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# From Income and Consumption Inequality to Economic Welfare Inequality: the Role of Labor Supply

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## Abstract

This paper discusses the links between earnings, consumption and economic welfare inequality. It places emphasis on the role of leisure and labor supply in the assessment of cross-household inequality and argues that the documented increase of such inequality has its origin in the labor market. It only serves as an introductory work and, as such, it attempts to outline the research frontier in the field of household inequality and address the issues that arise when household labor supply decisions are taken into consideration.

## 1 Introduction

The rise of cross-household economic inequality in the United Kingdom and the United States over the last decades has been well documented in the literature. Since Cutler and Katz (1992), Deaton and Paxson (1994) and Blundell and Preston (1998) research has evolved from a general description of inequality statistics to the identification of some mechanisms which contribute to inequality. These studies have shown that consumption is a better instrument than income for intertemporal cross-household comparisons since it captures the long-run level of their available resources; decomposing household income in transitory and permanent components of risk and uncertainty they show that consumption is less volatile than income. This is a central prediction of the Permanent Income Hypothesis which these studies have also verified empirically; consumption inequality in the UK and the US increases more smoothly compared to income inequality.

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Further work in the field has attempted to uncover the ways these transitory and permanent components are transmitted from income to household consumption and unveil the insurance mechanisms which make the latter smoother. Blundell et al. (2008) explore such means of insurance and show that the persistence of exogenous income shocks interprets the divergence between income and consumption inequality series. More recently, Blundell and Etheridge (2010) attempt to connect the aforementioned patterns of inequality with inequalities observed in earnings and wages; however they only explore data co-movements without addressing any underlying mechanisms.

In the present paper we raise the question of whether the well-documented *intertemporal increase in income and consumption inequality* also implies an *increase in cross-household economic welfare inequality*. We aim to explore the links between income, consumption and welfare and see whether the former constitute 'good proxies' for the latter. To do so we depart from the existing literature and try to define what household welfare consists of. At the same time however we also take a step back; we argue that income is an endogenous process and income inequality arises because of inequalities occurring in the labor market. Thus we attempt to explore how wages and labor supply choices across households contribute to income, consumption and, lastly, economic welfare inequality.

In our analysis we discuss the evolution of the cross-household distribution of income and consumption in Britain over the period 1961-2010; again we develop the arguments which made the aforementioned authors shift their attention from income to consumption. We also present data on inequality across British households for a shorter period of time (1968-1992) and we review the role that transitory and permanent income shocks have played therein. Then we attempt a cross-discipline approach to "welfare"; we argue that welfare is not just *utility* enjoyed from *goods* and *services*. Welfare captures broader aspects of one's life and thus we extend its definition to also include at least *leisure* as well. This constitutes our basic contribution to the literature; we attempt to link income and consumption inequality to economic welfare inequality incorporating labor supply. Our final aim is to build a household model with one or more earners and study how their labor supply decisions along with the wages they earn and their non-labor income affect their position relatively to other households; in this present work we describe the basic features that such a model must have.

This paper serves only as an introduction to our future research; thus it is mostly descriptive and not analytical. It makes also no use of primary data; data here-in are taken from other studies in the field. The paper is organized as follows: section 2 discusses income and consumption inequality; section 3 attempts to define welfare and describes a model with labor supply in; section 4 describes available datasets from the UK and the US which will allow us to test the theory. Section 5 concludes.

## 2 Income and Consumption Inequality

### 2.1 Income

A large number of authors have studied the cross-household income distribution in the UK over the years. Since the early '20s (i.e. Dalton (1920)) until almost a hundred years later (i.e. Jin et al. (2010)), household income has attracted economists' attention in a similar way as the different measures of GDP have. Increases in real disposable household income have been indicative of the household being better off (households become richer) whereas drops in its real disposable income have been interpreted oppositely (households become poorer).

Figure 1 and figure 2 plot the mean and median household income for Great Britain (i.e. the United Kingdom excluding Northern Ireland) for a period from 1961 up to 2009-10<sup>1</sup>. The illustration is restricted in this 50-year band because of lack of earlier data collected under a consistent methodology. Household income appears in 2009-10 Sterling on a *weekly* basis after taxes have been deducted. Cross-household comparisons are made feasible after considering the number and the age of members included in each household; the standard approach followed in the literature is the use of the modified OECD scales (Cutler and Katz (1992); Atkinson et al. (1995))<sup>2</sup>. The first figure illustrates real income before housing costs (BHC), whereas the second one illustrates real income after housing costs (AFC). Distinguishing between the two cases is essential for two reasons; (1) housing costs represent a non-constant share of household income depending on the relative position of a household in the distribution (i.e. poor households use a larger share of income for housing than rich ones); and (2) deflation of income streams is also different; consideration needs to be taken when deflating BHC income since the growth of prices of the housing market cannot be captured by an index of non-durable goods such as the Consumer Price Index.

The two figures illustrate an economically and statistically significant increase of both mean and median household income in real terms since 1961. Before (after) housing costs have been deducted, average real weekly income was 216.35 (182.27) in calendar year 1961 and 519.25 (452.63) in financial year 2009-10<sup>3</sup>; this corresponds to an overall real increase of 140% (148%) within the period. These changes are robust if Northern Ireland is also included (for the years of available data). However, further interpretation of the results cannot be free of caution.

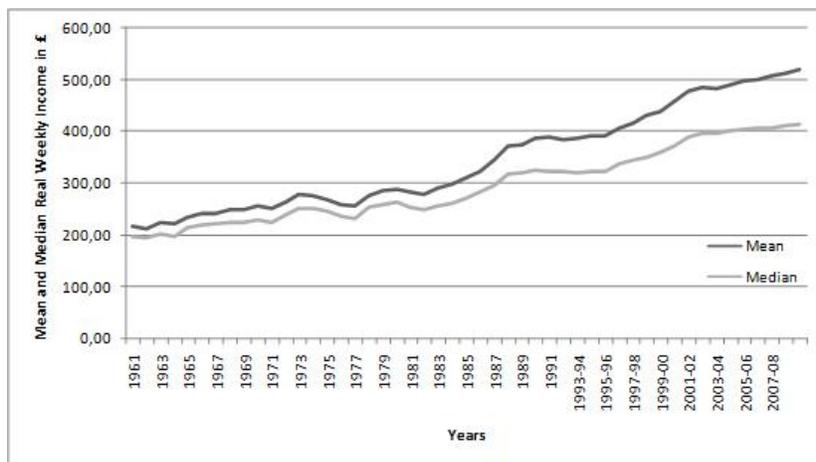
The fact that the *average* and the *median* household have become better off since 1961 does not imply necessarily that the living standards for households

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<sup>1</sup>Data for Northern Ireland are available from financial year 2002-03 onwards. For consistency, however, we restrict our illustration to Great Britain only.

<sup>2</sup>This is justified by the fact that households with different number of members and different age for each member will face different needs in goods and services.

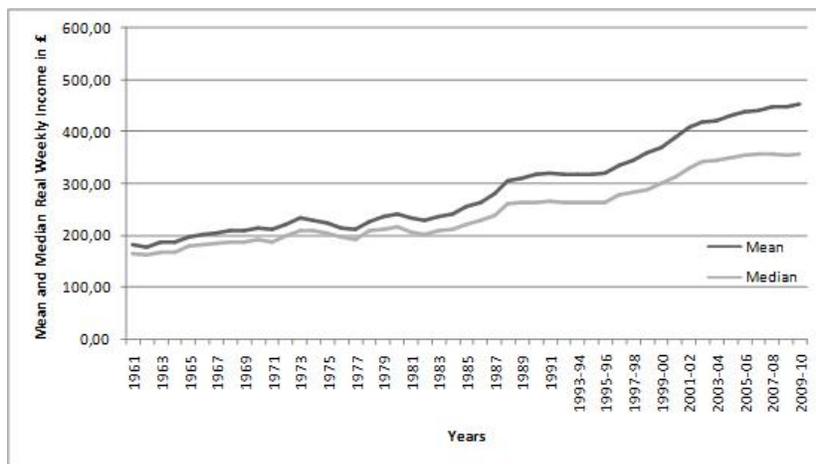
<sup>3</sup>The income data from the Family Resources Survey and the Family Expenditure Survey appear on a calendar year basis until 1992 inclusive. From 1993 onwards data appear on a financial year basis.



**Figure 1** – Mean and Median Income Before Housing Costs

*Source:* Author's calculations using the data spreadsheet accompanying Jin et al. (2010). Primary data are for Great Britain (i.e. the United Kingdom excluding Northern Ireland) and come from the Family Expenditure Survey (before 1994-95) and the Family Resources Survey (after 1994-95 inclusive). See Section 4 for more information on these Surveys.

*Note:* The figure plots average and median weekly household income over time, after direct taxes, expressed in average 2009-10 prices (deflation by a constructed index). Income appears in Sterling and has been adjusted according to the modified OECD scales. For further details on these data see Appendix A in Jin et al. (2010).



**Figure 2** – Mean and Median Income After Housing Costs

*Source:* Author's calculations using the data spreadsheet accompanying Jin et al. (2010). Primary data are for Great Britain (i.e. the United Kingdom excluding Northern Ireland) and come from the Family Expenditure Survey (before 1994-95) and the Family Resources Survey (after 1994-95 inclusive). See Section 4 for more information on these Surveys.

*Note:* The figure plots average and median weekly household income over time, after direct taxes, expressed in average 2009-10 prices (deflation by the Hugh Rossi index). Income appears in Sterling and has been adjusted according to the modified OECD scales. For further details on these data see Appendix A in Jin et al. (2010).

in Great Britain have improved during this period. Uneven changes across households may well result in the observed patterns for mean and median, but nonetheless in a deterioration of the situation of many other households. One needs to consider more sophisticated measures of the *evolution over time* of the *distribution of income*, such as the changes in the Lorenz curve or the Gini-coefficient (see Cowell (2007) for details); these measures illustrate the evolution of income inequality across households.

## 2.2 Consumption

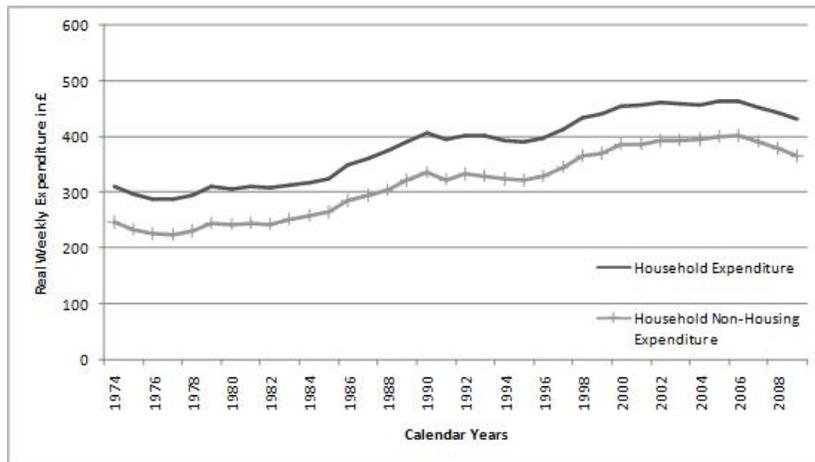
Even if these *more sophisticated* measures are employed and attention is shifted from *the levels* towards *the distribution* of income, the true position of households is still not fully unveiled. Over the last two decades, many authors have criticized the use of income as an indicator for the relative position of households. They have argued instead that household consumption is a more appropriate measure both inter-temporally and intra-temporally. Deaton and Paxson (1994) were among the first to follow such an approach in order to show that under various life-cycle models inequality growth across households is smoother in terms of household consumption than what it is in terms of household income. Blundell and Preston (1998) find the same result by implementing the Permanent Income Hypothesis (PIH) according to which (1) households insure themselves (at least partially) against temporary income shocks and (2) consumption streams change more smoothly than what income streams do.

Blundell et al. (2008) provide more concrete reasoning in favor of the use of consumption in cross-household comparisons. Instead of *assuming* that households smooth out temporary income shocks as in Blundell and Preston (1998), they *derive* it using empirical data. They find partial insurance against permanent income shocks and full insurance against transitory income shocks; they also explore some means of such insurance. This study is valuable since it attributes *empirically* the smoother consumption life-cycle profile (compared to its income counterpart) to the insurance possibilities households face. Having shown that income shocks (at least some of them) are actually smoothed out, we can now be more confident that consumption streams provide a better permanent picture for the position of a household.

Figure 3 describes how *average* weekly household consumption in Great Britain has changed since calendar year 1974. Although previously we presented both *average* and *median* weekly household income since 1961, lack of coherent data refrains us from maintaining the same exactly statistical environment for consumption. In the first year of expenditure<sup>4</sup> data, households spent on average 311.4 weekly (246.5 if housing costs are excluded), whereas in the last year of data (calendar year 2009) they spent 431.2 (364.9 without housing costs). Intertemporal comparisons are feasible since the amounts are expressed in average 2009 prices. These changes correspond to a 38.5% increase since the beginning

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<sup>4</sup>Strictly speaking expenditure is different from consumption; any intermediate textbook in microeconomic theory highlights this distinction. We will use however the two terms interchangeably in this study; this has also been followed by Blundell and Preston (1998).



**Figure 3** – Real Average Weekly Household Expenditure

*Source:* Author’s calculations using calendar estimates of average weekly household expenditure in Great Britain obtained from the Family Expenditure Survey (before 2001) and the Expenditure and Food Survey (after 2001 inclusive). The data span the period from 1974 until 2009 (all years are *calendar*); they are expressed in average 2009 prices and equalised using the modified OECD scales. Non-housing expenditure excludes rents, mortgage payments, water costs, insurance costs and local taxes.

*Note:* The series of nominal average weekly expenditure have been deflated by the Retail Prices Index (RPI). The series of nominal average weekly non-housing expenditure have been deflated by the Retail Prices Index excluding mortgage interest payments, housing etc (variation of RPIX). Although other indices may have been more appropriate for their deflation (i.e. the CPI for non-housing consumption), we have not used them due to our lack of access to data before 1988. The use of RPI and RPIX may have biased the levels of real consumption appeared in the figure; however it has not altered the general upward movement of real consumption that the data exhibit.

of the period (48% after housing costs); this increase is much smoother than the 86.4% increase (96.2% after housing costs) that average weekly household income exhibits between 1974 and 2009. This smoothness confirms households' access to insurance possibilities (i.e. borrowing and savings).

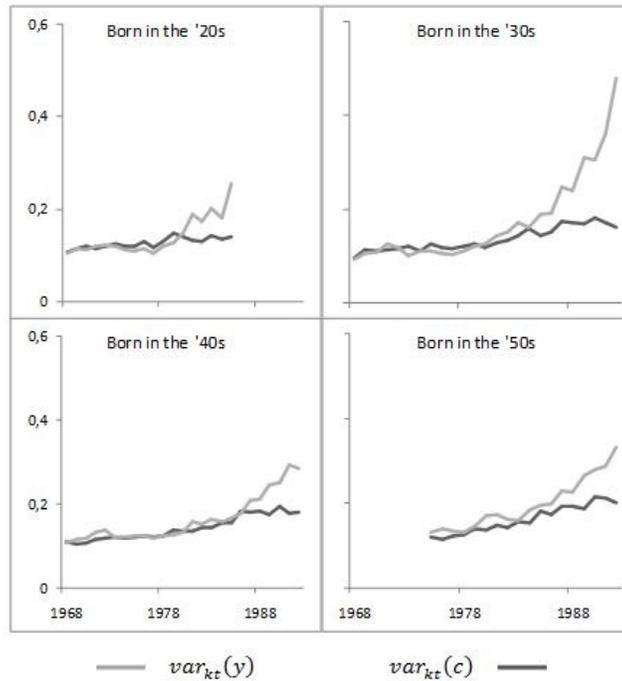
### 2.3 Inequality

Again, the essential information taken out from the analysis so far is limited. *Average* consumption may well go up over the years since the economy becomes gradually richer but this does not necessarily imply that the living standards of households improve. Higher moments of the distribution of consumption across households and over time must also be studied. In the case of income we could keep track of the Gini-coefficient; in the cases of income *and* consumption we can keep track of the cross-household variances of (log) income and (log) consumption<sup>5</sup> over time. These variances are indicative of *income* and *consumption inequality* respectively and have been widely studied in the literature. A larger cross-household variance of income (consumption) over time implies a greater dispersion of income (consumption) across households and indicates a widening of the gap between the extremes and the center of the respective distributions. Even if *average* household income and consumption move up with time (as shown to be the case for Great Britain), an *increasing variance* does not necessarily imply that *all* households enjoy this prosperity fully; many households will see their incomes grow more slowly, remain unchanged or even decline, while others will experience large increases. This results in a larger inequality among them.

Several authors have documented an inclining cross-household variance for income and consumption in Great Britain and other countries over time. Using data from the British Family Expenditure Survey (FES) between the years 1968-1992, Blundell and Preston (1998) predict and verify that both income and consumption inequality grow over time, with the latter being smoother than the former. The driving force for the increase of income inequality is growth in the variance of *transitory income shocks*, whereas the driving force for increasing consumption inequality is the accumulation of *permanent income shocks* (1998, p. 623). The result obtains even when the authors narrow their analysis in four 10-year band cohorts, each one depending on the age of the household head. Atanasio et al. (2002) use a similar framework but they now define a household as a couple of two earners. This distinction will later appear useful for drawing the labor supply decisions within the household. These authors extend the aforementioned findings by documenting an increase in income and (more smoothly) in expenditure cross-household variances in Britain *up until 1999*. Another set of authors, Blundell and Etheridge (2010) draw the picture of inequality for the period 1978-2005 in the UK (i.e. Great Britain including Northern Ireland); to the best of our knowledge, this constitutes the most up-to-date illustration on

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<sup>5</sup>In what follows, the variance of income (consumption) actually refers to the variance of the natural logarithm of income (consumption).



**Figure 4** – Income And Consumption Inequality In Britain  
 Source: Blundell and Preston (1998), based on table I and figure I therein (1998, pp. 619-620).

the issue. Using the FES, the Labor Force Survey (LFS) and the British Household Panel Survey (BHPS) (see Section 4 for details), they show that earnings inequality and consumption inequality rise significantly during the 1980s and the 1990s, albeit the two series gradually diverge because consumption is found to move more smoothly. Their added value to the previously existing literature is that they take a step back looking first at the evolution of wages and hours worked over time; initially they explore *individual earnings inequality*, which then contributes to *income inequality* and finally develops to *consumption inequality*. This expanded view on the topic constitutes an essential link to the labor market choices which cannot be ignored in the subsequent discussion about household economic welfare.

Figure 4 illustrates the evolution of income and consumption inequality in Britain over the years 1968-1992. This illustration comes from Blundell and Preston (1998). Four cohorts of households appear; each one depending on when the household head was born. In all cases, income inequality and consumption inequality increase; they increase more rapidly after the mid-80s. However, consumption (dark grey line) is significantly smoother than income (light grey line) for all four cohorts.

Data from other countries have also been used to explore the evolution of the cross-household variances of income and consumption over time. Cutler and Katz (1992) are among the first to document a rise in income and consumption inequality during the 1980s in the US; they comment that “the consumption distribution is substantially more equal than the income distribution in every year” (1992, p. 547). These authors explore different versions of equivalence scales in their effort to make comparisons across households meaningful; equivalence scales have been used hugely thereafter. Deaton and Paxson (1994) repeat a same exercise and find similar results for three countries (the US for the period 1980-1990; Britain for 1969-1990; and Taiwan for 1976-1990), whereas Attanasio et al. (2004) aim to explore a data insufficiency issue having first shown that cross-household variance of consumption follows an inclining path over time in the US Consumer Expenditure Survey (CEX).

Inherent feature in most of these studies is a decomposition of the income processes to transitory and permanent components. In the same spirit with the Permanent Income Hypothesis, the permanent or predicted component of income is thought to be highly persistent over time; *permanent shocks* may only shift it. Actual year-by-year income, however, may be different from the permanent one since unpredicted *transitory shocks* can change the levels of perceived household income. Blundell and Preston (1998) have been clear in the role that each type of shock plays in the documented increase of inequality: (1) within each distinct cohort, the series of income and consumption inequality diverge over time because of an increase in short-term risk (an increase in the variance of transitory shocks); (2) younger cohorts experience higher levels of consumption inequality compared to older ones because they are characterized by larger permanent inequality (larger variance of permanent shocks compared to previous cohorts). More details on the analytical parts of these claims will follow later herein.

### 3 Economic Welfare Inequality

Although income and consumption inequality provide us a picture for cross-household inequality of economic resources, they cannot be informative about *welfare inequality* between different households and over time. Welfare is a broader aspect of individuals’ and households’ life and is not solely captured by income or/and consumption. Even if a household has its earnings and consumption going up, this will not necessarily mean that the household also experiences a “higher welfare”. In this section we will attempt to link income and consumption to welfare, explain the idea of welfare inequality and explore the issues arising.

#### 3.1 Defining Welfare

Under a narrow definition, welfare has been considered equivalent to the utility that one enjoys from consuming goods and services; this still remains the basic

textbook approach to welfare (see for example Hindriks and Myles (2006) for various definitions on welfare functions). There is a lot more in it however. The living standards of a household (or a community) may improve in several occasions; when they earn more, when they consume more, when they live longer, when they enjoy more leisure (and thus work less), when they have access to desirable health and education services, when they feel happiness, and in many other. Economists have recently started developing a relevant literature augmenting the aspects of life captured under the term “welfare” (see for example Becker et al. (2005) for considering life expectancy in evaluating national welfare; Kimball and Willis (2006) for associating short- and long-run happiness with people’s welfare; Ferrer-i Carbonell (2005) for showing that keeping up with the Joneses contributes positively to individual well-being; Stone et al. (2010) and Kahneman and Deaton (2010) for uncovering the effects that ageing and money have on individual life evaluation and emotions).

According to the Commission on the Measurement of Economic Performance (2009), welfare or well-being, either on an individual or on a household basis, consists broadly of “material living standards (income, consumption and wealth); health; education; personal activities including work; political voice and governance; social connections and relationships; environment (present and future conditions); insecurity” (2009, pp. 14-15)<sup>6</sup>. We will distinguish two major aspects of welfare; the *objective* well-being<sup>7</sup> and the *subjective* well-being. The former consists of all those measures that can be observed objectively (such as wages, income, consumption or hours of work), whereas the latter consists of measures whose observations come from individual self-reporting (such as life evaluation, happiness or quality of leisure). According to Stone et al. (2010), subjective well-being can be further decomposed to (1) life satisfaction indicators (global well-being) and (2) emotional indicators (hedonic well-being) such as joy, anxiety or anger.

The analysis so far should give a first answer to the question raised in the introduction of this study; *income and consumption inequality cannot give the full picture of welfare inequality across households and over time because welfare is much broader than income and consumption only*. The joint distributions of many more indicators need to be studied in order to get a clearer illustration of how welfare inequality has evolved across households and throughout the years. The feasibility of this extension however is questionable since problems

<sup>6</sup>This report was appointed to Joseph Stiglitz, Amartya Sen and Jean-Paul Fitoussi by French authorities in April 2008. Along with 22 more academics, they constituted the Commission on the Measurement of Economic Performance and Social Progress (<http://www.stiglitz-sen-fitoussi.fr>). Their task was to suggest ways of measurement and evaluation of various aspects of welfare and well-being, other than only strictly economic or financial ones. Their report was released one and a half year later. This project comes along with similar plans undertaken by the OECD, Canada and other countries. Currently the UK Office for National Statistics is working on a similar study, collecting at the same time relevant data to accompany the British Households Surveys. More on UK’s attempts can be found at <http://www.ons.gov.uk/well-being>.

<sup>7</sup>The terms “objective well-being”, “material well-being”, “objective welfare” and “economic welfare” will be used interchangeably throughout this paper.

will arise in attempting to measure and integrate the objective and subjective welfare indicators presented before.

The most serious obstacle seems to be the ambiguous measurement and interpretation of data on life satisfaction, happiness, emotions or even the quality of leisure enjoyed. Self-reported data may be naturally biased by social, cultural or religious conditions of the sampled population; intentional misreporting and measurement errors may often arise; and sometimes *what* exact aspects of life being captured by the collected data may also be debatable. Despite the efforts in the last ten years and the ongoing research on collecting consistent data and overcoming these impediments<sup>8</sup>, we will not further discuss any self-reported measures of welfare as this will affect the robustness of the results we want to draw herein. We will only focus on the objectively observed indicators, i.e. wages, income, consumption and hours worked. This simplification - narrowing of scope still produces a negative answer to the question raised at the beginning of this study; *income and consumption inequality cannot give the full picture of welfare inequality across households and over time because welfare also incorporates (at least) the wages, the hours worked and the leisure time of individuals or households.*

### 3.2 Analytical Arguments

Most of the studies seen so far<sup>9</sup> have not taken the labor market into account. In particular, they assume an individual  $i$ , belonging to some cohort  $k$  and whose (log) income<sup>10</sup> in period  $t$  is given by

$$\ln Y_{ikt} = \ln Y_{ikt}^P + u_{ikt}$$

where  $Y_{ikt}^P$  is the permanent-predicted component of income and  $u$  is the transitory shock which we have already described before. For simplicity of notation, we can just write

$$\ln Y_t = \ln Y_t^P + u_t.$$

The permanent income component can be decomposed further; according to Hall (1978) permanent income follows a random walk

$$\begin{aligned} \ln Y_t^P &= \ln Y_{t-1}^P + v_t \\ \Delta \ln Y_t^P &= v_t. \end{aligned}$$

In some occasions a trend may also be included in this expression.  $v_t$  is the permanent income shock and is thought to be orthogonal to the transitory one.

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<sup>8</sup>Gary Becker, David Blanchflower, Angus Deaton, Daniel Kahneman, Miles Kimball and Andrew Oswald are among the many economists who are currently working on the task of 'objectivising' these additional measures of well-being

<sup>9</sup>See for example Deaton and Paxson (1994); Blundell and Preston (1998) and Blundell et al. (2008).

<sup>10</sup>In what follows, upper-case letters indicate the level of a variable  $X$ , whereas lower-case ones indicate the natural logarithm of the variable. Shocks are excluded from this rule.

Blundell and Preston (1998) show that these relations imply that income process for individual  $i$ ,  $i \in k$ , can be written compactly as

$$\Delta y_t = v_t + \Delta u_t$$

with  $y_t \equiv \ln Y_t$ ,  $\Delta y_t = y_t - y_{t-1}$  and  $\Delta u_t = u_t - u_{t-1}$ .

Under specific conditions and assumptions<sup>11</sup>, Blundell and Preston (1998) and Attanasio et al. (2003) show that

$$\Delta var_t(y) = \Delta var_t(u) + var_t(v),$$

where  $var_t(x)$  is defined to be the cross-section variance of variable  $x$  in cohort  $k$  at time  $t$ . Employing a life cycle model they also show that for young individuals (or young households) in cohort  $k$  and a small interest rate

$$\begin{aligned} \Delta var_t(c) &\approx var_t(v) \\ \Delta cov_t(c, y) &\approx var_t(v) \\ \Delta var_t(y) &\approx \Delta var_t(u) + \Delta var_t(c) \end{aligned}$$

where  $c_{ikt}$  denotes (log) consumption of individual  $i \in k$  at time  $t$ . These analytical relations justify the claims made at the end of subsection 2.3; they show how the change in income inequality  $\Delta var_t(y)$  depends both on permanent inequality  $var_t(v)$  and on the change in transitory uncertainty  $\Delta var_t(u)$ , whereas the change in consumption inequality  $\Delta var_t(c)$  evolves more smoothly since it only depend on  $var_t(v)$ . Based on these results, age-inequality profiles have been drawn for different cohorts in the aforementioned articles.

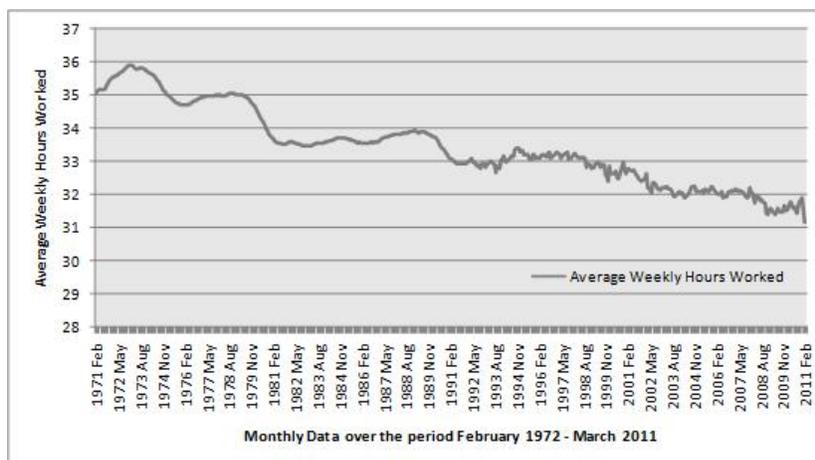
### 3.3 A Step Forward to Labor Supply

The studies seen so far *assume* an income process without dealing with *where* this income process comes *from* (i.e. earnings, income from non-labor sources or a mixture between the two). And even if it is assumed it comes from labor sources, then this succinctly implies *fixed* hours of work or *constant* wages. But both these have been shown to be false.

First, average hours worked for all workers in main and secondary jobs in the UK are steadily decreasing since 1971; figure 5 illustrates this downward movement based on data from the British Labor Force Survey. Average weekly hours worked were 35.1 in February 1971; they kept diminishing gradually over a 40-year period and they reached 31.2 hours in March 2011. Some cyclical movements are also ap-parent. This decrease is both economically and statistically

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<sup>11</sup>They assume that  $u$  is orthogonal to  $v$  and that both shocks experience no serial correlation with previous shocks or incomes. Within each cohort  $k$  the variances  $var(u_{ik})$  and  $var(v_{ik})$  are constant for all  $i$  in any period but they do change with time; i.e.  $var_t(u)$  is not necessarily the same with  $var_{t-1}(u)$ . They also assume that shocks are identically and independently distributed across individuals, although Meghir and Pistaferri (2004) provide evidence against this assumption.



**Figure 5** – Average Weekly Hours Worked

*Source:* Authors calculations using monthly series of total weekly hours worked in main & secondary jobs and total UK population in employment; both taken from the Labor Force Survey, available from the Office of National Statistics.

significant<sup>12</sup>.

Second, several authors have found large intertemporal changes in wage inequality and wages in the last fifty years. For example, Katz and Murphy (1992) explore how the composition of wages has changed for different educational groups in the US from the early '60s until the late '80s. Other studies for the US include Katz and Autor (1999) and Cunha and Heckman (2007). Meghir and Whitehouse (1996) repeat the same exercise for a similar time period in the UK; they explore the evolution of wage premia associated with different levels of education and experience. Other studies for Britain include Machin (1996) and Kalwij and Alessie (2007). Gosling et al. (2000), finally, focus on wage inequality among British male workers since the '70s. Most of these studies document a large increase in wage inequality for the US and the UK; this is driven significantly by the changing returns to education. They even find growing wage dispersion within groups of individuals with similar characteristics<sup>13</sup>. These arguments render the assumptions of fixed hours of work or constant wages misleading.

The step forward this study attempts to make is the consideration of the

<sup>12</sup>We understand that the observed drop of average weekly hours worked in the UK during the period 1971-2011 is the result of different driving forces; i.e. there can be a decrease of hours worked over time *within cohorts*, but also a decrease *across cohorts* as well. Further investigation of this issue is beyond the scope of this paper.

<sup>13</sup>The increasing wage dispersion, even among workers belonging to a same-characteristics group, has been attracting more and more economists' attention. Search models have been employed to justify these wage differentials; see for example Burdett and Mortensen (1998) or Postel-Vinay and Robin (2002). Further details on this issue are beyond the scope of this paper.

*labor market* (wages and labor market decisions and outcomes on hours worked and leisure) in the evaluation of cross-household economic welfare inequality over time. There has already been some effort to integrate the literature on income uncertainty and consumption insurance with that on wage dynamics and labor market decisions; this has only been done however in the grounds of a statistical analysis of data co-movements. Attanasio and Davis (1996) were among the first to make the cross-connection employing wage dynamics in testing the hypothesis of complete markets insurance. Most recently, Blundell and Etheridge (2010) explore wages and earnings inequality and link them statistically to the well-documented inequality in income and consumption. Finally, the yet unpublished work from Attanasio et al. (2003), by which the current study is greatly inspired, constitutes an important structural integration between household labor market outcomes and income & consumption inequality.

In this current paper we focus on an individual  $i$ , belonging to a cohort  $k$ , whose *objective welfare* or *utility* function at time  $t$  is given by

$$\sum_t \frac{1}{(1+\rho)^t} U(C_{ikt}, L_{ikt}),$$

where  $\rho$  is the subjective discount rate and  $C_{ikt}$  and  $L_{ikt}$  denote  $i$ 's consumption and leisure at time  $t$  respectively ( $i \in k$ ). Individual labor supply is denoted by  $N_{ikt}$ . The usual assumptions apply here; within-period utility  $U$  is increasing and concave in both arguments; total (working and leisure) time available each period is normalized to 1 (i.e.  $N_{ikt} + L_{ikt} = 1$ ). For simplicity we can write

$$\sum_t \frac{1}{(1+\rho)^t} U(C_t, L_t).$$

We choose to represent preferences with a functional form which exhibits additive non-separability within each time period because we aim to give the broader possible picture in the present introductory study. Of course different functional forms bear different implications for the transmission of shocks and for cross-household welfare comparisons. We intend to illustrate narrower cases in our future research.

The individual is expected to maximize the objective welfare function subject to an intertemporal budget constraint. Apart from wealth  $A_{ikt}$ , all other income is *earned* (i.e. endogenous) rather than *received* (i.e. exogenous). We can write

$$Y_{ikt} = W_{ikt}N_{ikt}$$

where  $W_{ikt}$  is the relevant wage paid; and therefore

$$A_{ik,0} + \sum_t \frac{1}{(1+r)^t} W_{ikt}N_{ikt} = \frac{A_{ik,T+1}}{(1+r)^{T+1}} + \sum_t \frac{1}{(1+r)^t} C_{ikt}$$

constitutes the intertemporal budget constraint.  $r$  is a time invariant interest rate which is brought to be equal with  $\rho$  aiming to avoid unnecessary complications. The terminal date is thought to be  $T + 1$  (for detailed presentation of

the issues related to retirement or end of life see part 3.7 in Attanasio (1999)). For simplicity we can write

$$A_0 + \sum_t \frac{1}{(1+r)^t} W_t N_t = \frac{A_{T+1}}{1+r} + \sum_t \frac{1}{(1+r)^t} C_t$$

for the intertemporal budget constraint; and for  $t = 0, \dots, T$ ,

$$A_t + W_t N_t = \frac{A_{t+1}}{1+r} + C_t$$

for the period-by-period budget constraint. Under equality of  $\rho$  and  $r$ , the first order conditions for the individual's maximization problem are

$$\begin{aligned} U_{C_t} &= \lambda_t && \text{(with respect to } C_t) \\ U_{N_t} &= \lambda_t W_t && \text{(with respect to } N_t) \\ \lambda_t &= E_t \lambda_{t+1} && \text{(with respect to } A_{t+1}) \end{aligned}$$

and the period-by-period budget constraint (first order condition with respect to  $\lambda_t$ ). The notation  $U_{X_t}$  corresponds to the partial derivative of  $U(C_t, L_t)$  with respect to variable  $X$  at time  $t$ ;  $\lambda_t$  is the Lagrange multiplier on the budget constraint or the marginal utility of wealth. The first order conditions can be written more compactly

$$U_{C_t} = \frac{U_{N_t}}{W_t} = \lambda_t$$

and

$$\lambda_t = E_t \lambda_{t+1}.$$

They constitute the familiar Euler equation for consumption; optimal behavior implies that *expected discounted marginal utility of consumption* and *expected discounted real marginal disutility of labor* remain constant over time (for details see Attanasio (1999)). Soon we will see how these will be used in the problem. But still, we are far away from saying anything about the consequences on economic welfare inequality that the consideration of labor supply has.

### 3.4 General Outline of the Model

We aim to deal with two broad issues that arise when labor market is introduced in this discussion. First, we aim to explore the channels through which the wage process and its components are reflected upon economic welfare and welfare inequality. Put differently, we need to know what are the mechanisms through which wage structure, wage shocks, choice on participation in the labor market and aggregation issues within a household affect earnings, consumption and, lastly, economic welfare volatility. Second, whereas previously we measured welfare inequality by income uncertainty and, later, by consumption inequality, now we need to expand that initial view and suggest ways of measuring inequality under this current framework (i.e. with labor supply in). We realize

that *unequal* consumption accompanied by *equal* working or *equal* leisure hours will now have a lesser effect on objective welfare inequality than what *unequal* consumption and *unequal* hours would have. In the remaining of this section, we will describe briefly these issues.

### 3.4.1 From Wages to Economic Welfare

Describing the mechanisms through which wages affect welfare requires to put down a model for consumption, savings and labor supply choices for individuals and households. The model must be consistent with a number of theoretical predictions & assumptions and a number of empirical findings; they are all presented hereafter.

*The form of the wage process:* aiming to be consistent with the relevant literature in the last decade, the wage process can take a permanent-transitory form which is equivalent to that of the exogenous income process in Blundell and Preston (1998), Attanasio et al. (2002) or Blundell et al. (2004). Thus we can write

$$\ln W_{ikt} = \ln W_{ikt}^p + u_{ikt}$$

or, for simplicity,

$$w_t = w_t^p + u_t,$$

where we have omitted subscripts  $i$  (denoting the cross-section observation) and  $k$  (denoting the cohort that this observation belongs to). Like before  $w_t \equiv \ln W_t$ . Following the same exactly steps with those already shown, we obtain

$$\Delta w_t = v_t + \Delta u_t,$$

where  $v_t$  is permanent *wage* shock and  $\Delta u_t$  is change in transitory *wage* shock. The properties of these shocks can be kept to a minimum level of assumptions (i.e. i.i.d. across individuals, no serial correlation with past shocks), although a more realistic approach may allow for some degree of correlation across individuals. It makes sense, for example, to believe that an unexpected recessionary movement of the economy which causes one's wage to drop will be also reflected to another's wage as well. Finally, Meghir and Pistaferri (2004) provide empirical evidence for ARCH effects in the conditional variance of income innovations; this can also be considered when building the properties of these shocks.

*The links between wages, income and consumption:* The model must describe in what ways wage shocks are transmitted to earnings, income and consumption. Economic theory predicts a declining volatility as we move from wages to earnings, from earnings to income and, finally, from income to consumption. A further step in this chain, moving from consumption towards economic welfare volatility, has not been explored yet. Crossley and Pendakur

(2002) describe that “the link between wages and earnings is mediated by labor supply responses, the link between earnings and income [...] by the tax and benefit system [...], the link between income and consumption [...] by saving and borrowing decisions [...] and credit market conditions” (2002, p.1). Empirical findings corroborate these theoretical claims; consumption has been found significantly smoother than income (for example in Blundell and Preston (1998), Blundell et al. (2008) or Krueger and Perri (2006)); moreover, disposable income, at least at the household level, has been also found significantly smoother than household head’s wage (for example in Blundell and Etheridge (2010)). This empirical smoothness does not necessarily imply that *transitory* wage shocks are smoothed out whereas *permanent* ones are not. The mechanisms may well be more complicated, particularly in the general additively non-separable case of preferences. At the individual earner’s level, the degree to which transitory and permanent wage innovations are transmitted into income and consumption depends on a number of parameters, such as the intertemporal consumption substitution elasticity, the intertemporal labor supply elasticity, their cross-elasticity, the taxation pattern or the degree and the type of insurance available to individuals.

Income and consumption are connected through the budget constraint; the intertemporal consumption substitution elasticity measures the degree to which consumption reacts to unexpected (transitory or permanent) income shifts over time (assuming that  $r$  is kept constant). A fully inelastic intertemporal consumption is one extreme; it implies that income changes generate no intertemporal substitution effects. An infinitely elastic one is another extreme; it implies that consumption moves easily from one period to another and creates a very smooth stream over the life cycle<sup>14</sup>.

Labor market decisions come in with the intertemporal labor supply elasticity. In his seminal paper, Heckman (1974) describes that, when wages increase, workers substitute leisure with consumption and thus work harder to take advantage of the higher wage. When wages decrease, leisure becomes relatively cheaper and workers are therefore expected to work less. Intertemporal elasticity of labor supply measures the responsiveness of hours worked to (transitory or permanent) changes in wages. Again, zero elasticity implies non-responsiveness of hours worked; infinite elasticity implies choices along the extensive margin. In all cases consumption is affected; it is either substituted in or substituted out. The degree to which this phenomenon occurs is captured by the cross-elasticity between consumption and labor (or leisure). In the case of additively non-separable preferences this cross-elasticity is generally non-zero; however we also need to refer to it empirically. We expect that transitory income changes will affect consumption through their effect on labor supply.

Attanasio et al. (2003), relying on *additively separable* preferences, use a Taylor approximation to the problem’s first order conditions and implement Campbell (1993)’s method of log-linearizing the intertemporal budget constraint.

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<sup>14</sup>Hall (1988) and Patterson and Pesaran (1992) are among the first to study the intertemporal elasticity of consumption substitution.

Combining the results, they get

$$\begin{aligned}\Delta var_t(c) &\approx \beta^2 \phi^2 (1 + \psi)^2 var_t(v) \\ \Delta var_t(y) &\approx (1 + \psi)^2 \Delta var_t(u) + \beta^2 \phi^2 (1 + \psi)^2 var_t(v) \\ \Delta var_t(w) &\approx \Delta var_t(u) + var_t(v)\end{aligned}$$

where  $c$ ,  $y$  and  $w$  are defined as before; superfluous transcripts have been omitted.  $\phi$  denotes the intertemporal consumption substitution elasticity (i.e.  $\phi_t = U_{C_t}/C_t U_{C_t C_t}$ ),  $\psi$  the intertemporal labor supply elasticity (i.e.  $\psi_t = U_{N_t}/N_t U_{N_t N_t}$ ) and  $\beta = 1/(\phi - \psi)$ . Notice that when labor supply is fully inelastic intertemporally (i.e.  $\psi_t = 0, \forall t$ , and fixed hours worked), then the variance of income collapses to that of wages and we return to the case of Blundell and Preston (1998).

*Individual and household level:* The model must adequately address the issues related to labor supply both at the individual and the household level. The individual level has been briefly described above; it mostly refers to *tracking* shocks from the wage process up to consumption and *identifying* how different types of uncertainty, risk or dispersion determine welfare inequality. The household level, although helpful in previous studies (consumption data are mainly available at a household scale), now imposes a great challenge! When two individuals (two-earner household) or more (multi-earner household) come together and form a household, issues arise concerning the aggregation of individuals' own economic welfare functions. Household economic welfare can be -for example- a weighted sum of the individual functions or a more complex expression; we aim to shed light on this in our future research. However, for illustrative purposes herein, we impose the strong assumption that household members share a common economic welfare function which subsumes household consumption and each member's leisure. For the two-member case, this is

$$\sum_t \frac{1}{(1 + \rho)^t} U(C_t, L_{1t}, L_{2t})$$

where  $C_t$  denotes joint household consumption and  $L_{jt}$  (or equivalently  $N_{jt}$ ) denotes leisure (hours worked) for member  $j$ . But members' respective labor supply decisions may not only respond to shocks that each one experiences on her/his own; their labor supply may well respond to wage shocks received by their partner as well. Consider the following example; a young couple needs to take care of a newborn baby. Both parents work but the mother works part-time only. They have both arranged their shifts so that one of them is always home for the baby. Unexpectedly, the father receives a temporary wage cut. The mother may then decide to turn her job to full-time so that the household can maintain the same consumption level. In this case, her labor supply has responded to a negative transitory shock received by the father. In an extreme case the father will stop working and the mother will start working double shifts every day. This case illuminates the participation issues which also arise at the household level and which the model needs to account for.

Maintaining the same transitory-permanent framework, we will now have to keep track of four shocks as they move upwards to the two-member household consumption<sup>15</sup>; these are  $u_1, u_2$  (transitory shocks) and  $v_1, v_2$  (permanent shocks). The wage process for member  $j$  -in its simplest form- will be as before

$$\Delta w_{jt} = v_{jt} + \Delta u_{jt}.$$

Total household earnings will now be the sum of their individual earnings

$$Y_t = D_{1t}W_{1t}N_{1t} + D_{2t}W_{2t}N_{2t}$$

where  $D_{jt}$  is a dummy variable for individual  $j$  at time  $t$  denoting participation choice. Generally one at least household member will participate in the labor force conditional on  $W_{jt}$  being no smaller than the reservation wage. Transmission of shocks to income and consumption will now depend on what kind of taxation & benefits the members are eligible to and on a larger number of elasticities than before (since we now have more cross-elasticities due to  $N_{1t}$  and  $N_{2t}$ ).

Attanasio et al. (2003) present a two-member household setting, where one only individual earns a wage; the other receives exogenous payments instead. They allow for non participation under separable preferences and they derive relations for the cross-section variances of income, consumption etc.

*Taxation and benefits:* The model must explore various regimes of taxation and benefits. These regimes affect household consumption at any time through their effect on household income. If these regimes generate anticipated and constant distributional effects at all times, then their impact on economic welfare inequality will remain unchanged over time. However, taxes and benefits are now used to change more frequently and unexpectedly than previously, causing significant shifts in the cross-section distribution of economic resources. Total household income under a tax system which taxes individual members (and not households) is

$$Y_t = D_{1t}(1 - T_{1t})W_{1t}N_{1t} + B_{1t} + D_{2t}(1 - T_{2t})W_{2t}N_{2t} + B_{2t},$$

where  $T_{jt}$  and  $B_{jt}$  denote  $j$ 's income tax rate and lump sum benefit respectively. Mirrlees et al. (2010) have worked on a comprehensive review of the British tax system which can be used as a guideline in incorporating different regimes in our model.

*Other kind of shocks:* The model must address and evaluate the relevancy of other shocks as well. Heathcote et al. (2009) describe additional sources of risk beyond earnings risk. They include health shocks (i.e. a serious accident which leaves one out of the labor force for some time), family composition shocks (i.e. a newborn baby generates new household needs for consumption and leisure) or

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<sup>15</sup>This illustration can be obviously extended to a multi-member household.

shocks to capital<sup>16</sup> (i.e. the Bank of England decides unexpectedly to increase the interest rate) (2009, pp.20-22). More sources of risk may include a tax shock or an aggregate shock, although the latter can be contained in the existing framework by decomposing transitory and permanent shocks to their aggregate and idiosyncratic components.

*Insurance mechanisms:* Individuals and households insure themselves against these shocks through saving and borrowing; this is the only smoothing mechanism available in so far; this has also been the case in Blundell and Preston (1998) and Attanasio et al. (2003). However, our building model must also address and evaluate alternative means of insurance as well. An example of within-household (family) insurance has already been given: the mother increases her working hours as a response to a wage cut experienced by the father and, therefore, household income may still remain at the same levels as before. This kind of family insurance belongs to a broader insurance set, the labor supply insurances. Other types of insurance include credit and debit across households (in the same spirit as Krueger and Perri (2006) do across individuals) and public insurance (taxation and benefits). Blundell et al. (2008) evaluate the degree of insurance available across households; they do not distinguish however between the different types of insurance.

### 3.4.2 Measuring Economic Welfare Inequality

Quantifying cross-household welfare inequality and its evolution throughout the years requires availability of data on economic welfare under the definition that we have given (i.e. leisure time *in* the utility function). Then we would just measure the cross-section variance of welfare each period by  $var(\ln \Theta_{ikt})$  or simply  $var_t(\theta)$  ( $\theta_t = \ln \Theta_t$ ,  $i$  denotes household,  $k$  denotes cohort that household head belongs to and  $t$  denotes time), where welfare in the two-member household case is defined as

$$\Theta_t = U(C_t, L_{1t}, L_{2t})$$

and is expressed in real terms (i.e. appropriately discounted in each period).

Lack of such data has impeded this project so far. But there can still be a way out even without taking a stance on the functional form of  $U$ . This will possibly involve a solution based on artificially generated data. It is true that we can uncover the empirical relations between  $C$ ,  $L_1$  and  $L_2$  by making use of estimates of intertemporal substitution elasticities (i.e. Attanasio and Weber (1989)). Then, under some assumption on  $U$ , such as strict monotonicity and concavity, we can reveal a pattern of *relative* movements for  $\Theta$  each time  $C$ ,  $L_1$  and  $L_2$  change. We are aware however that this is far away from a cardinal representation of economic welfare. But this approach can constitute a first step towards the identification of changes in  $\Theta_t$  up to some scale. We aim to deal with the difficulties of this project in the near future.

<sup>16</sup>We realize that we have been silent about the role of capital in this framework. We intend to augment this study incorporating capital at a later stage.

Subsection 3.4 attempted to draw a broad picture of the model which our future research will endeavor to build. The following section will describe briefly the datasets available for testing the theory and evaluating its empirical power.

## 4 Available Datasets

Currently there is a number of UK and US datasets with observations on various economic resources at the individual and household level. We will only focus on those which are accessible to researchers and have been widely used in recent studies. Table 1 summarizes the information in this section.

### 4.1 United Kingdom

*British Family Expenditure Survey (FES)*: It constitutes one of the oldest and most major datasets used in the field. Deaton and Paxson (1994), Blundell and Preston (1998), Attanasio et al. (2002), Blundell and Etheridge (2010) are among those who make use of it. The FES contains data on various socio-economic characteristics of private households such as income, expenditure, household composition or occupation but no labor market variables are included; its initial use was to determine a typical basket of goods for capturing inflation. Data have been collected annually since calendar year 1957 up until financial year 2000-2001 when the FES was replaced by the Expenditure & Food Survey; the methodological shift from calendar to financial years occurred in 1993. Around 6,500 observations were randomly selected in Great Britain and Northern Ireland each year; the FES therefore consists of repeated cross-sections. Members of households (mainly adults) were interviewed and asked to complete an expenditure diary; the response rate was around 60%.

*National Food Survey (NFS)*: It is the longest-running survey in Britain; it started in 1940 aiming to depict the nutritional status of households involved in the war but it was maintained even after it. In 1950 it became representative of all households in Great Britain and in 1996 it was extended to include Northern Ireland as well. The last year the survey was running is 2001; it was then replaced by the Expenditure & Food Survey. Data on in-home consumption and expenditure on food and drinks (i.e. on a part only of household budget) have been collected from approximately 6,500 households each year; a smaller sample has been used for monitoring consumption and expenditure when eating out. The NFS consists of repeated cross-sections. Data collection was based on interviews and diary completion; the response rate is reported to be around 65%.

*Expenditure and Food Survey (EFS)* - currently known as the *Living Costs and Food Survey (LCF)*: It replaced both the FES and the NFS in April 2001; since then it constitutes a major British consumer survey and as such it is a basic

source of data for the National Accounts or the CPI; in January 2008 it was renamed to LCF and became a part of the *Integrated Household Survey (IHS)*. The EFS adopts the scope of the FES and maintains some of the questions previously found in the NFS; it is also improved incorporating contemporary European standards. Data collection is done on repeated cross-sections of UK households by interviewing their members; these members (children above age 7 included as well) are also asked to keep a household and a personal diary. The primary sample counts 12,000 households; the response rate is however only 53%.

*Family Resources Survey (FRS)*: It is a very large survey of households across the UK collecting data on their economic resources (i.e. income, expenditure), their position in the labor market, social security & health issues and a range of other objectively measured characteristics. It was launched in 1992 but only after 2002 did it also include Northern Ireland as well. FRS's major achievement is the joint collection of information on many aspects of household life at the same time; this facilitates cross-discipline research and policy evaluation since it reduces inconsistency issues that may arise across different datasets. 42,200 households are randomly selected each year, but only 65% of them reply. Jin et al. (2010) along with preceding IFS studies on poverty and inequality make use of the FRS to derive the *Households Below Average Income (HBAI)*.

*British Household Panel Survey (BHPS)*: By contrast to the previous surveys, BHPS is a panel dataset of around 5,000 representative households in Britain which have been followed continuously since 1991 (Northern Ireland was included in 2001). A comprehensive range of socio-economic questions on households and individuals therein are asked with the purpose of studying how family life evolves in Britain; collection of data involves face-to-face or telephone interviews and completion of questionnaires. Attrition issues as well as changes in the composition of households (i.e. marriages or divorces) are taken into consideration. The panel dimension can unveil some important dynamics when studying inequality which the repeated cross-sections cannot; Blundell et al. (2008) explain more on this using US data.

*Labor Force Survey (LFS)*: It is the largest UK survey on households and individuals regarding their labor market characteristics and outcomes; it collects information on wages, labor income, occupation, unemployment, training, current and previous jobs and other related topics. The LFS was launched in 1973; it was maintained on a 2-year basis for 10 years; it was then converted to an annual survey until 1991. Since spring 1992, data are collected on a quarterly basis. Around 52,000 randomly drawn households (representing 120,000 individuals) are monitored for five consecutive quarters; the response rate is considered to be more than 70%. Although the LFS is representative of all geographical areas in the UK, it may underreport some industries since it is not stratified on an industrial basis. Blundell and Etheridge (2010) are among the authors who made recent use of the LFS.

*Survey of Personal Incomes (SPI)*: It is an annual survey on earnings, income, pensions, taxes and benefits; its main purpose is to collect information on individuals who are eligible to pay tax in the UK and, as such, it covers part only of the income distribution. Jin et al. (2010) report that the SPI gives “a significantly more accurate picture of very high incomes than a sample-based survey such as the FRS” (2010, p. 14). The survey began in financial year 1990-91 and is still ongoing; its most recent sample counts almost 600,000 observations.

*Integrated Household Survey (IHS)*: It is a broad household survey which integrates questions coming from various others surveys run by the Office for National Statistics in the UK (questions on economic activity, education, health etc). It consists of the LFS, the LCF, as well as the *General Lifestyle Survey*, the *English Housing Survey* and the *Life Opportunities Survey*. IHS’s advantages are that it provides accurate statistical estimates on a narrower geographical basis and it includes some measures of well being in the spirit of the Commission on the Measurement of Economic Performance (2009). The first wave of IHS took place in 2009-10 and contained data corresponding to almost 450,000 individual members of UK households.

Other current UK datasets include the *General Household Surveys (GHS)* used partly in Gosling et al (2000) (currently known as the General Lifestyle Survey under the IHS; it has been decided to cease) and the *Millennium Cohort Study (MCS)* which tracks individuals born in the 2000s and monitors various socio-economic characteristics as they grow up.

## 4.2 United States

*Consumer Expenditure Survey (CEX)*: Along with the PSID, it is one of the oldest and most widely used datasets in consumer studies in the US; Cutler and Katz (1992), Deaton and Paxson (1994), Attanasio and Davis (1996) and more recently Krueger and Perri (2006) and Blundell et al. (2008) have made use of the CEX. The launch of the survey dates back in 1800 but it used to run only once every 10 years until 1980 when it became annual. The CEX collects analytical information on income, consumption-expenditure patterns and general social characteristics of around 5,000 US households each year (repeated cross-sections). These households are randomly chosen and monitored for five consecutive quarters: in the first quarter general information is sought (such as household composition) whereas in quarters 2 to 5 detailed data on consumption patterns are collected. Data collection is achieved in two ways; a quarterly interview and a weekly diary. Attanasio et al. (2004) attempt a reconciliation of these two components, since different variable volatilities have been reported between them. In broad terms, the CEX is considered as the equivalent to the FES (and later the EFS) in the UK.

*Panel Study of Income Dynamics (PSID)*: It is a panel survey equivalent to the BHPS in the UK. It is considered as the oldest such dataset in social sciences; it began in 1968 monitoring 5,000 representative US households; it still monitors these house-holds and/or their descendants; thus it currently tracks around 9,000 households. However, in 1997 it was converted to a biennial survey (it was annual until then). The PSID collects information on wages, income and pensions, wealth, expenditure and consumption habits, education, health and fertility and other related topics at the household level; however more detailed information is collected from the head of the household. Recent studies that use the PSID include Meghir and Pistaferri (2004) and Blundell et al. (2008).

*Current Population Survey (CPS)*: It is a monthly survey collecting information on labor market variables (wages, occupation etc) and social characteristics (education, health etc) of around 50,000 representative US households. Member of the households aged 15 and above are questioned; however no information on consumption is sought. Thus the CPS is considered as the equivalent to the LFS in the UK. CPS's launch dates back in 1940 when its primary purpose was the measurement of unemployment, but since then many extensions have taken place. Attanasio et al. (2004) have made use of the CPS along with the CEX.

Other significant datasets from the United States that have recently attracted economic or cross-discipline attention include the *Medical Expenditure Panel Survey (MEPS)* and the *Gallup-Healthways Well-Being Index (GHWBI)*. The MEPS began in 1996 attempting to collect comprehensive information on a range of health-related issues. Currently it consists of two major components; the household and the insurance component. The household component -which is most relevant to us- keeps track of around 12,000 representative American families for two years. Data are collected on their income and labor supply, their medical expenses, their health conditions and some demographic characteristics. Attanasio et al. (2008) evaluate a federal medical scheme (under the title "Medicare") making use of the MEPS; its usefulness is significant for a future broader discussion on welfare including subjectively reported variables (such as the individual health status).

The GHWBI is a huge survey over more than 450,000 US residents which took place in 2008 and 2009; individuals were interviewed over the telephone. Data were collected on their income and employment, their work environment and their life satisfaction. Information on subjective well-being was also sought. This dataset appears to be helpful in the extended welfare discussion; Kahneman and Deaton (2010) have made use of it in exploring whether "money buys happiness" (2010, p.1). However it is only a snapshot of the American society since it has not been carried on since 2009.

These last two datasets will not contribute to the first stage of our future research, i.e. the extension of the discussion on inequality with the inclusion of labor market choices. They will however shed light on the topic at a further stage when we intend to integrate the components of *objective* and *subjective* welfare all together.

## 5 Conclusion

This paper has been a further step towards a better understanding of the evolution of cross-household inequality in some countries such as the UK or the US which have been shown to experience increases of this kind of inequality since the early '60s. We evaluate a significant part of the literature on income and consumption inequality and we argue that household labor supply decisions have been mistakenly ignored so far.

In more detail, the paper presents briefly how research has moved from the study of income to the study of consumption when assessing the relative situation of households. It then shows that even if consumption inequality exists, economic welfare inequality may not exist because economic welfare also incorporates labor market outcomes as well. This has two main implications: first, we no longer need to talk about transitory or permanent income shocks but we need to explore wages and labor supply shocks; and second, measurement of cross-household inequality now needs to consider both consumption- (as before) and labor supply- inequalities.

The paper addresses these issues on a theoretical and descriptive basis, not on an analytical one. It serves mostly as a detailed research plan and not as a comprehensive and self-contained piece of research. Yet its potential implications for public policy and macroeconomics are important; it can be shown that people need to shift attention to wages and labor supply shocks if they aim to fight poverty and household inequality; it can also give a more measurable dimension to what economists have been giving so far the name “welfare”. Our near-future research aims to build an analytical model capturing these issues and test them empirically.

TABLE 1: COMPARATIVE DESCRIPTION OF AVAILABLE DATASETS IN THE UK AND THE US

Dataset - Survey			Dates Running		Observations			Data Collected on <sup>a</sup> :				
Name of Survey, Abbreviation, Authority in Charge <sup>b</sup>			Start Date, End Date		Level, Number, Type of Observations <sup>c</sup>			INC	NDC	DC	D&SC	LMV
Family Expenditure Survey (UK)	FES	ONS	1957	2000-01	Households	~ 6,500 each year	RCS	✓	✓	✓	✓	✗
National Food Survey (UK)	NFS	DEFRA DARD	1940	2000-01	Households	~ 6,500 each year	RCS	✗	Food& Drinks	✗	✗	✗
Expenditure and Food Survey (UK)	EFS LCF	ONS DEFRA	April 2001	Ongoing	Households	~ 6,000 each year	RCS	✓	✓	✓	✓	✗
Family Resources Survey (UK)	FRS	DWP	October 1992	Ongoing	Households	~ 24,000 each year	RCS	✓	✓	✓	✓	✓
British Household Panel Survey (UK)	BHPS	ONS ISER	1991	Ongoing	Households	~ 5,000 followed	PD	✓	✓	✓	✓	✓
Labour Force Survey (UK)	LFS	ONS	1973	Ongoing	Households	~ 36,400 each year	RCS	Labour Income	✗	✗	✓	✓
Survey of Personal Incomes (UK)	SPI	HMRC	1990-91	Ongoing	Individuals	~ 600,000 latest data	RCS	Tax-payers	✗	✗	✗	✗
Integrated Household Survey (UK)	IHS	ONS	2009-10	Ongoing	Households	~ 450,000 individuals	RCS	✓	✓	✓	✓	✓
Consumer Expenditure Survey (US)	CEX	BLS	1800	Ongoing	Households	~ 5,000 each year	RCS	✓	✓	✓	✓	✗
Panel Study of Income Dynamics (US)	PSID	ISRUM	1968	Ongoing	Households	~ 9,000 followed	PD	✓	✓	✓	✓	✓
Current Population Survey (US)	CPS	BLS CB	1940	Ongoing	Households	~ 50,000 each year	RCS	✓	✗	✗	✓	✓
Medical Expenses Panel Survey (US)	MEPS	AHRQ	1996	Ongoing	Households	~ 12,000 biennially	RCS	✓	✗	✗	✓	✓
Gallup-Healthways Well-Being Index (US)	GHWB	GO HC	2008-09	Ended	Individuals	~ 450,000	CS	✓	✗	✗	✓	✓

<sup>a</sup> INC: Income; NDC: Non-durable consumption; DC: Durable consumption; D&SC: Demographics & Social Characteristics; LMV: Labour Market Variables.

<sup>b</sup> ONS: Office for National Statistics; DEFRA: Department for Environment, Food & Rural Affairs; DARD: Department of Agriculture & Rural Development; DWP: Department for Work and Pensions; ISER: Institute for Social & Economic Research; HMRC: HM Revenue & Customs; BLS: Bureau of Labor Statistics; ISRUM: Institute for Social Research – University of Michigan; CB: Census Bureau; AHRQ: Agency for Healthcare Research & Quality; GO: Gallup Organization; HC: Healthways Corporation.

<sup>c</sup> RCS: Repeated Cross-Sections; PD: Panel Data; CS: Cross-Section

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