yet to return to their pre-1980 level, although female employment rates show a strong secular trend upward over the whole period.

The second recession in this period followed soon after the peak growth rates at the end of the 1980s. From late 1993 onwards the economy moved into a period of stable and moderate growth, accompanied by a consistent rise in employment, interrupted only by the recent downturn. This overall growth in employment over this period was offset to some extent by the continued fall in labour market attachment among low skilled workers that extended throughout the first half of the 1990s. This reflected a fall in demand for low skilled workers over this period. This in turn engendered a change in welfare and tax policy that heralded a strong expansion in earned income tax credits and 'make work pay' welfare to work policies in the late 1990s under the Blair government.<sup>5</sup>

The detailed picture of labour market attachment over this period can be seen in Fig. 2.2. This highlights the impact of the early 1980s recession on the employment of low skilled men and women. Employment rates for lower educated women only very recently returned to the rates of the late 1970s, while for low educated men, employment rates remain

<sup>5</sup> Blundell (2001).

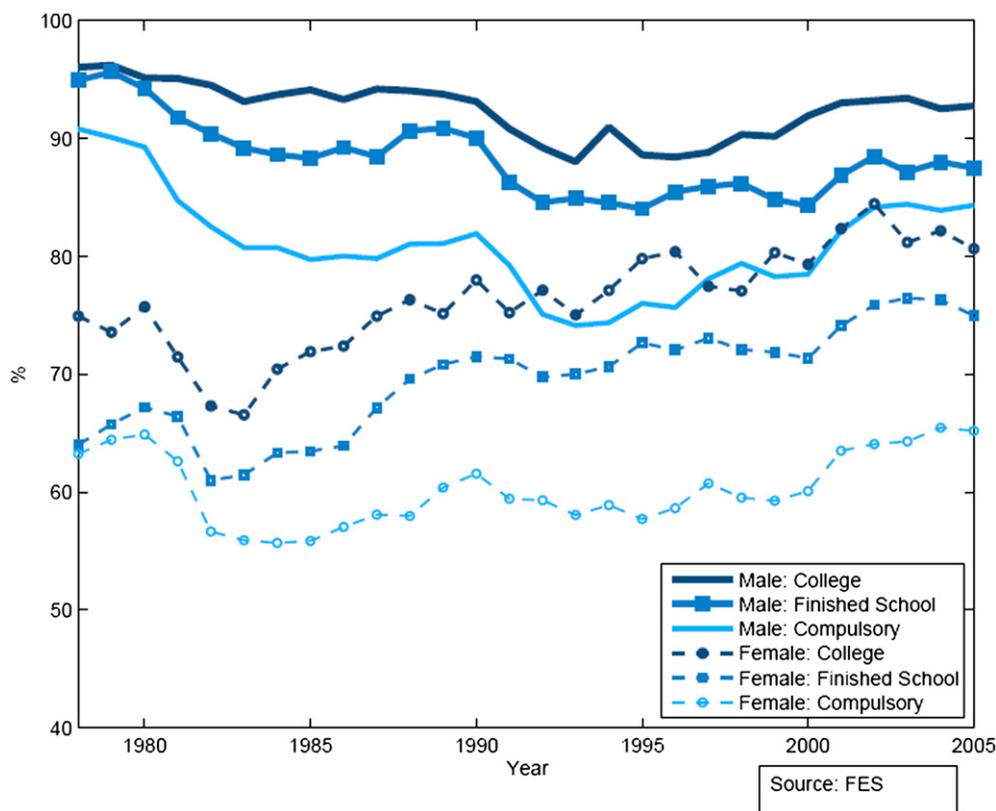


Fig. 2.2. Employment by education and gender, by year.

below those of three decades ago.<sup>6</sup> Fig. 2.3 shows that this drop in employment among the low educated shows up in a lower level of households with at least one adult working, although the growth in female labour supply continues strongly throughout the period.

In the analysis that follows we will see that life-cycle stages matter too. The overall changes in working behaviour for men and women by age over this period are perhaps most dramatically documented in Figs. 2.4(a) and (b). These show that the impact of the 1980s recession on male employment was felt most among the relatively young and old, while the increase in female labour supply has happened most at child bearing years. These are key considerations for understanding changes in inequality across time, across age and across gender.

## 2.2. Data sources and definitions

As already noted, although there are a number of key data sources used in the analysis reported here; we draw primarily from the consistent repeated cross-section household survey, the Family Expenditure Survey. For our analysis of income dynamics we draw on panel data from the BHPS, although this is only available from 1991 onwards. We analyse the recent evolution of the top of the income distribution using data from the Survey of Personal Incomes. We also use data on employment from the Labour Force Survey over the entire survey period. In the remainder of this section we briefly describe these data sources and draw some comparison with the national income accounts.

### 2.2.1. The Family Expenditure Survey – FES

The principal dataset used in this study is the UK Family Expenditure Survey (FES). The FES is an annual survey conducted chiefly for determining the basket of goods used to construct the retail price index. The FES has been running since 1957, although it has only collected data in its present form on a consistent basis since the 1970s. In 2001, this dataset merged with the UK National Food Survey to create the Expenditure and Food Survey (EFS), but we shall make reference to the FES for the remainder of the paper. In a typical year the FES contains information on around 6500 households. Over the first few decades of the survey, the response rate was consistently over 70%. However, this has declined since the 1980s and fell to 58% in 2000. In general the households form a representative sample, but excluded are those not living in private houses, such as residents of residential homes or students.

<sup>6</sup> Although not shown here employment rates for single mothers, also continued to be lower, see Blundell and Hoynes (2004).

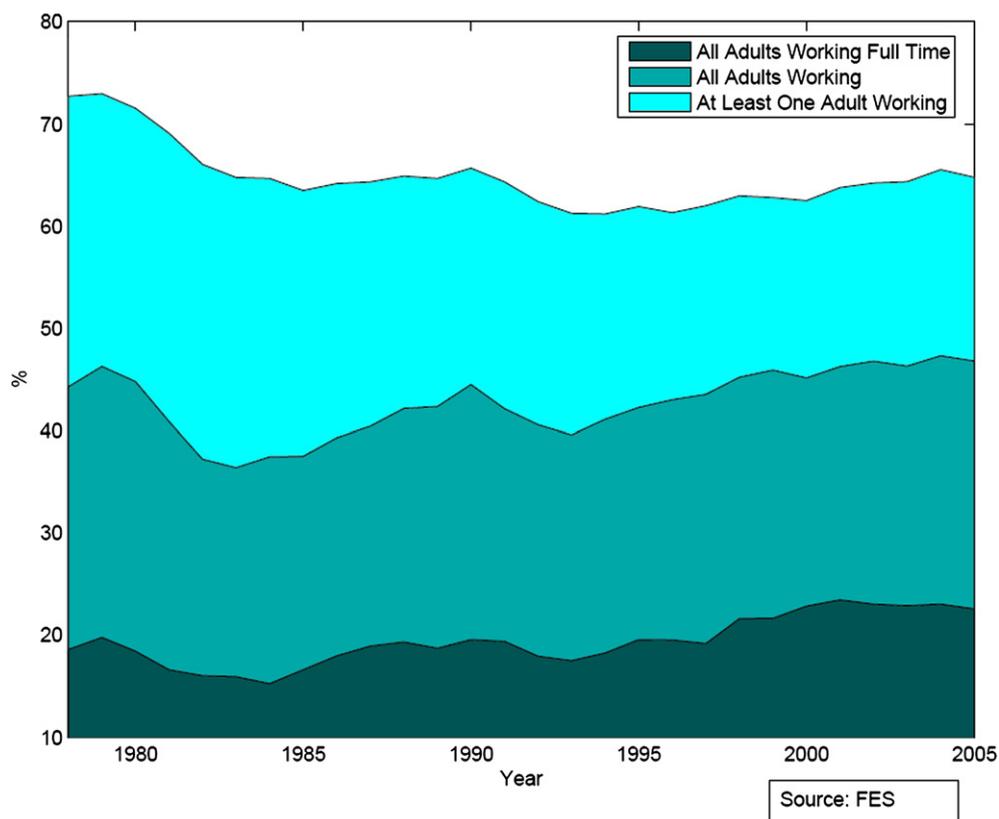


Fig. 2.3. Proportion of households with a working adult.

For households participating in the FES, each member over 16 is asked to complete a diary detailing all their spending, both home and abroad, over a two week period. In addition to this diary, household members perform an interview in which they are asked questions about their demographic background, and asked to recall expenditures on large infrequently-purchased items (such as cars).

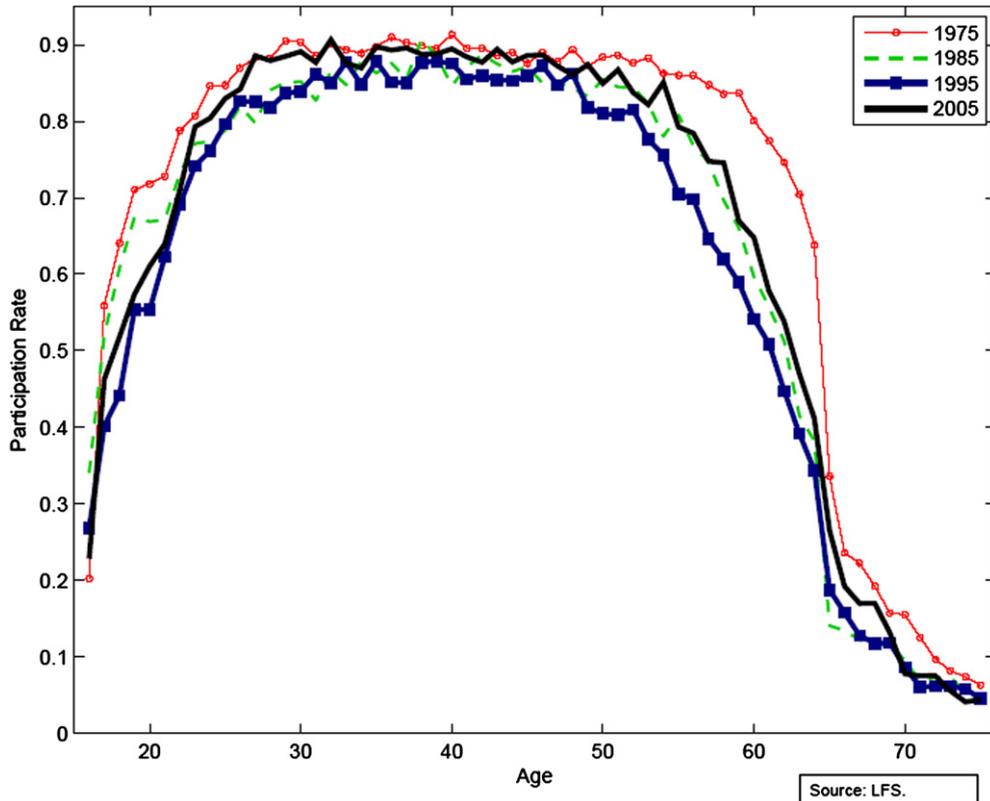
Because data on income have been collected consistently only since 1978, our sample period is 1978–2005. This gives a baseline sample of 197,190 households (369,599 adults, 496,067 individuals). To each household we allocate a head, in accordance with the guidelines for this project (usually the male in a household consisting of a married couple with children). For the majority of statistics quoted in this study, we use as population all households with heads aged 25–60. The sample is formed as follows: we drop 71,041 households for which the head is outside our age range; we then drop observations where food consumption or disposable income is negative (515 observations), leaving 125,614 households representing 370,343 individuals. For robustness of the results we trim the top and bottom 0.25% of observations of each distribution. For consistency with the other variables, we follow this same procedure for wages, rather than selecting on the minimum wage or the wage of a typical low-skilled job. It is worth noting, however, that the minimum wage was introduced in the UK in 1999 at £3.60 for over-21s: our trimming point for this year is around 40% of this, at £1.41.

### 2.2.2. The British Household Panel Survey

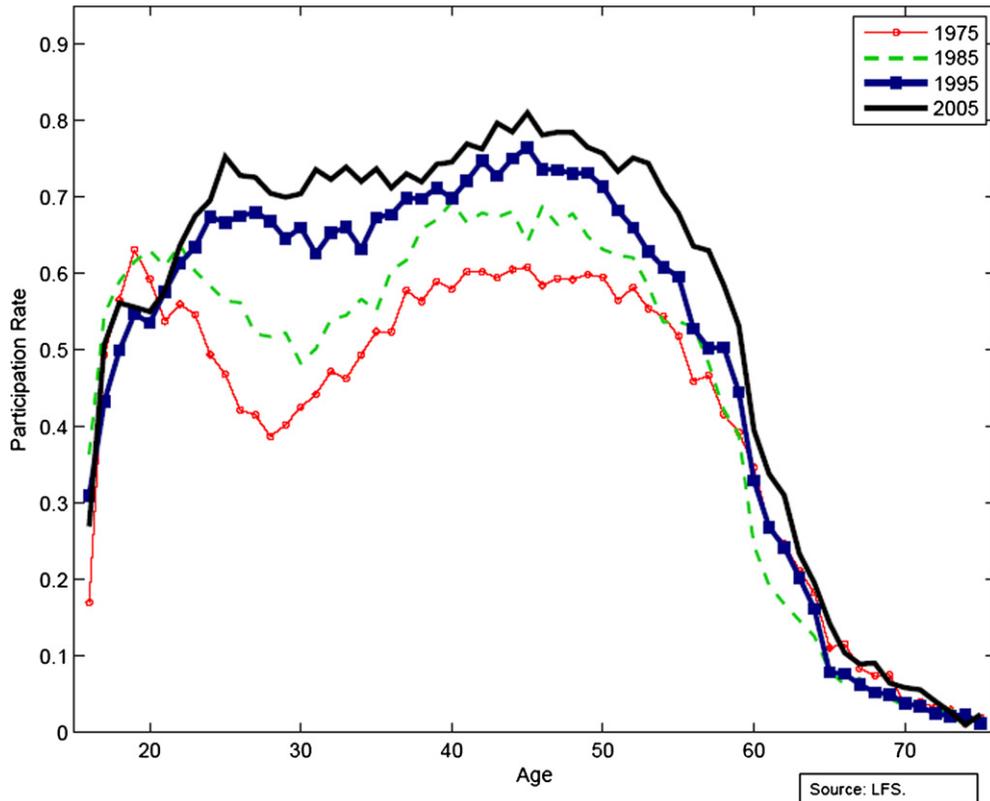
In order to study wage and income dynamics we use data from the British Household Panel Survey (BHPS). The BHPS is a comprehensive longitudinal study for the UK for general use in the social sciences, running since 1991. Like the US PSID it tracks individuals across household changes and tries to match the population age distribution by taking a refresher sample of new adults in each wave. In the first wave, it achieved a sample size of around 5000 households (10,000 adult interviews), a 65% response rate. The sample size has fallen somewhat since 1991, both because of sample attrition and because of a net outflow of households. In 2000 it achieved around 4200 complete interviews, a 75% response rate.

The BHPS has detailed information on earnings, hours worked and other income, and information on housing and durables, but little information on non-durable expenditure. An auxiliary dataset compiled by researchers at the University of Southampton contains derived data on net household disposable income, which we use in this study.

We follow similar sample selection procedures for the BHPS as followed for the FES. The baseline sample is 68,027 households, comprising 166,144 individuals. We remove 24,414 households for whom the head is outside our age range. We then trim the bottom 0.5% of the distribution of disposable income and remove observations for which the head's education status is missing (346), leaving 43,017 households, comprising 122,269 individuals. Unlike the FES, where each questionnaire



(a)



(b)

Fig. 2.4. (a) Employment over the life-cycle: men. (b) Employment over the life-cycle: women. Source: Blundell et al. (2008a), LFS data.

is completed in entirety, the BHPS contains many incomplete observations, so the quoted statistics are computed using fewer observations. For example, the total sample size of observed changes in household income is 24,363.

### 2.2.3. *The Survey of Personal Incomes*

The Survey of Personal Incomes (SPI) is an annual survey conducted by Her Majesty Revenue and Customs (HMRC, the UK equivalent of the US IRS) based on data collected on individuals who could be liable for income tax. We use these data to provide information on top incomes. The dataset is constructed as follows: stratified samples are drawn from three separate HMRC databases (those subject to pay-as-you-earn income taxation, self-assessment and neither of these). Variables that were used to stratify the sample include sex, pay, tax liability, main source of income and occupational pensions in previous years. Individuals with high incomes or rare allowances tend to be over-sampled. In 2004–05, this procedure produced a valid sample of 523,621 cases.

Around 15% of individuals within the SPI are not taxpayers, since their taxable income does not exceed the personal allowance (£4745 in 2004–05). However, the SPI does not cover all non-taxpayers, since some individuals do not have any interaction with HMRC in a particular year, e.g. individuals without children on non-taxable state benefits.

The SPI contains data pertaining to before-tax income, sources of before-tax income, tax reliefs and some data on individual characteristics, e.g. sex, age group, industry and their marginal rate of income tax. However, the measure of total before-tax income (and some of its components) is incomplete because income that is not subject to tax is not provided to HMRC. Moreover, certain items have to be imputed by HMRC, e.g. investment income where tax has been deducted at source and personal pension contributions.

Certain steps also have to be conducted in order to ensure anonymity. All sources of income, deductions and reliefs are rounded to three significant figures, with tax amounts imputed based on these rounded figures. Unusual combinations of allowances must be examined to ensure no-one can be identified. Some variables are combined to further ensure anonymity. HMRC also ensures that no group has a sampling weight less than 1 in 60 or represents a population of less than 10,000. Finally, individuals with incomes greater than £600,000 are combined to create 'composite records' in order to ensure anonymity. This is done by combining cases with similar characteristics (e.g. same stratum and sex) and taking averages for each variable on the file.

### 2.2.4. *The Labour Force Survey – LFS*

The Labour Force Survey is a continuous household survey which provides the most detailed data on labour market characteristics such as participation, earnings, training and qualifications. The LFS has been running since 1973 and provides national accounts employment data. It was first collected every two years, then over 1983–1992 it was collected yearly, and since 1992 it has been collected quarterly, as a revolving panel lasting 5 quarters. The sample size in each wave is around 60,000 households covering 140,000 individuals. The survey has complete response to questions on participation; in a typical year, we collect round 100,000 responses for adults between 25 and 60. We do not use the data on earnings and wages, because these data have only been collected since 1992.

## 2.3. *Comparisons with UK National Income Product Accounts (NIPA)*

Here we present a comparison of per-capita disposable income, expenditure and employment from the UK national accounts and the FES. Owing to definitional and methodological differences, it would be unsurprising to find a difference in levels between the national accounts and FES. Moreover, both datasets are subject to measurement error of different kinds: the FES may include (possibly systematic) mis-reporting by households, while, for example, many national account expenditure items are formed as a residual from income, value-added and trade items in national accounting identities. Of particular interest is: the size of any discrepancy; whether any such differences can be accounted for, and whether the two measures have the same time-series properties. We give a brief overview of apparent differences between the two datasets: the issues are discussed in further detail in Tanner (1998) and Attanasio et al. (2006).

Fig. 2.5 shows per-capita disposable net income in FES and national accounts, deflated by the RPI. The coverage of the FES has been consistently high over the sample period, rarely dropping below 90% of the national accounts level. For most of the period, the FES also matches the dynamics in the national accounts, matching the recession in the 1980s and slowdown in the early 2000s. The FES data departs significantly from the NIPA statistic only in 1992.

Fig. 2.6 shows estimates of per-capita income and total expenditure from the FES as a proportion of national accounts data. The measure of expenditure used here is broader than that used in the rest of this study as we include durable and semi-durable goods, excluding housing and some other small items which are incompatible between the two data sets. The largest departure from national accounts for both income and expenditure occurs in the early 1990s. However, whereas income coverage suffers a pronounced dip in 1992, then recovers later in the decade; the coverage of consumption first begins to decline in 1993, but then to continues to decline.

In order to try to understand what may lie behind the declining performance of the expenditure data, it is worth looking at some of the components behind the total. Fig. 2.7 shows the percentage coverage of certain items included in our consumption basket. Expenditure on food, clothing and catering matched the national accounts extremely well, both in levels and in dynamics until the late 1980s (and before the beginning of our sample period). Coverage for these items rarely fell below 90%. On the other hand, alcohol and tobacco have always had low coverage, but this is common for items

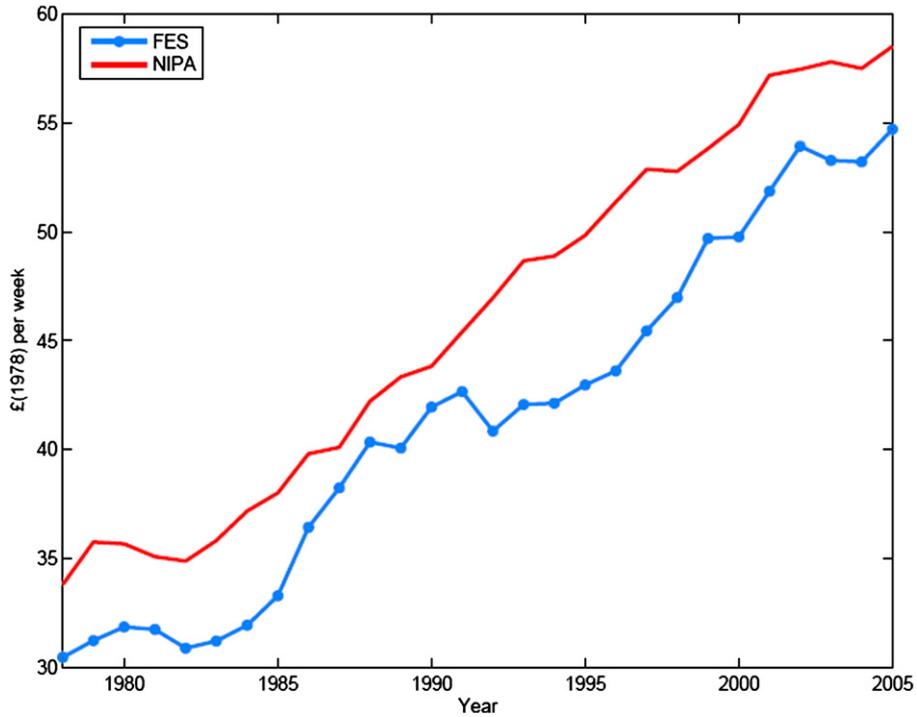


Fig. 2.5. Income per capita: FES vs NIPA.

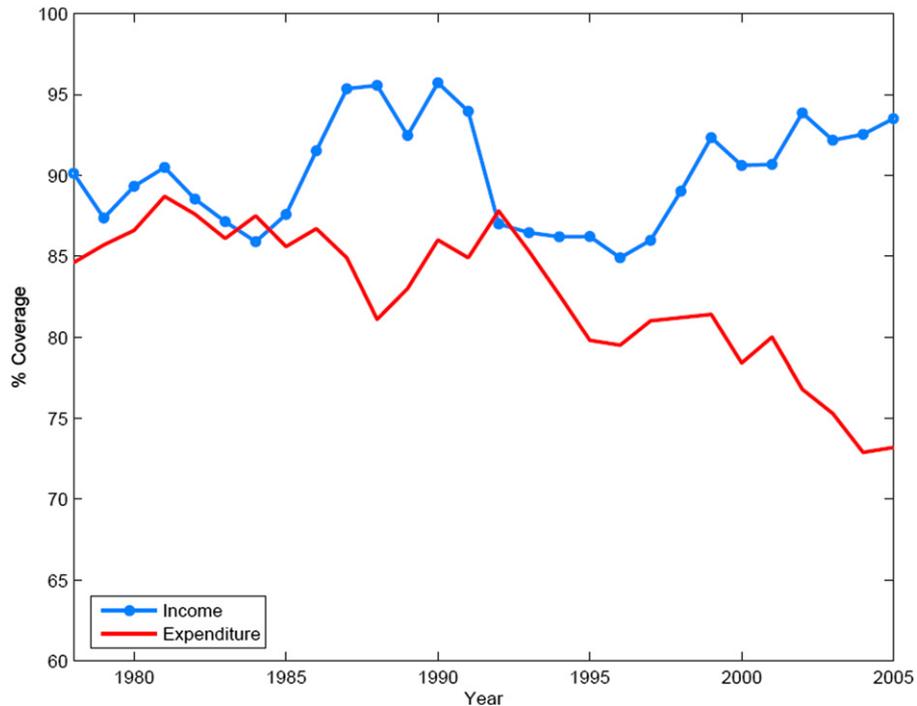


Fig. 2.6. Income and consumption coverage – FES totals as a percentage of NIPA totals.

that carry a social stigma. 1988 saw a sudden collapse in the coverage of catering, which suggests that there was a sudden change in measurement for this category in one of the datasets. However, for all other categories there has been no sudden shift, but a gradual decline in coverage, approximately since 1993. Therefore the decline in coverage of the aggregate since 1993 is not confined to certain items but seems to be a broad trend across many expenditure categories. The case of food expenditure is puzzling since the national accounts data for this item are formed mainly from the FES data. It may therefore be sensible to use the FES food coverage as a basis for comparison.

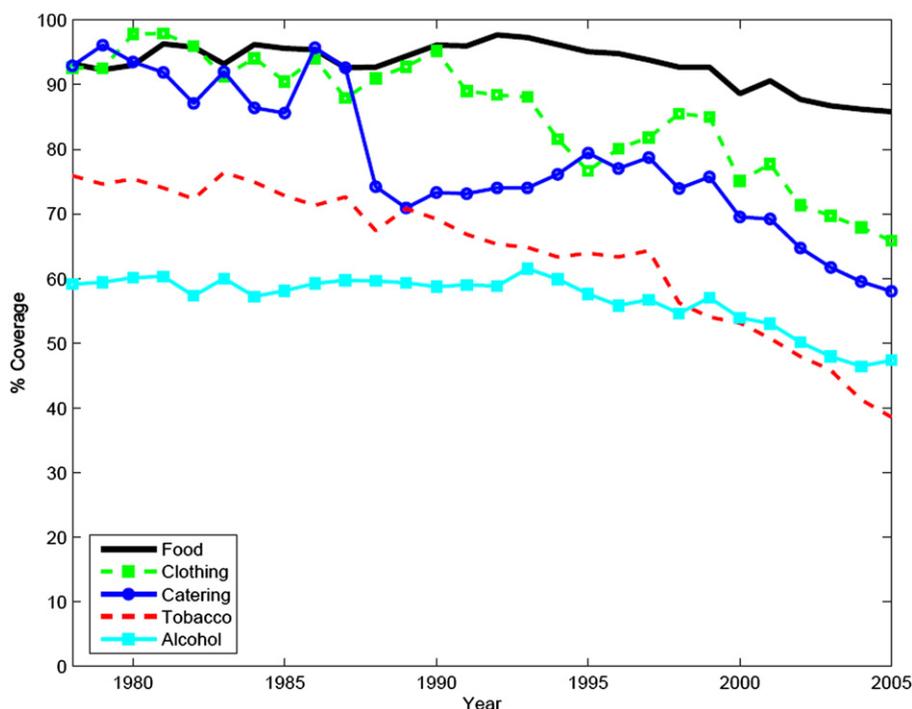


Fig. 2.7. Consumption coverage – selected categories.

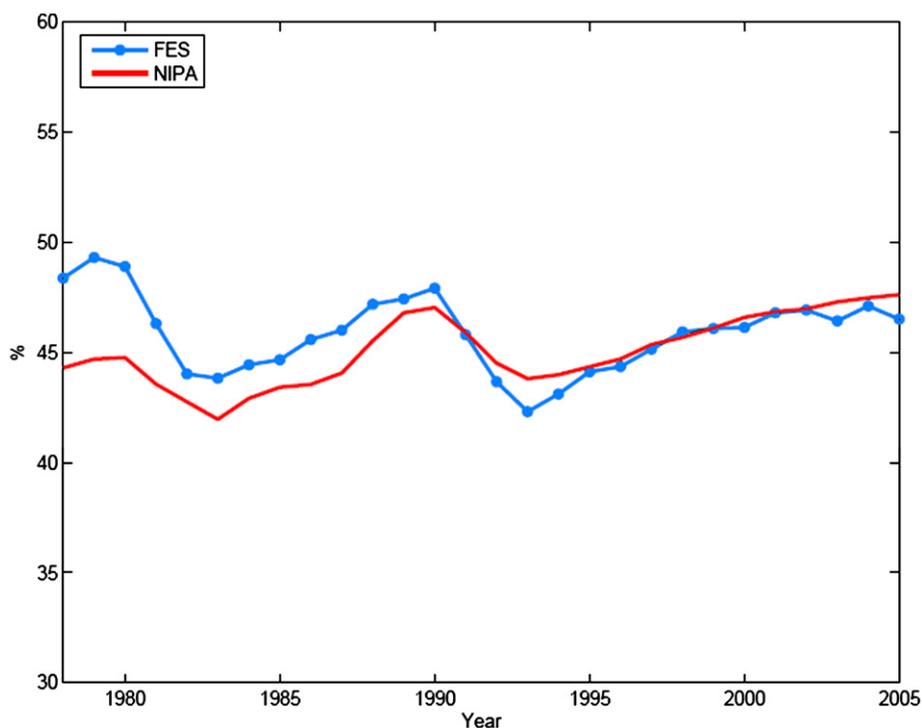


Fig. 2.8. Labour force participation: FES vs NIPA.

There are several possible explanations for the declining performance of the expenditure data. First, there may be a worsening sampling problem. As mentioned above, the response rate to the FES has declined from over 70% to under 60% over the past 30 years. It is possible that the survey is systematically selecting out high spenders for some reason. However, the FES continues to cover income well, so the discrepancy would have to be caused by selecting out groups who spend more of their income relative to the rest of the population. We know that FES excludes students and people in residential housing, among others, but it seems unlikely that these two groups can explain all the difference. Second,

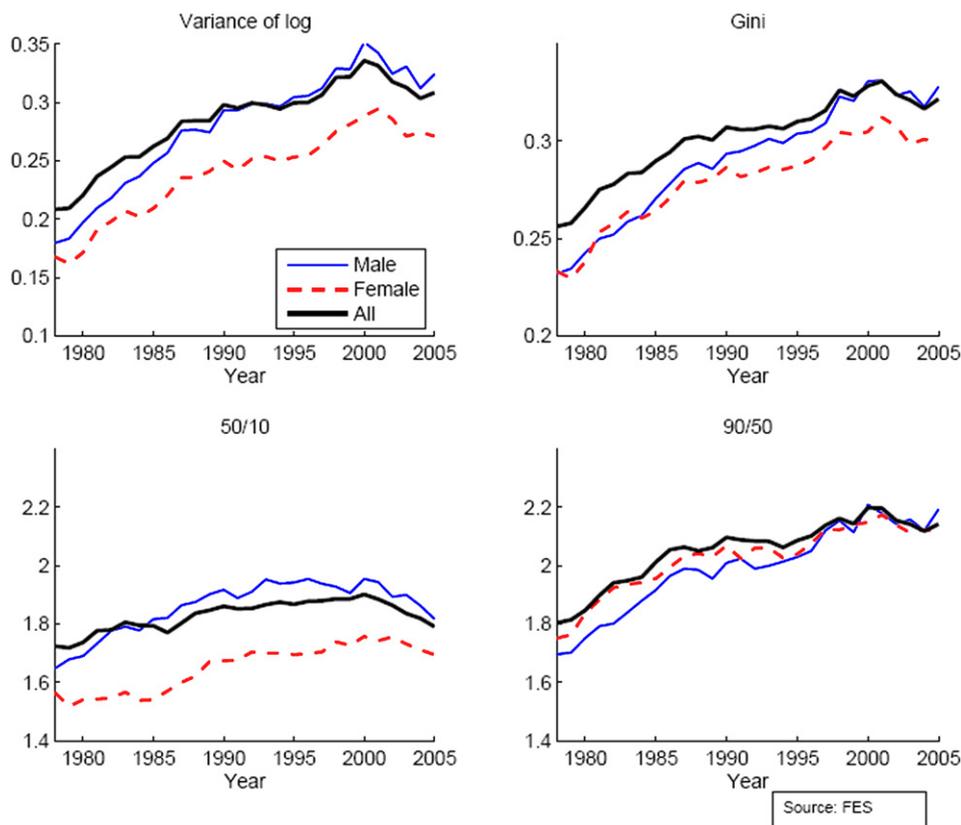


Fig. 3.1. Basic inequality in wages.

the departure could be caused by changes in the way people spend money. The 1990s saw the introduction of internet purchasing and a rise in spending on credit cards. Additionally, children's expenditure has become more important: although their expenditure is accounted for, children are not given a diary, so their spending may be under-recorded. Third, spending abroad and spending by NPISH (non-profit institutions serving households e.g. local sports clubs) is not included in the FES. These items are separable from domestic and household spending in the national accounts, though not at the level of individual categories, and there is likely to be high measurement error in recording, for example, foreign spending by UK households. Finally, the decline coincides with the shift from sampling the FES over the calendar year to sampling over the financial year (e.g. from April 1993 to March 1994). However, it is hard to think why this would cause a departure in trend between the datasets, rather than maybe a shift in the coverage. Whatever the cause of this discrepancy, it is interesting to note that the US CEX also displays a more quickly deteriorating coverage for consumption than for income: the comparison of data collection methodology in the FES, the CEX and other consumer surveys seems a promising approach for uncovering the cause of the problem.

Fig. 2.8 shows the employment rate for over-16s in the FES and NIPA data (which derive from the LFS). In contrast to income and expenditure, the match for participation between the FES and NIPA data has improved in the last decade. This is because the demographic weights are now calculated yearly for the FES, while prior to 2001, sampling weights are an interpolation from 10-yearly censuses.

To summarise, the FES seems strong in matching national account income, employment data and to an extent consumption data. However, the departure for expenditure is of growing importance. This raises some puzzles since it occurs for items (food) which are used directly from FES in constructing the national accounts data. This is the subject of on-going research as there seems no easy explanation. The discrepancy has increased gradually since the early 1990s, for nearly all items, and it does not seem to have been caused by selecting out high-income households.

### 3. Hours, wages and earnings inequality

#### 3.1. Wages

Our discussion of inequality turns first to the dispersion of wages and labour earnings. Fig. 3.1 provides the key measures of inequality in overall hourly wages in the UK over the period 1978 to 2005. The strong growth during the 1980s is clearly visible. As is the moderation in the early 1990s and the subsequent growth in the late 1990s.

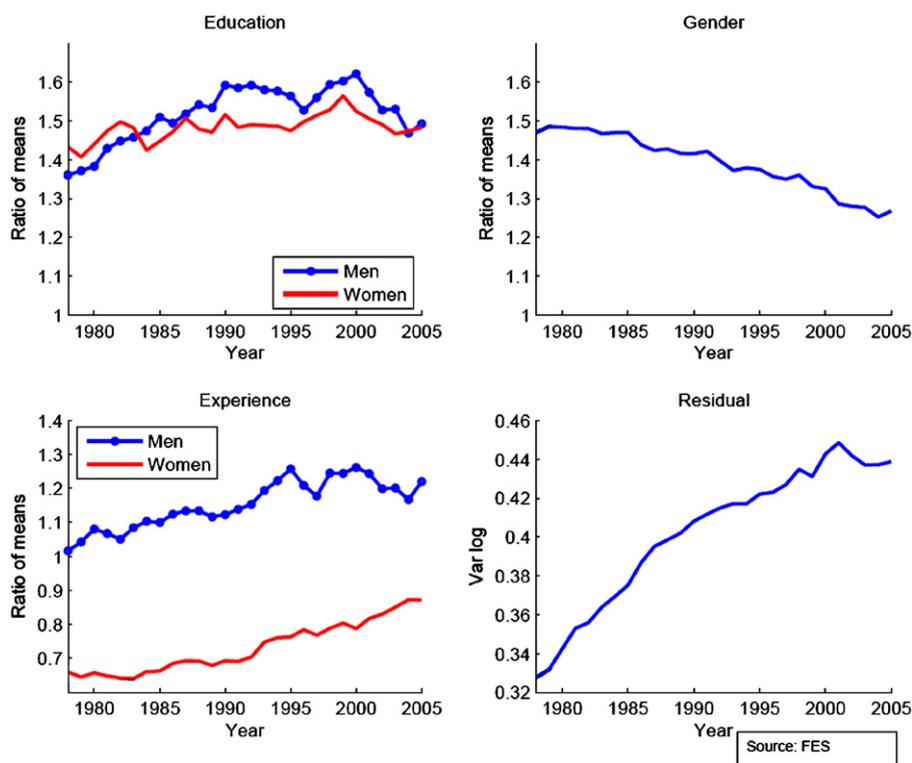


Fig. 3.2. Wage premia.

This general picture of growth in wage inequality especially in the 1980s is reflected in both the variance of the log measure and the Gini measure. The quantile comparisons also show strong growth in inequality across the distribution in the early 1980s. However, the moderation in the early 1990s and subsequent increase in inequality are more marked in the upper-decile comparison (90–50) than in the lower decile comparison (50–10) and inter-quartile range (not shown). Many of the distinguishing features of the evolution of broad wage inequality since the 1980s have occurred primarily in the top quarter of the distribution.

### 3.2. Wage premia

Education differentials in the UK rose rapidly during the early 1980s and have been reasonably stable thereafter. This is clear from the first panel in Fig. 3.2. The experience differential, which here simply measures the time since leaving education, also rose and continued to do so through until the mid-1990s. On the other hand the raw gender differential has fallen secularly over the whole period. The residual term shows that other factors remain important in explaining the overall growth over this period.

### 3.3. Wage inequality, earnings and labour supply

The growth of observed wage inequality over this period has been strongest for men, despite the fall in labour market attachment of the low skilled. In contrast, growth in wage inequality for women has been moderated by the fact that growth in the labour supply of women has been strongest for those with medium education levels (see Section 2.1 above). Fig. 3.3 also shows the systematic differences in the variation of hours worked between men and women over this period. This again largely reflects the relative increase in the labour supply of women. Female wages and hours show a strong correlation throughout the period. Generally male wages are weakly or even negatively correlated with hours of work, although this correlation has been becoming more positive over this period.

This correlation is further investigated in Fig. 3.4 which shows that the correlation for men is mostly positive, and increasingly so, at either end of the life-cycle. This is where we expect labour supply elasticities for men to show most responsiveness.<sup>7,8</sup>

<sup>7</sup> See Blundell and MaCurdy (1999).

<sup>8</sup> For the US the correlation of wages and hours over the life cycle is documented in Kaplan (2007) and in Heathcote et al. (2007). Using PSID data, Kaplan estimates the profile to slope downwards from around  $-0.1$  to  $-0.2$  over the first 25 years of working life before flattening out. He fits a monotonically

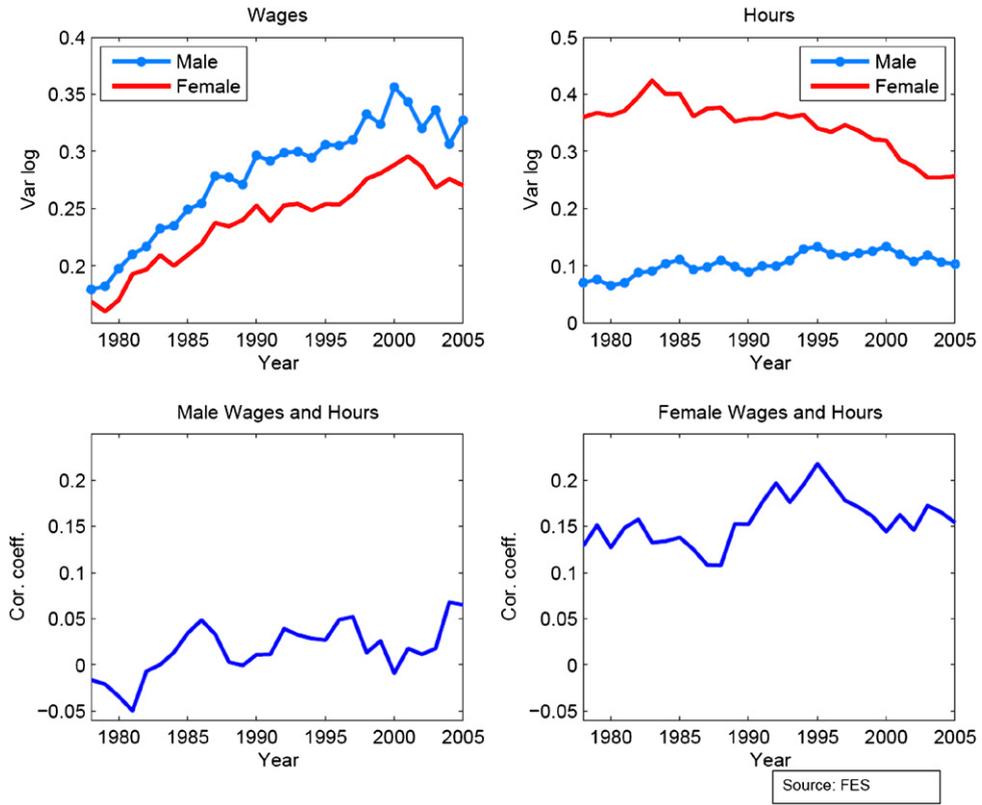


Fig. 3.3. Inequality in labour supply.

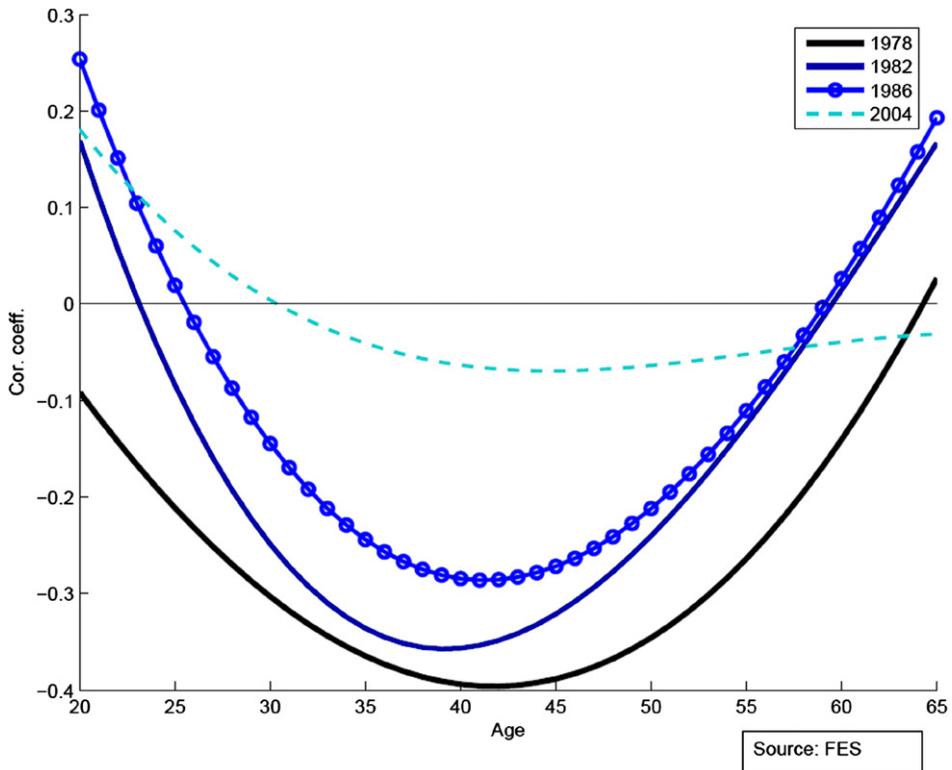


Fig. 3.4. Correlation across the life-cycle. Correlation between male wages and hours, by age (cubic polynomial fit).

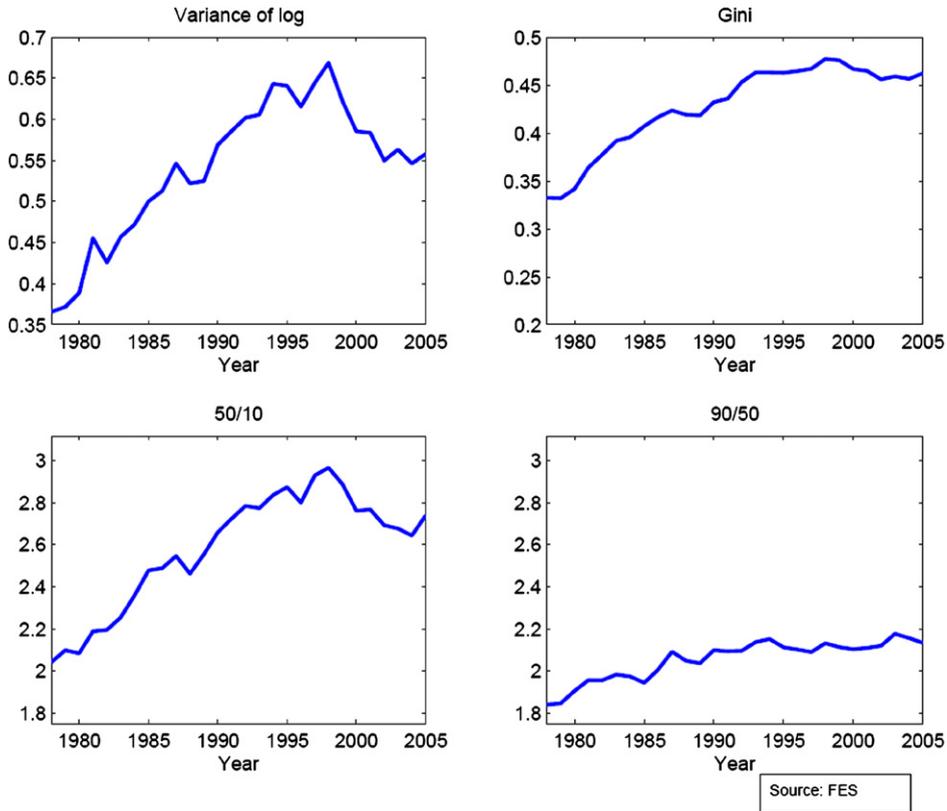


Fig. 3.5. Inequality in equivalized household earnings.

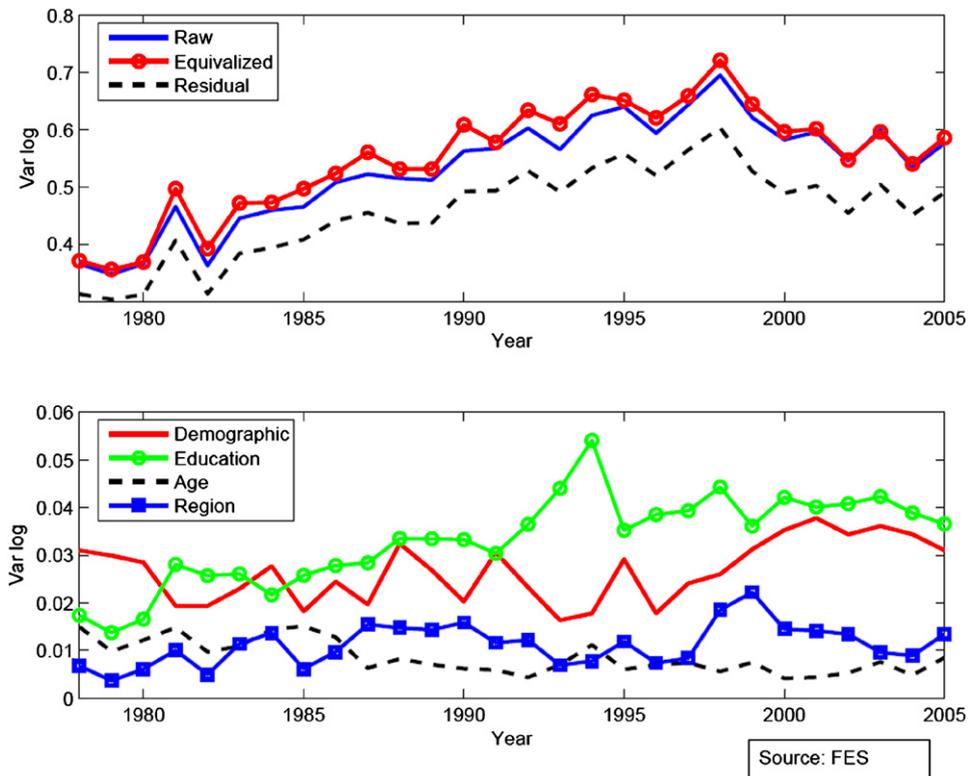


Fig. 3.6. Labour earnings inequality: decomposition.

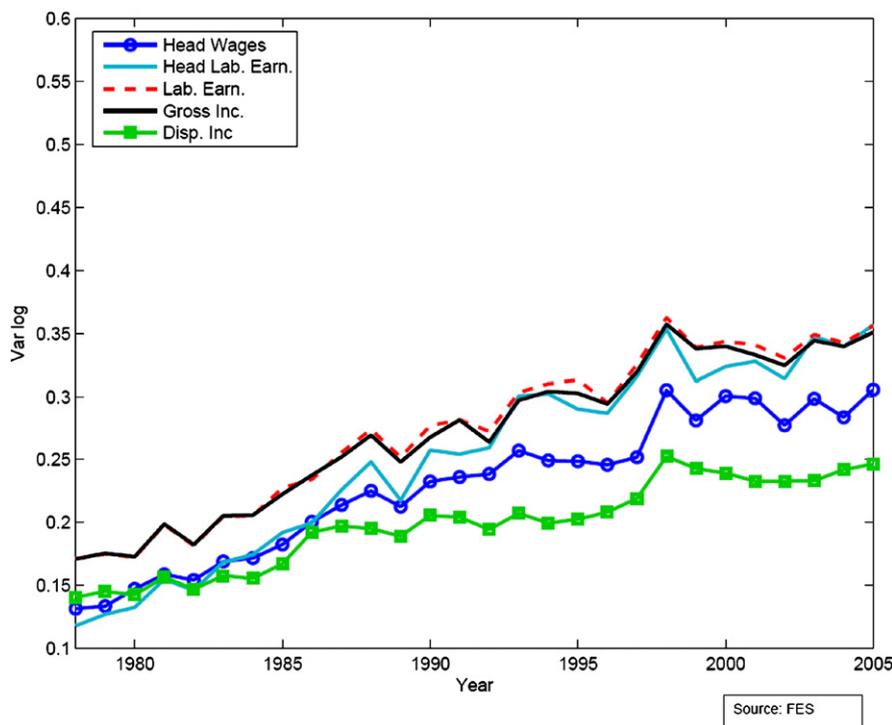


Fig. 4.1. From wages to disposable income – heads in employment.

The general picture of inequality growth in wages follows through into household earnings, as can be seen from Fig. 3.5 which presents the inequality measures for equalized household earnings. As with most other variables, the variance-of-log measure responds more to the lower end of the distribution, as reflected in the 50/10 ratio, whereas the Gini is closer to the 90/50 ratio. This feature is observed in other countries (see for example Heathcote et al.'s US study). While the path of inequality at the top end here closely follows the path for the upper half of the wage distribution in Fig. 3.1, the more recent decrease in dispersion in the lower half is much greater than the corresponding drop in wage dispersion. It is likely this substantial decline is caused by the increase in labor-force attachment among low-skilled workers, as shown in Fig. 2.2.

Finally, Fig. 3.6 shows the importance of the returns to education in underpinning earnings inequality in the early part of this period, as well as a more recent role for demographics and region.

#### 4. From wages to disposable income

The linkages between individual hourly wages and family disposable income can be described as a set of 'insurance' mechanisms. These are mechanisms that individuals, families and society adopt in response to changes in hourly wages. They include regular savings and borrowing to smooth out shocks to income. They also include individual and family labour supply responses, as well as the redistribution of the tax and welfare system. These mechanisms place a wedge between the distribution of individual hourly wages and the final distribution of disposable income.

In Fig. 4.1 we show the overall pattern of the variance-of-log measure of inequality for the sample of households in which the head is in employment. The sharp rise in inequality for wages through to disposable income in the early 1980s is clearly evident. From 1990 onwards the growth in inequality of household earnings tends to separate from that of the head's wage, pointing to the importance of positive labour supply effects.

Inequality in household earnings has grown more slowly than for head earnings, in part because the growth in female labour supply has been strongest amongst those with medium education levels. The slower growth in disposable income inequality highlights the role of taxes and transfers. Fig. 4.2 shows the impact of including the self-employed. Here the divergence with disposable income is particularly strong.

Inequality is generally much higher and grows more rapidly once we consider the entire sample of households. The impact of including households with no labour income is clear from Fig. 4.3.

Fig. 4.4 shows inequality by different measures and across different parts of the distribution. Not surprisingly perhaps, the impact of taxes and transfers is greatest among the lower deciles.

downward sloping profile with his parameter estimates. Using the same data, Storesletten et al. estimate the profile to be roughly flat at  $-0.1$  and fit an upward sloping profile.

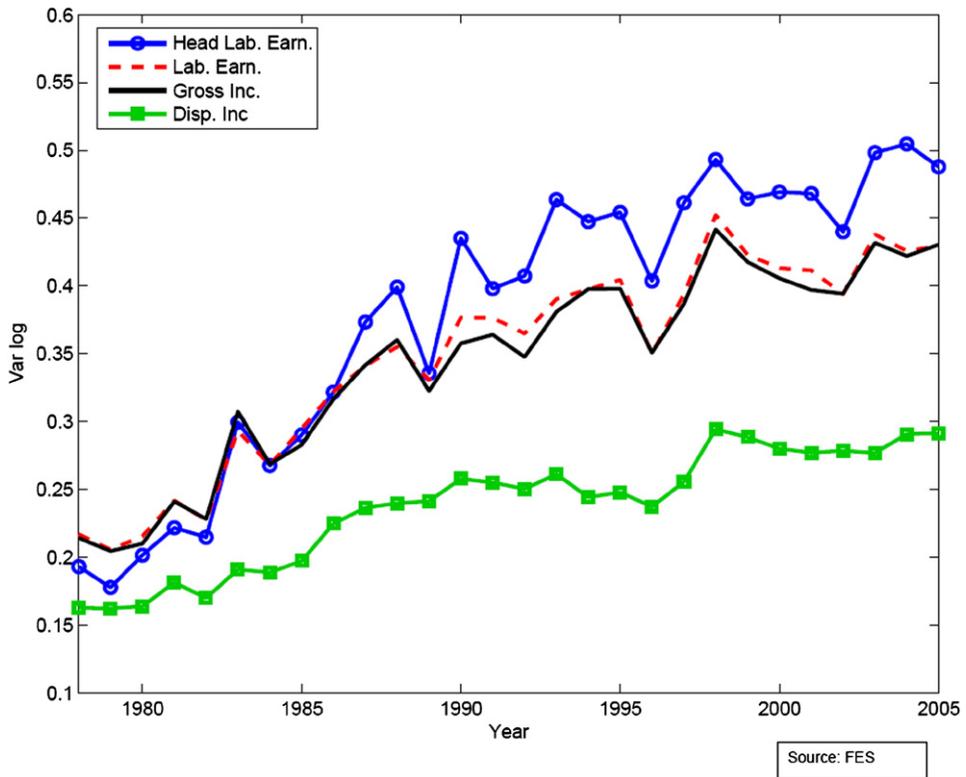


Fig. 4.2. From earnings to disposable income – heads with earnings from employment and self-employment.

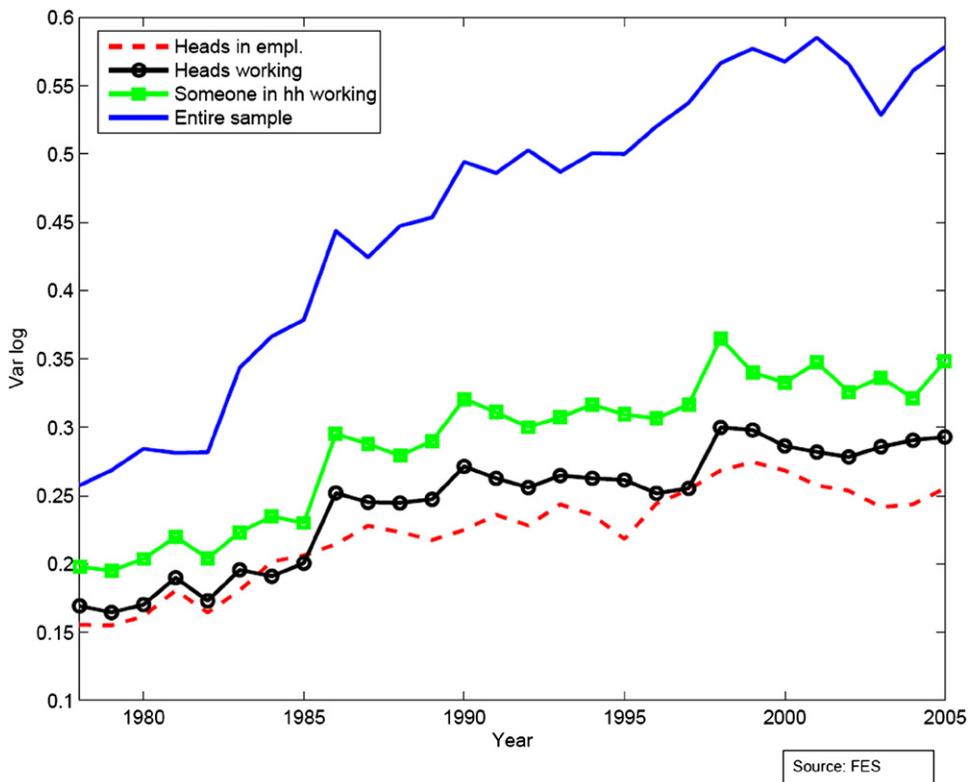


Fig. 4.3. Disposable income inequality: decomposition by sample.

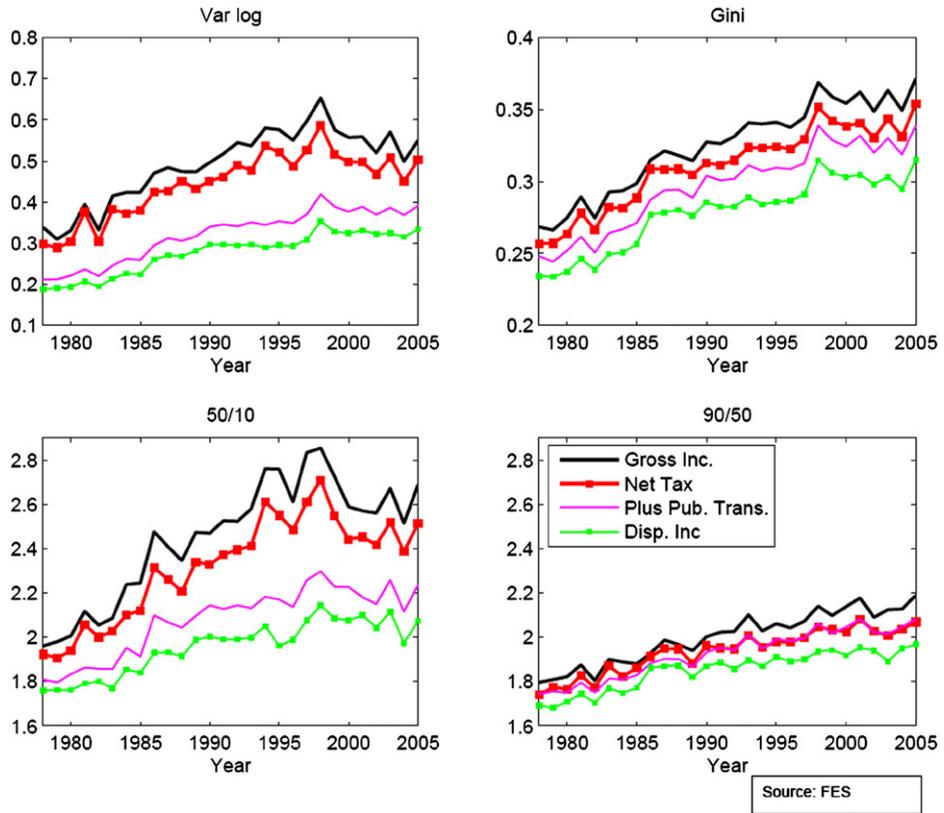


Fig. 4.4. From earnings to disposable income (at least one worker).

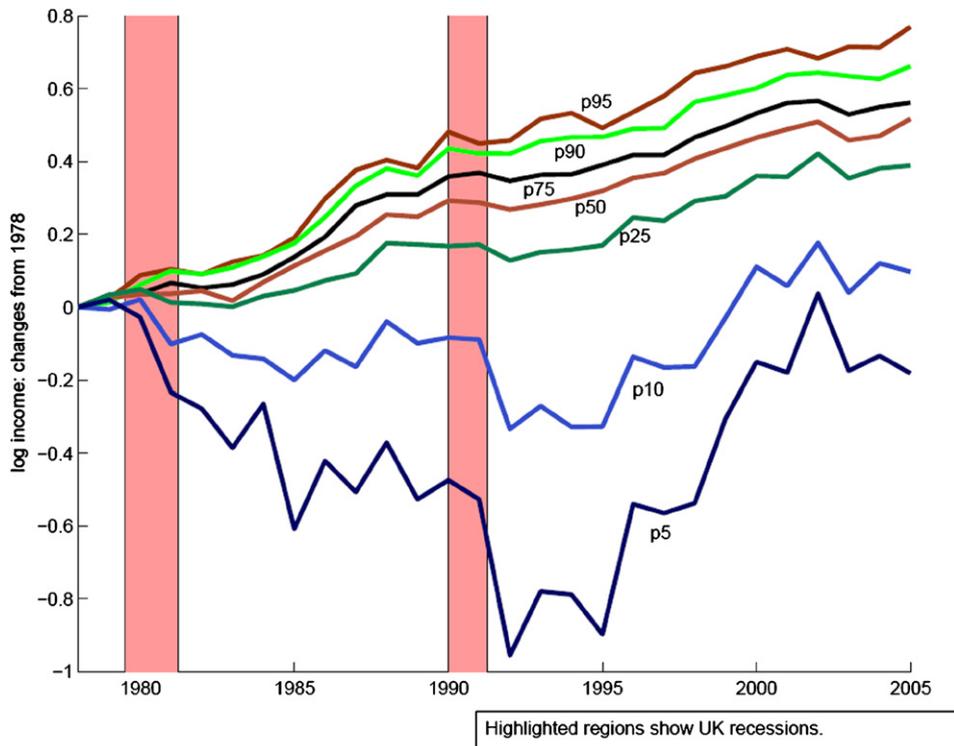


Fig. 4.5. Quantiles of the household gross income distribution.

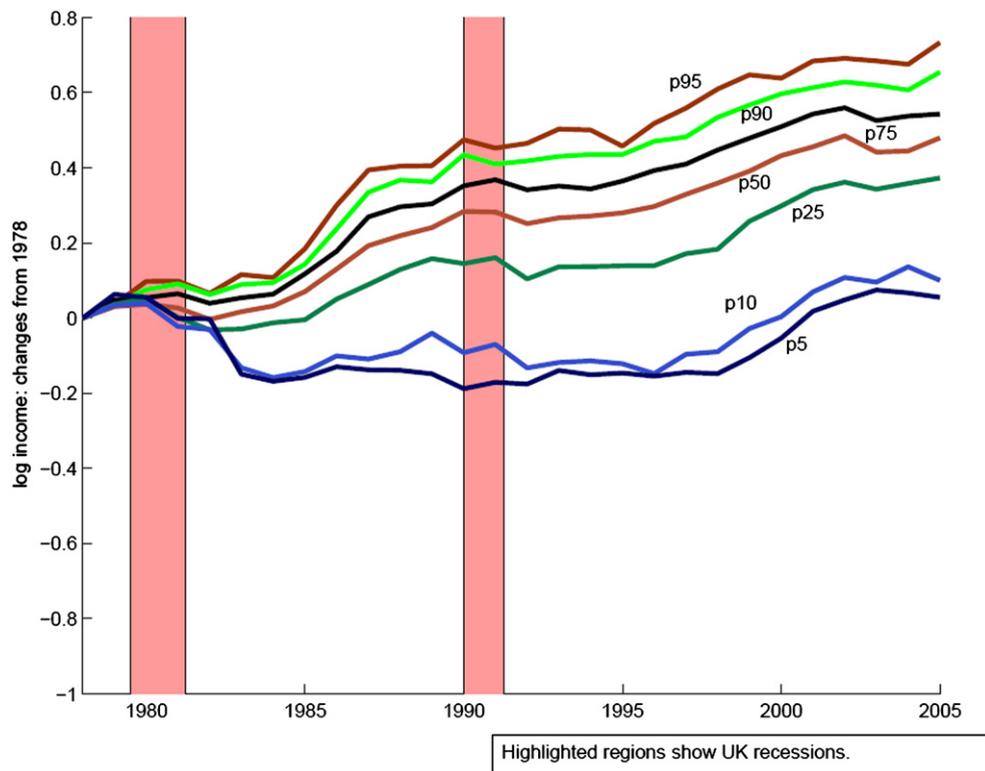


Fig. 4.6. Quantiles of the household net income distribution.

The key importance of the relationship between the business cycle and inequality is documented in Figs. 4.5 and 4.6. In the years following each of the two significant recessions in the early 1980s and the early 1990s, inequality in gross income expands, driven largely by deep falls in the lower quantiles of the income distribution. The picture for the distribution of net income is very different. The tax and transfer system plays a key role in off-setting the impact of recessions on the lower quantiles of the income distribution.

## 5. Consumption inequality

### 5.1. The inequality boom and after

Consumption inequality rose strongly in the UK in the early 1980s. This has been documented elsewhere, see Blundell and Preston (1998), but Fig. 5.1 also points to the episodic nature of consumption inequality growth since the late 1970s. In Fig. 5.2 we use the variance-of-log measure since it decomposes easily.<sup>9</sup> The systematic growth in consumption inequality gives way to a period of almost no inequality growth in the early 1990s and then an uptake of inequality growth in the late 1990s.

The bottom panel of Fig. 5.1 shows that the two episodes of inequality growth – the mid-1980s and late 1990s – show distinct patterns with regard to education. Specifically, the 1980s inequality boom followed the education pattern fairly closely but the growth in the late 1990s found no significant counterpart in the education component.

This underlying difference in the nature of the two inequality growth periods in the UK is further revealed in Fig. 5.2 which considers alternative samples. In the late 1980s and early 1990s there is stronger growth for the entire sample in comparison to the sample with heads working. For the more recent growth in consumption inequality there is very little difference across samples.

### 5.2. From income to consumption inequality

The transmission from wages and income through to consumption is of considerable interest in understanding the workings of the economy at both the macro and micro levels. There is a growing literature which seeks to understand these transmission mechanisms, see for example Attanasio and Davis (1996), Blundell et al. (2008c), Guvenen (2006), Heathcote et al. (2004, 2007), Krueger and Perri (2006).

<sup>9</sup> It should also be noted that log consumption is close to normally distributed, see Battistin et al. (2009).

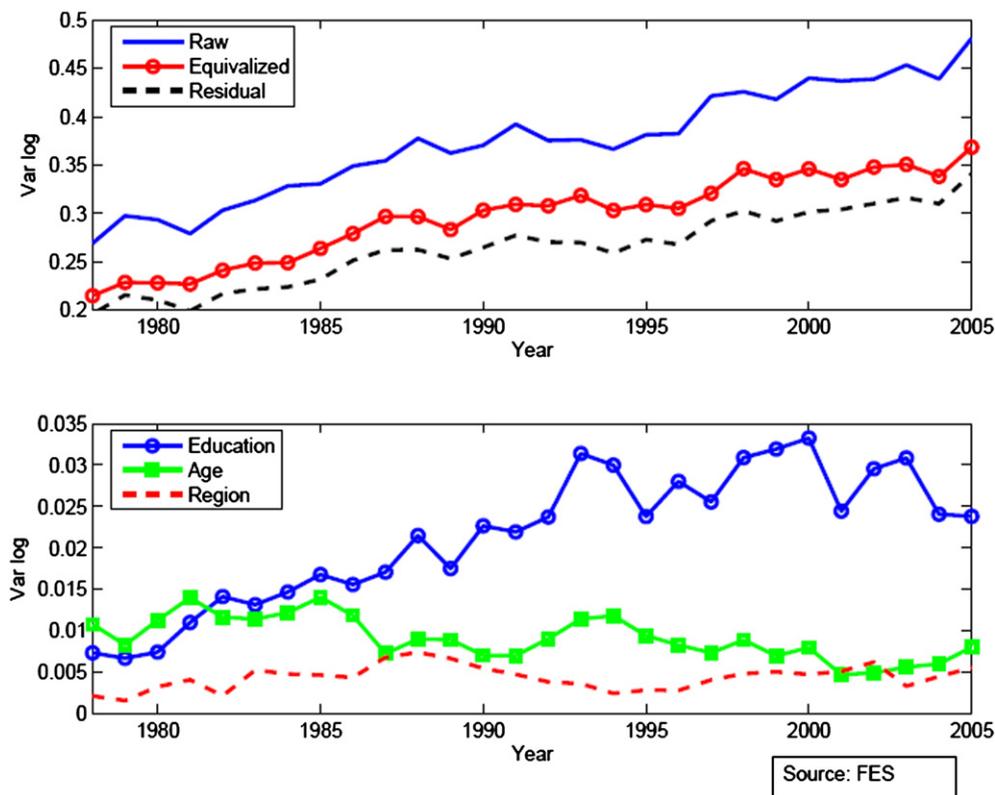


Fig. 5.1. Consumption inequality: decomposition. Note: The decomposition here includes a demographic component, omitted from the bottom panel.

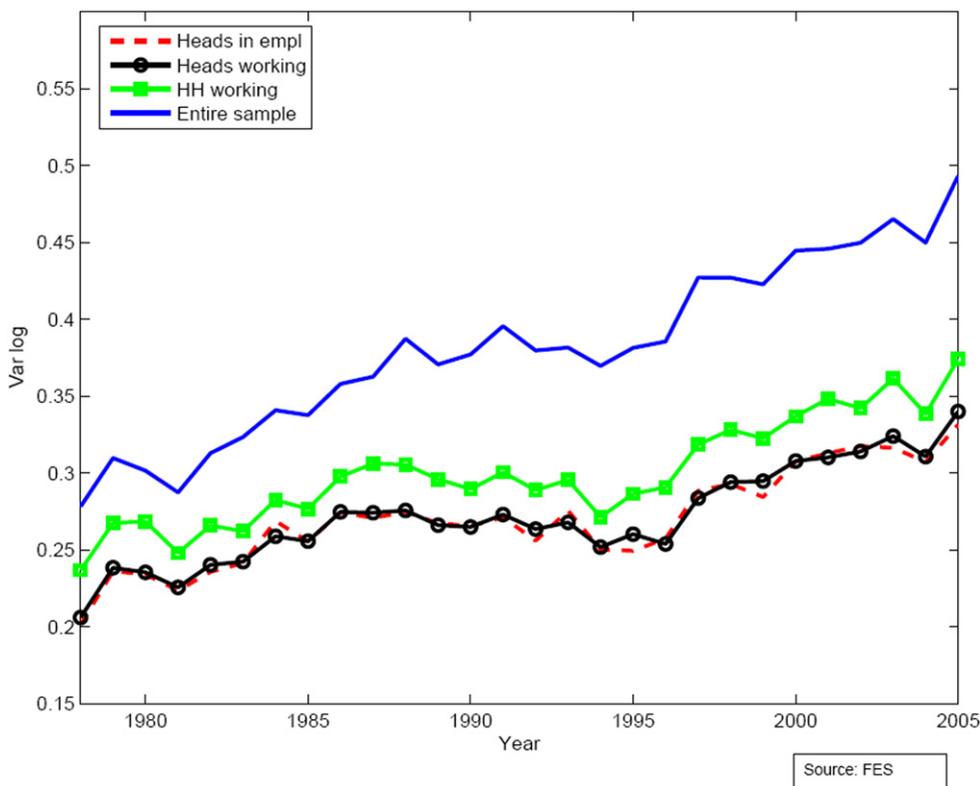
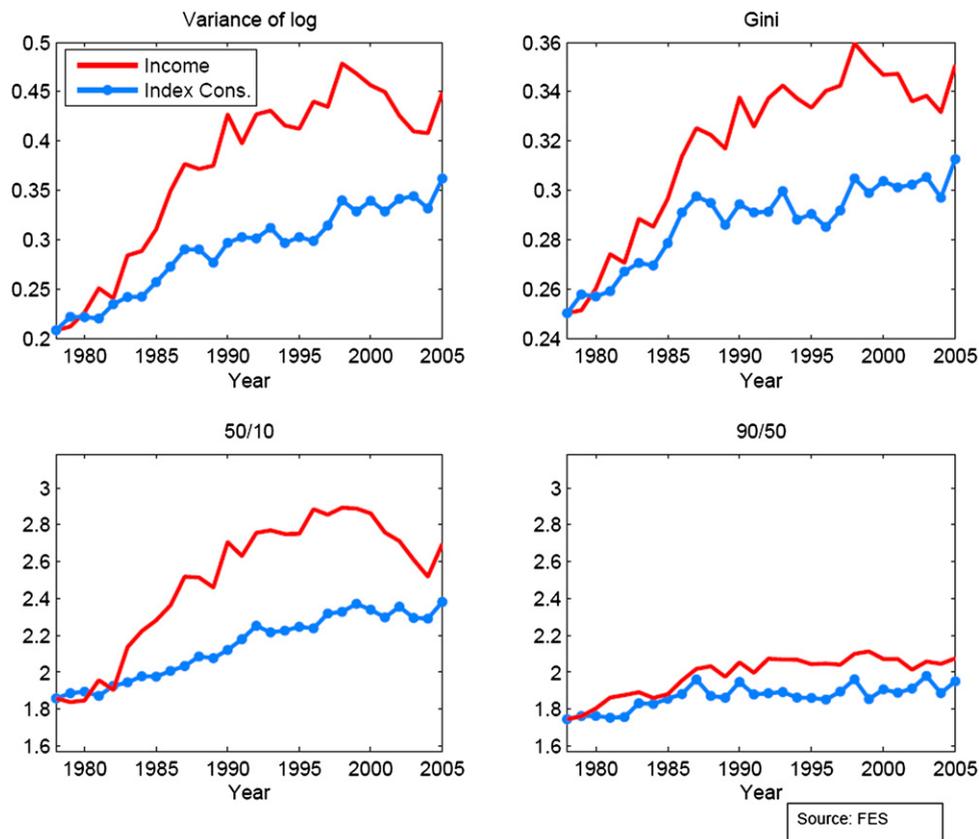


Fig. 5.2. Consumption inequality: decomposition by sample.



**Fig. 5.3.** From disposable income to consumption. Notes: The indices of the variance of log consumption and consumption Gini are obtained by subtracting a constant from each year's measure. The indices of percentile ratios are obtained by dividing through by a constant.

Fig. 5.3 clearly shows the disjuncture between consumption and income inequality in Britain. Here we plot income inequality by the four standard measures, alongside consumption inequality, re-based so that the growth rates can be easily compared. At the beginning of the 1980s consumption inequality rose strongly and largely kept pace with the growth in income inequality. By the late 1980s the two series break apart. The two series grow furthest apart in the late 1980s and early 1990s. Income inequality, for all measures, rose strongly in the 1980s, with some further rise in the late 1990s. Consumption inequality, for all measures, rose quite strongly in the early 1980s and then again, although at a slower rate, in the 1990s.

Fig. 5.4 displays the full variance–covariance structure. This is used in Blundell et al. (2008b) to recover permanent and transitory variances over the 1978–2005 period in the UK for each of the 10 year birth cohorts. They find strong growth in permanent variances in early 1980s and some growth in early 1990s. Transitory variances increase strongly throughout the 1980s and into the 1990s. Birth cohorts show important life-cycle inequality growth, however these are dominated by the strong growth in permanent shocks in early 1980s with some growth in 1990s, and the strong growth in transitory shocks in late 1980s with milder growth in 1990s. This lines up closely with the results for the US documented in Blundell et al. (2008c).

An interesting feature of Fig. 5.4 is the path of the covariance between income and consumption. This moves in line with consumption until the mid-1990s. The covariance then begins to fall, suggesting the link between consumption and income is diminishing, but in a way that is consistent with a relative rise in consumption inequality. The strong growth in asset prices especially in the value of real estate which continued to the end of this sample period is one possible explanation. This could drive up expected life-time wealth relative to income and consequently drive up consumption among home owners. Given that home-ownership rates are around 70% in the UK, the inequality this would generate could be expected to lie in the 50–10 region, something confirmed in Fig. 5.3.

### 5.3. The life-cycle dimension

We might expect inequality in variables that are subject to permanent shocks to show increasing variance over time. As the analysis in Deaton and Paxson (1994) suggests this is particularly the case for inequality measures over the life-cycle. Fig. 5.5 presents these measures over the lifetime, conditioning on cohort effects, for male wages, equivalized earnings, equivalized disposable income and equivalized consumption.

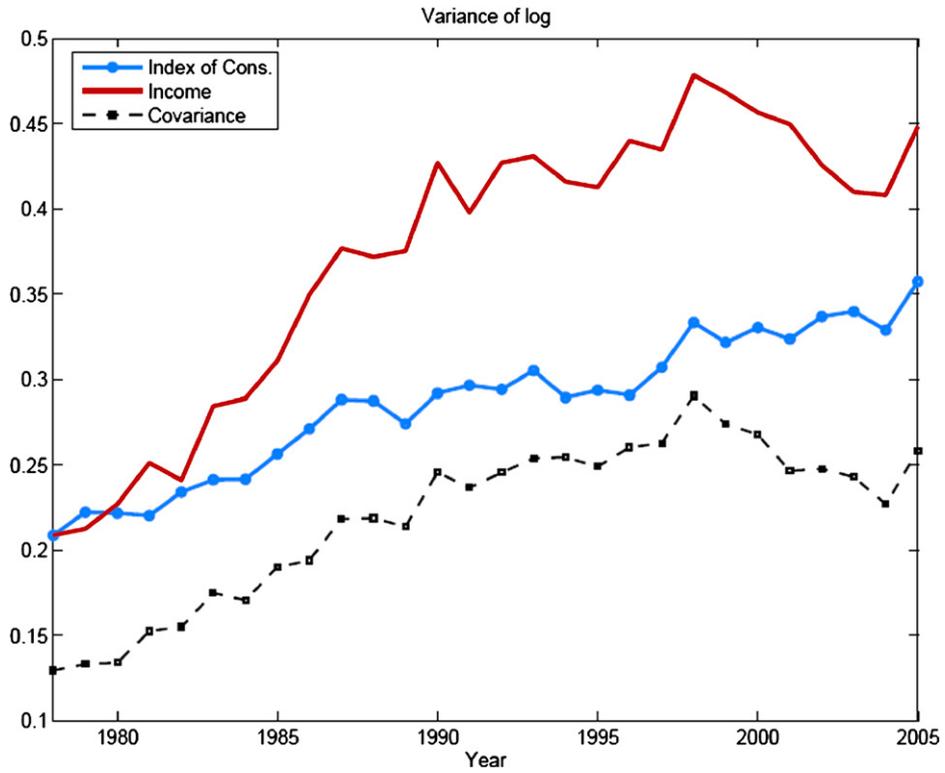


Fig. 5.4. Disposable income and consumption: variances and covariance.

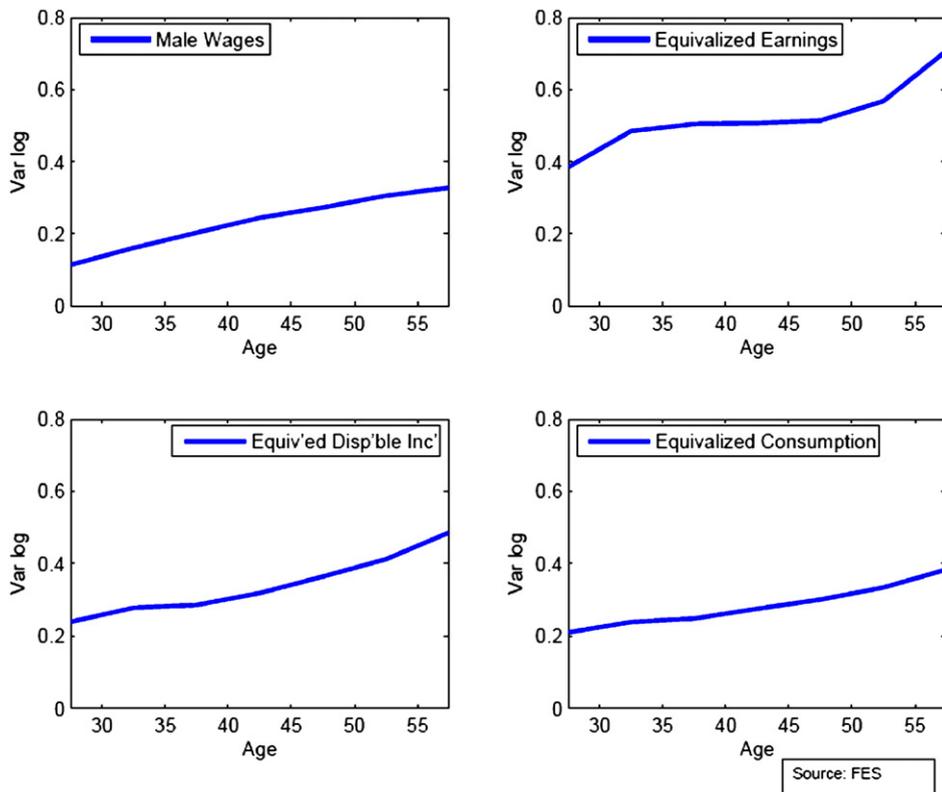


Fig. 5.5. Life-cycle dispersion, controlling for cohort effects.

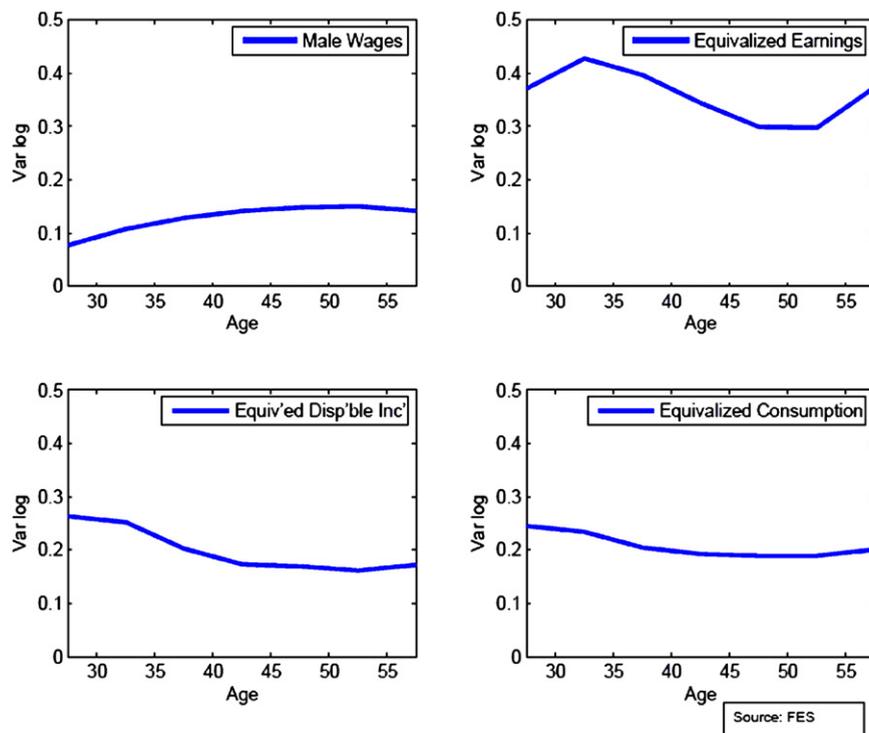


Fig. 5.6. Life-cycle dispersion, controlling for year effects.

One interesting feature of these profiles is that the variance of earnings increases strongly after age 45, while the life-cycle profiles of the variance of wages and consumption are roughly linear over the life cycle. Fig. 3.4 above shows that the covariance of wages and hours increases strongly in late working life, implying that labour supply and possibly selection effects are important in explaining the strong increase in variance of earnings up to retirement. Consumption inequality rises consistently with age but at a slower rate than for disposable income. Differences in the rate of growth appear particularly strong at middle and later working ages. Suggesting that uncertainty about longer-run permanent differences in wages becomes less important for individuals in their 40s and early 50s. All profiles are consistent with a wage process driven by idiosyncratic permanent shocks that are at best partially insured and shorter-run fluctuations that are effectively smoothed out.

Fig. 5.6 presents the life-cycle profiles conditioning on year effects. Other than male wages, these profiles all show a decreasing profile in mid working life. This highlights the difficulty in identifying time from age effects. To illustrate further, Fig. 5.7 plots the variance of log equivalized consumption for four 10-year birth cohorts, first by year, then by age. Clearly in this time period, as each cohort enters working age, consumption dispersion roughly matches that for the previous cohort that is now in its mid 30s. When entering year dummies in a regression, therefore, the secular growth in consumption dispersion is interpreted largely as a time effect. However, we could equally interpret these profiles as steadily-increasing cohort growth in dispersion and a monotonic increasing age effect.

## 6. Panel data distributional dynamics

In this section we further investigate the dynamics of the distribution of income. First we use panel data on income dynamics from the British Household Panel Data to decompose income into two factors – a persistent and a transitory component.<sup>10</sup> We show that this simple decomposition works well to describe income dynamics in the UK provided the variances of each component are allowed to be non-stationary and allowed to evolve nonparametrically over time. We then document the path of the variances of the transitory and permanent components over time.

Turning first  $y^P$  to the panel data dynamics we consider a model of the form:

$$\ln Y_{i,a,t} = Z'_{i,a,t} \lambda + f_i + y^P_{i,a,t} + y^T_{i,a,t}.$$

<sup>10</sup> We have also compared cross-sectional dispersion in the BHPS to the FES. The distributions of all relevant variables are closely aligned at the beginning of the survey period. However, over the sample period, income dispersion contracts slightly in the BHPS relative to the FES. For example the variance of residual disposable income contracts by 4 log points in the BHPS but grows by 1 log point in the FES over 1991–2005. It seems this is caused by attrition at the bottom end, unexplained by other observable characteristics. See also Francesconi et al. (2006) for a comparison of the BHPS and the FRS. It is unclear how this might affect the estimates of dynamic effects, particularly the variance of permanent shocks.

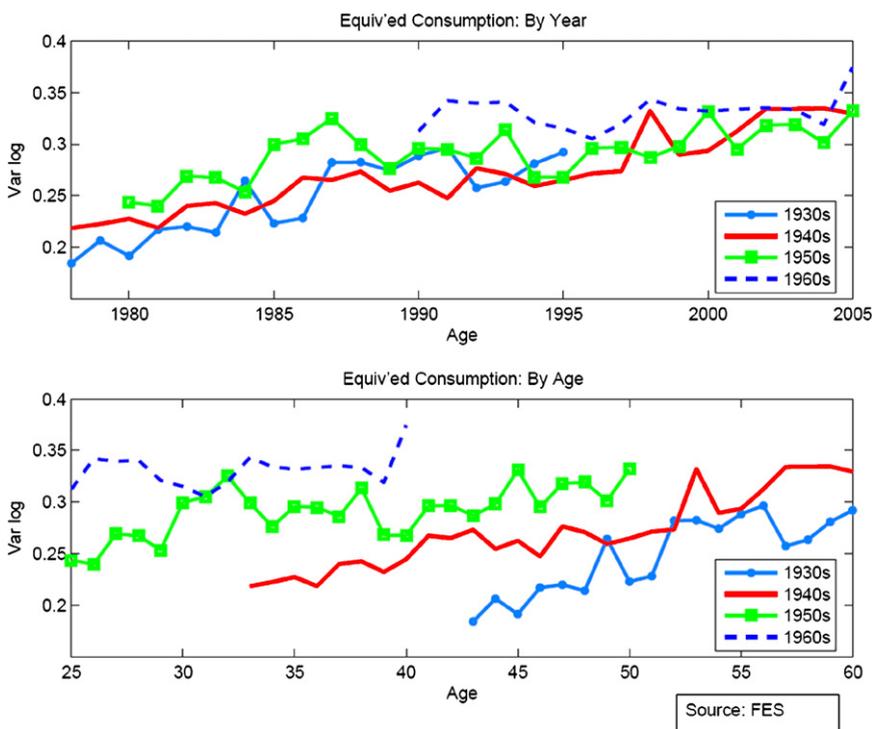


Fig. 5.7. Life-cycle household consumption dispersion, by cohort.

The  $y^T$  term is the permanent component which follows a martingale process

$$y_{i,a,t}^P = y_{i,a-1,t-1}^P + \zeta_{i,a,t}$$

and  $y^T$  is a transitory or mean-reverting component

$$v_{i,a,t} = \sum_{j=0}^q \theta_j \varepsilon_{i,a-j,t-j} \quad \text{and} \quad \theta_0 \equiv 1.$$

This model implies a simple structure for the autocovariance structure of  $\Delta y \equiv \ln Y - Z'\lambda$ . In particular that higher order autocovariances in the growth of income should be zero, see Meghir and Pistaferri (2004) for example. This determines the order of the MA component. We argue this model structure provides a good approximation to the UK income data. Alternative models with less persistence or with idiosyncratic trends as in Baker (1997) and Baker and Solon (2003), for example, imply higher-order non-zero autocovariances.

Unfortunately, the BHPS data has only been collected since 1991 and therefore misses the ‘inequality boom’ of the 1980s. In these results the sample definition is as close as possible to any similar FES statistics: all households (headed by couples or otherwise, but with heads between 25 and 60) are included. ‘Labour earnings sample’ refers to those households where we observe positive household gross labour income.

The results from estimating this model on BHPS data on the growth of male hourly wages are provided in Table 6.1. In this autocovariance analysis we have removed demographic, age and education effects. The autocovariance structure shows significant own and first-order terms which underlie the simple permanent-transitory model. The second order terms suggest the possibility of a first-order MA in the transitory component, for which we consequently allow. There is little evidence that further terms are required.

In Figs. 6.1 and 6.2 we plot the implied estimates of the permanent and transitory variances for household earnings and household disposable income. These show the importance of permanent shocks which show some evidence of falling back in the late 1990s and then tailing off towards the end of the period.

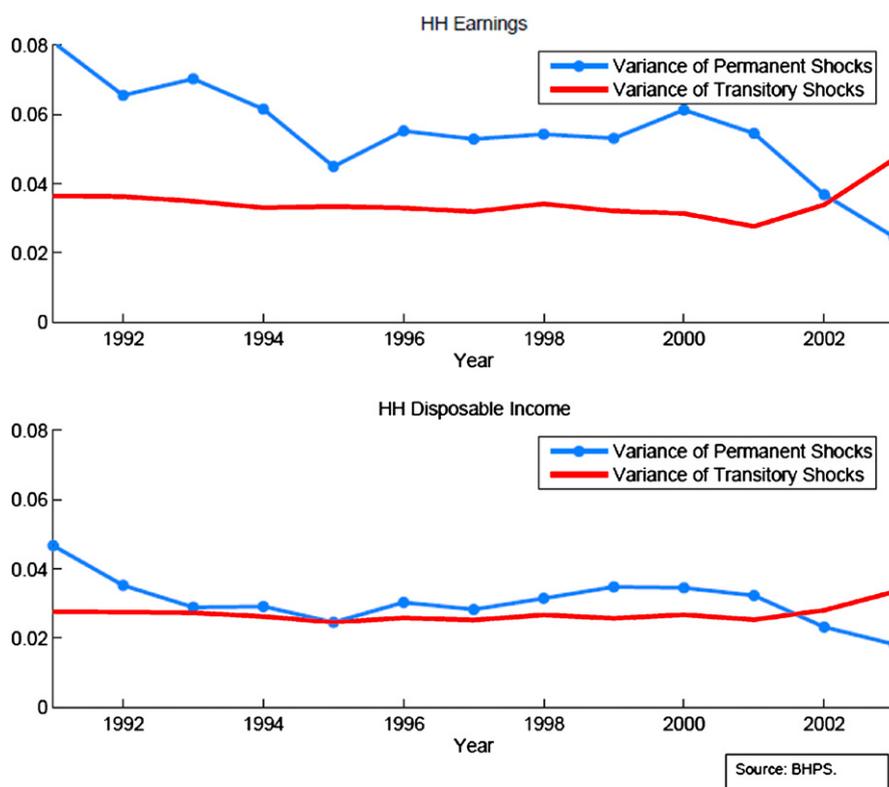
The estimates of the variances of permanent shocks presented here are higher than those implied by the evidence from the FES. The specification used in Fig. 6.1, for example, indicates a variance of permanent shocks averaging around .03 per year. In a stationary permanent-transitory model, these variances imply an increase in cross-sectional dispersion for a fixed group of households of around .6 log points over 20 years. This is far higher than the rise in cross-sectional dispersion in the FES presented here and higher than the rise in cross-sectional dispersion in the BHPS. This appears to be prima facie evidence of non-stationarity, that is the variances of the permanent and transitory components change over time (see Blundell et al., 2008c).

**Table 6.1**

The autocovariance structure of wage growth for male head.

Year	var( $\Delta y_t$ )	cov( $\Delta y_t, \Delta y_t + 1$ )	cov( $\Delta y_t, \Delta y_t + 2$ )	cov( $\Delta y_t, \Delta y_t + 3$ )
1992	.0636 (.0053)	-.0150 (.0020)	-.0053 (.0021)	-.0037 (.0022)
1993	.0529 (.0028)	-.0135 (.0021)	-.0033 (.0017)	-.0011 (.0015)
1994	.0599 (.0046)	-.0121 (.0019)	-.0025 (.0018)	-.0016 (.0016)
1995	.0653 (.0061)	-.0120 (.0022)	-.0005 (.0018)	.0017 (.0018)
1996	.0511 (.0032)	-.0125 (.0016)	.0000 (.0016)	-.0003 (.0014)
1997	.0493 (.0025)	-.0101 (.0016)	-.0015 (.0015)	.0015 (.0016)
1998	.0515 (.0024)	-.0111 (.0017)	-.0002 (.0017)	.0029 (.0018)
1999	.0484 (.0028)	-.0107 (.0020)	-.0014 (.0016)	-.0004 (.0016)
2000	.0529 (.0029)	-.0185 (.0021)	.0005 (.0015)	.0002 (.0017)
2001	.0555 (.0029)	-.0139 (.0017)	-.0013 (.0017)	.0009 (.0017)
2002	.0511 (.0027)	-.0137 (.0017)	.0001 (.0018)	-
2003	.0506 (.0034)	-.0147 (.0018)	-	-
2004	.0497 (.0030)	-	-	-

Notes: Authors calculations from the BHPS.

**Fig. 6.1.** Variance of permanent and transitory shocks: labour earnings sample. Note: The variance of shocks is computed only for households who receive labour income for three consecutive periods.

## 7. Top incomes: The new inequality

The late 1990s saw highest income growth at the very top of the distribution, and the emergence of a ‘new inequality’ dominated by a growth in employment related incomes, as employment income replaced investment income in the top 1%. This growth in inequality for top incomes is clearly illustrated in Fig. 7.1 which uses tax return data to analyse the growth in the top 10 percentiles. The late 1990s sees a strong growth in the top percentiles. Breaking up the top percentile further we see the strongest growth in incomes at the very top of the distribution.

Fig. 7.2 shows that the strength of the growth in the top percentile and the strong cyclical nature of these changes. Looking at income components (Fig. 7.3) we see the importance and cyclical nature of employment remuneration in the top 1% of incomes. The proportion of employment earnings in total gross income for this group grew from 52% in 1985 to a peak of 66% in 2000. It then declined to 58% in 2003 before rising again in 2004. The recent financial crisis will no doubt accentuate these patterns.

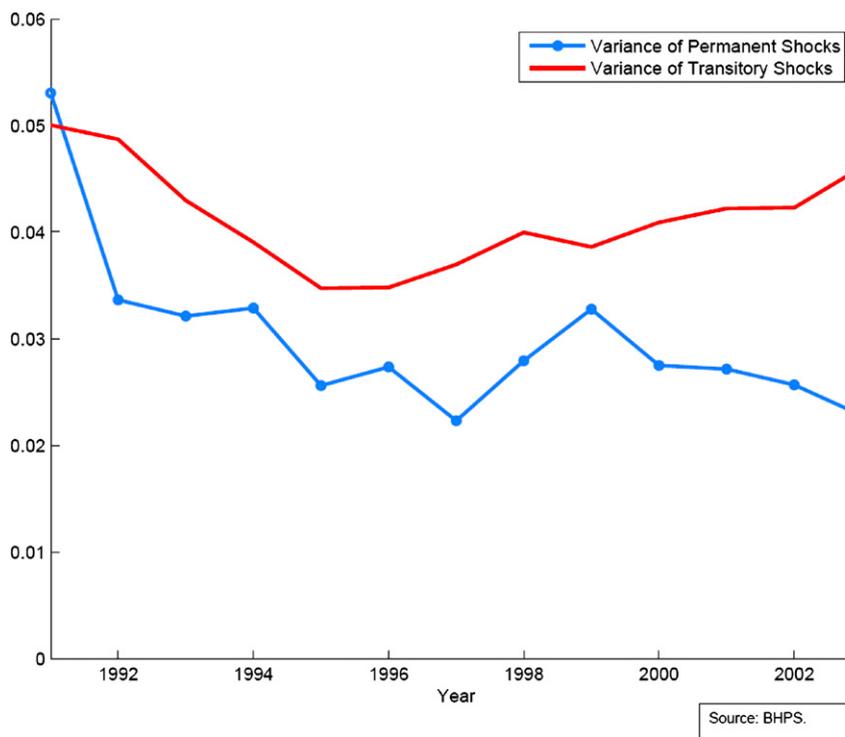


Fig. 6.2. Variance of permanent and transitory shocks: household disposable income. Note: The variance of shocks is computed for all households, including those who spend any time out of the labour market.

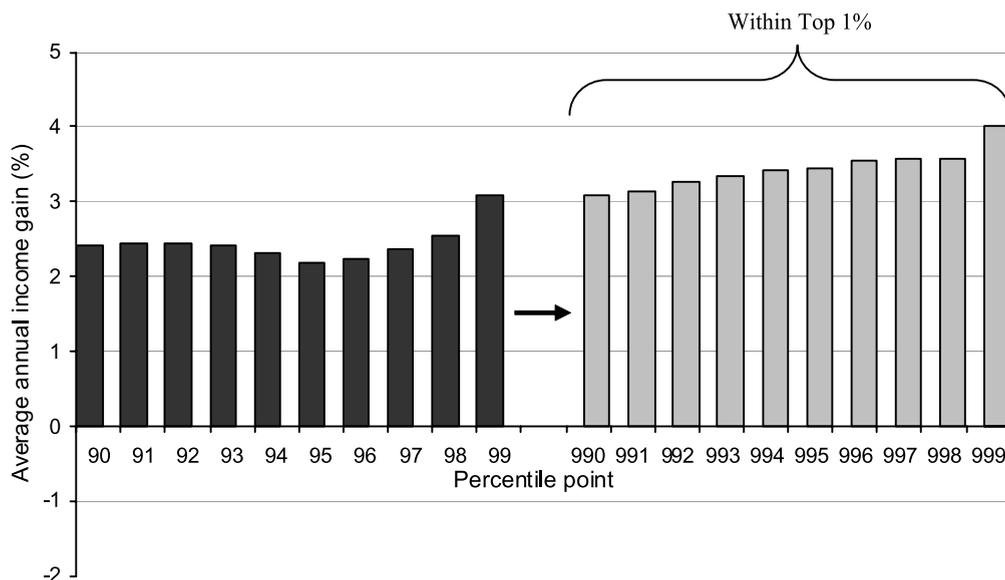
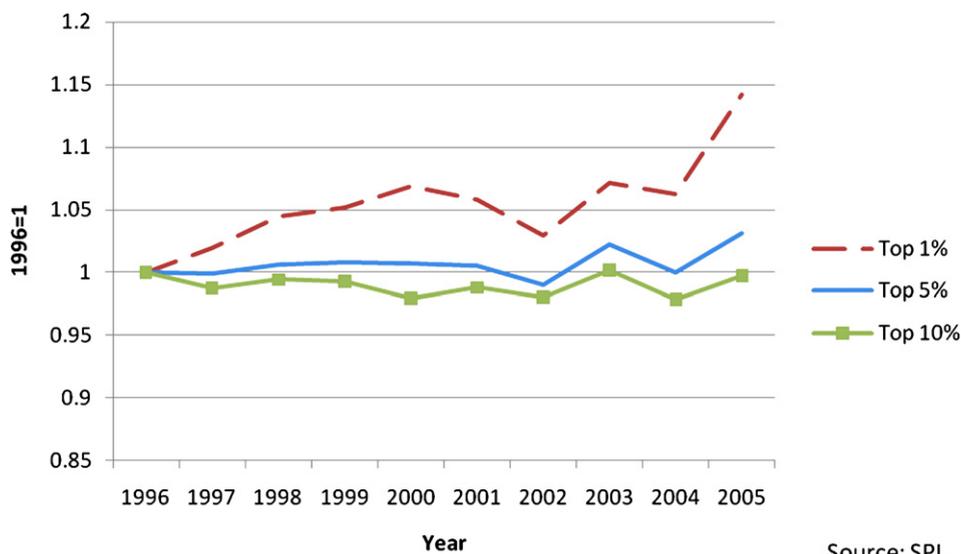


Fig. 7.1. Real income growth for the richest 10% and 1% using the SPI, 1996-97 to 2004-05 (GB). Notes: (1) Incomes are net of income tax but do not include the deduction of council tax or national insurance. (2) Incomes have not been equalized. (3) Percentile incomes are measured as the income of the person on the border of the two percentiles. (4) Income growth for the median worker is difficult to estimate due to growth in participation over the period, but can be sensibly be bounded between 1.1%pa and 3.5%pa. Source: Brewer et al. (2007b).

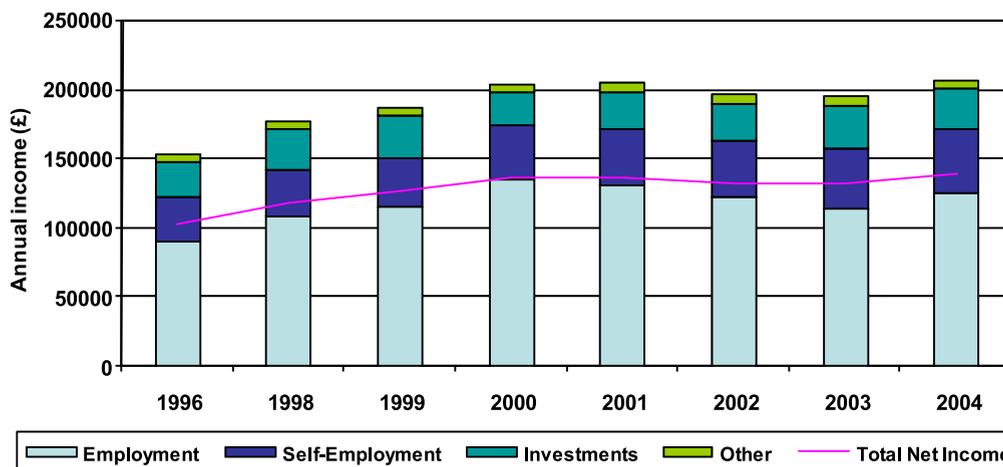
8. Interpretations and conclusions

The UK has seen significant variation in inequality growth over the last three decades. Income inequality, for all measures, rose strongly in the 1980s, with some further rise in the late 1990s. Consumption inequality, for all measures, rose quite strongly in the early 1980s and then again, although at a slower rate, in the 1990s. The analysis of consumption and income inequality suggests strong growth in the variance of permanent shocks in the early 1980s and some further growth the



Source: SPI.

**Fig. 7.2.** Change in top net income shares. Notes: The shares of net income out of total income in 1996 for these groups were: 38.0% for the top 10%; 25.0% for the top 5%, and 10.2% for the top 1%. Source: Brewer et al. (2007).



**Fig. 7.3.** Income components for the top 1%. Notes: Net incomes do not include the deduction of council tax or national insurance. Incomes have not been equalized. Source: Brewer et al. (2007b).

1990s. It also points to strong growth in transitory shocks in late 1980s and mild growth in 1990s. Birth cohorts have also been found to display important life-cycle inequality growth.

We have shown the inequality boom of the 1980s in the UK to be characterised by strong growth in permanent shocks to labour income followed by an increase in transitory volatility leading to a period of moderation. There is a strong role of education differentials in the growth on inequality over the 1980s and early 1990s, and subsequent decline in their importance in the early 2000s. In the late 1990s inequality was dominated by a growth in employment related earnings at the top as employment income replaces investment income in the top 1%. Taxes and transfers have done much to offset losses at the lower end of the earned income distribution.

In this study we have made use of extensive micro-data sources in the UK on consumption, income, earnings, labour market participation, hours of work to study the evolution of the inequality in these series and the relationship between them. On a note of caution we point to the time series patterns in the household level consumption data which have become increasingly divergent from the patterns documented in national accounts. A further analysis of these differences is warranted.

## Acknowledgments

We thank Orazio Attanasio, Antoine Bozio, Andrew Leicester, Cormac O'Dea, the editors, referees and participants at the Fifth PIER-IGIER International Conference Inequality in Macroeconomics for helpful comments. We are grateful to the ESRC Centre for the Microeconomic Analysis of Public Policy at the Institute for Fiscal Studies for financial support. Material from

the FES made available by the ONS through the ESRC Data Archive has been used by permission of the controller of HMSO. Neither the ONS nor the ESRC Data Archive bear responsibility for the analysis or the interpretation of the data reported here. The usual disclaimer applies.

## Appendix A. Data appendix

### A.1. FES income data

#### A.1.1. Wages

The wage variable used is usual labour earnings plus any bonuses, divided by hours worked (see below). We keep only those in employment, omitting the self-employed.

#### A.1.2. Hours

Our hours variable is usual hours worked plus usual overtime. Again we omit the self-employed.

#### A.1.3. Earnings and income

'Labour earnings' cover both the employed and self-employed. 'Labour earnings plus private transfers' includes regular allowances from outside the immediate family, allowances from a spouse, payment for odd jobs, child income and income from private annuity or trust. 'Asset income' is all income from investments minus income from real estate, which is then included in 'asset income plus residential income.' 'Gross income' is the sum of these items. 'Net disposable income' consists of 'gross income' plus public transfers (social security benefits, state pension, luncheon vouchers, education grants and student top-ups) minus labour and payroll taxes.

### A.2. BHPS income data

Definitions in the BHPS are almost identical to those for the FES.

#### A.2.1. Education

Qualifications are not given in the FES, so we define 'compulsory education' as those who left at compulsory leaving age (this has risen from 14 to 16 since WW2), 'intermediate education' as those who attended school up to 18, and 'high education' as those who left school after 18.

BHPS includes information on educational attainment. We therefore form the following categories: 'high education' includes those with an honours degree or equivalent; 'intermediate education' includes those with A-levels or equivalent (the equivalent of a US high school diploma), and 'low education' is the remainder.

#### A.2.2. Consumption

Consumption is expenditure on the following items: food, catering, alcohol, tobacco, fuel, household services, clothing, personal goods and services (toiletries, etc.) motoring expenses excluding vehicle purchases, travel expenses, leisure goods (books, music recordings) excluding audiovisual equipment, entertainment and holiday expenses. The main omissions are housing costs, furniture, furnishings and electrical appliances, motor vehicles and garden and audiovisual equipment. In short, our measure of consumption includes non-durable goods and services and excludes durable and semi-durable goods. 'Consumption plus housing' includes rent, mortgage interest payments and housing taxes. This is a user-cost measure of housing. The FES does not easily permit a calculation of imputed rents for homeowners as it does not include house prices.

#### A.2.3. Income and consumption in Figs. 2.5, 2.6 and 2.7 – comparison with national accounts

Both income and expenditure data used for these figures differ from those used in the rest of the study. Income is total disposable income minus imputed owner-occupier rental income. Private pension contributions are included but employer pension contributions are excluded.

Expenditure is total household expenditure excluding public transport and housing. These two categories are omitted in order to provide the best fit between FES and national accounts definitions.

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