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CONSUMPTION INEQUALITY AND INTRA- HOUSEHOLD ALLOCATIONS

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Abstract

The consumption literature uses adult equivalence scales to measure individual level inequality. This practice imposes the assumption that there is no within household inequality. In this paper, we show that ignoring consumption inequality within households produces misleading estimates of inequality along two dimensions. First, the use of adult equivalence scales underestimates the level of cross sectional consumption inequality by 30%, as large differences in the earnings of husbands and wives translate into large differences in consumption allocations within households. Second, the rise in inequality since the 1970s is overstated by almost two-thirds: within household inequality declined over time as the share of income provided by wives increased. Our findings also indicate that increases in marital sorting on wages and hours worked can simultaneously explain virtually all of the decline in within household inequality and a substantial fraction of the rise in between household inequality for one and two adult households in the UK since the 1970s.

JEL Classification: D12, D13, D63, J12, J22

Keywords: Collective Model, Consumption Inequality, Marital Sorting, Adult Equivalence Scales

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1 Introduction

A recent literature has documented a large rise in consumption inequality in several developed countries.¹ Underlying these measures of inequality is the use of adult equivalence scales, which are used to assign consumption levels to each member of a household. This has been necessary as there do not exist comprehensive measures of individual level consumption for households with more than one member. The drawback of this approach is that it implicitly assumes there is no inequality among adults within the household. In particular, the use of adult equivalence scales implies a very restrictive model of the household in which husbands and wives split consumption equally, regardless of the source of the income.²

This equal division assumption is inappropriate in the study of consumption inequality, as a large theoretical and empirical literature routinely rejects the assumption that the consumption allocation does not vary with the source of income in the household (Browning, Bourguignon, Chiappori and Lechene, 1994; Browning and Chiappori, 1998; Chiappori 1988, 1992; Chiappori, Fortin and Lacroix, 2002; Donni, 2007; Lundberg, Pollak and Wales, 1997; Manser and Brown 1980; McElroy and Horney, 1981, among many others). Since there has been a sizable increase in women's wages and labour supply over the last half century, the share of household earnings provided by the wife has changed substantially over time. If consumption allocations depend on the source of income and the sources of income within households have changed over time, then adult equivalence scales will produce an inaccurate picture of the trends in consumption inequality.

The goal of this paper is to document the trends in consumption inequality once within household inequality is taken into account. We construct and estimate a static model of intra-household allocations to examine how changes in the source of income in the household translate into changes

¹See Blundell and Preston (1998) for the UK, Pendakur (1998) for Canada and Barrett, Crossley and Worswick (2000) for Australia. The evidence on consumption inequality in the United States is mixed. Slesnick (2001) and Krueger and Perri (2006) do not find a large rise in consumption inequality since the 1970s. Alternatively, Cutler and Katz (1992) and Johnson and Shipp (1997) report a rise in inequality. Attanasio, Battistin and Ichimura (2007) use two sources of data on consumption and also find consumption inequality was rising over time.

²Recently, there has been a substantial departure from this literature. Browning, Chiappori and Lewbel (2006) relax the assumption that household members split consumption equally in the construction of adult equivalence scales. Hong and Ríos-Rull (2007) use information on the purchase of life insurance to estimate equivalence scales.

in individual-level consumption allocations. In particular, we observe variation in labour supply, total household consumption and wages for singles and married couples in the data. We use the joint relationships between consumption, wages and labour supply for single households and between own and spousal wages in married households to infer the private consumption levels for married men and women. The model is estimated on a sample of one and two person households from the UK Family Expenditure Survey (FES) for the years 1968 to 2001. Under relatively weak identification assumptions, the model allows us to infer the level of consumption allocated to each member of the household, which is necessary for the measurement of individual level consumption inequality.

We then use our estimates to construct a new measure of consumption inequality across individuals. We have two main findings. First, ignoring the potential for intra-household inequality may underestimate individual-level consumption inequality by 30%, as differences in earnings across husbands and wives generates substantial within-household inequality. Second, the rise in consumption inequality reported in the literature is overstated by almost two-thirds. This result is due to the fact that within household inequality has fallen over time as female wages and labour supply have increased. An implication of our findings is that the equal sharing assumption implicit in adult equivalence scales is valid *only* for households in which the wife has the same earnings as her husband.

A recent literature examines several dimensions of the relationship between inequality and household behavior. Kremer (1997) and Fernández and Rogerson (2001) consider the extent to which increases in marital sorting cause increases in inequality. Fernández, Guner and Knowles (2005) and Dahan and Gaviria (1999) present empirical evidence of a positive correlation between sorting and inequality.³ Gould and Paserman (2003) consider whether male wage inequality has a causal effect on marriage and find that increases in inequality lead to reductions in marriage rates. We contribute to this literature by providing evidence on the importance of several potential

³In this instance, the degree of marital sorting is measured by the correlation between characteristics such as education across spouses.

explanations for the rise in consumption inequality between households and the fall in inequality within households since the 1970s in the UK. While changes in the demographic composition of the population appear to play a limited role, an increase in marital sorting has profound effects on the trends in consumption inequality. In particular, the rise in marital sorting on wages and hours observed in the data has the potential to account for all of the fall in within household inequality and at the same time can explain a large fraction of the rise in consumption inequality between households.

The remainder of the paper is organized as follows. Section 2 describes in detail the stylized facts on consumption, wages and labour supply that provide the motivation for our study. Section 3 outlines the theoretical framework and the identification strategy for estimating the rule to allocate consumption to individuals within a household. Section 4 describes the data set and Section 5 the strategy for estimating the model. The estimation results are presented in Section 6. Section 7 presents a decomposition of consumption inequality and considers the importance of several explanations for the trends in consumption inequality. Section 8 concludes.

2 Trends in Consumption and Earnings Inequality in the UK

In this section, we outline the main stylized facts regarding consumption and income inequality in the UK between 1968 and 2001. The data we use to conduct our analysis comes from the UK Family Expenditure Survey (FES). The FES contains information on household consumption expenditures and earnings over the period 1968 to the present. In the construction of the following stylized facts, we restrict the sample to individuals between the ages of 16 and 65 and eliminate students, retirees and the self-employed. We are particularly interested in the following four features of the data:

1. There has been a large rise in earnings inequality between individuals. Figure 1 documents the trend in the Gini index for the distribution of individual and household earnings. The Gini index for individual earnings has risen by 12% over the past 30 years. This rise in

earnings inequality in the UK has been well documented in the literature (e.g. Blundell and Preston, 1998).

2. Although earnings inequality between individuals is much higher than earnings inequality between households, the latter rose much more rapidly: the Gini index for inequality between households rose by 41% between 1968 and 2001.
3. As reported by Blundell and Preston (1998), there has been a corresponding rise in consumption inequality. To account for economies of scale, we construct a standard measure of individual-level consumption by dividing total household consumption by the square root of household size. The Gini index for this measure of consumption is presented Figure 1. The level of earnings inequality is higher than the level of consumption inequality but the rise in inequality is higher for consumption than for earnings.
4. As illustrated in Figure 2, the correlation between the earnings of husbands and wives increased dramatically over time. At the same time, the gender wage gap decreased and female labour supply increased. Figure 3 highlights the dramatic change in the gender wage gap and in women's contribution to household labour income between 1968 and the present. The dashed line represents the female's share of potential income, defined as the share of labour earnings that would be contributed by the wife if both spouses worked full-time.⁴ The solid line represents women's share of actual household earnings. Overall, potential earnings of wives increased by 13.5%, and women's share of earnings in the household increased by 93% over the sample period. The latter partly reflects the increase in women's wages relative to those of men, but also the large changes in female and male employment rates and hours worked since the 1960s.

In summary, the evidence presented here highlights the fact that there has been a large rise in earnings and consumption inequality *between* households while at the same time there has been a

⁴For households with missing wage data due to non-participation, we include a predicted wage based on a standard selection-corrected wage equation. Results are available upon request.

fall in inequality in the earnings distribution *within* households.

3 Model

In this section, we present a model that allows us to infer the level of consumption for each member of a household. The model is based on Chiappori's (1988, 1992) collective model of household decision making.⁵ This framework is less restrictive than the model of equal division underlying adult equivalence scales, as the only restriction on the intra-household allocation process is that households reach Pareto efficient allocations.

We modify the basic collective model along three dimensions to address several issues of relevance to our analysis. First, to account for the lumpiness of labour supply observed in the data, we allow individuals to choose zero, part-time or full-time hours of work.⁶ Second, we make a distinction between private and public consumption in the model. As public consumption is consumed by both members of the household, ignoring the presence of public consumption may overestimate the degree of inequality within households. We follow the strategy of Browning et al. (1994) and partition all expenditures into either public or private expenditures. The goal of the estimation exercise is to determine the allocation of private expenditures across household members.

Third, as in Vermeulen (2004) and Browning, Chiappori and Lewbel (2006), we need to impose additional restrictions on the collective model to identify the entire sharing rule. The question we aim to address in this paper is whether measures of consumption inequality from the collective model differ from measures in the literature based on standard equivalence scales. To answer this question, we require an estimate of the full sharing rule to uncover the share of income allocated to each household member for consumption. We assume that the sub-utility over private consumption

⁵See also Browning et al. (1994), Browning and Chiappori (1998), Chiappori et al. (2002) and Blundell et al. (2007).

⁶Blundell et al. (2007) model the labour force decision of the wife as continuous and of the husband as discrete; either he works full-time or not at all. Donni (2003) considers the labour force participation decision and Vermeulen (2004) considers the case where males are assumed to work full-time and females face a discrete labour supply choice which includes the option of non-participation. As in our application, Vermeulen et al. (2006) treat the labour supply decisions of both spouses as discrete.

and leisure is the same when married as when single. In Section 6, we test whether this assumption is supported by the data.

We start with a general description of the problem faced by single agents. We then describe the intra-household allocation decision of married couples and the model restrictions that allow for the identification of the share of private consumption allocated to each household member.⁷

3.1 Singles

Assume all single individuals have preferences over leisure and consumption. For individuals of gender g , denote discrete labour supply choices h^g , $h^g \in H$, leisure L^g , expenditures on private consumption C^g , and expenditures on public consumption P^g . The total time available is T , i.e. $h^g = T - L^g$.

Assume preferences for public consumption are separable from preferences over private consumption and leisure. Denote total household non-labour income net of savings by Y^g . After tax labour earnings are denoted $w^g(h^g)$, where the notation is chosen to reflect the progressive nature of the tax system. Labour earnings includes all after tax income that depends directly on the labour supply decision. In particular, $w^g(h^g)$ includes unemployment insurance benefits paid to individuals who are not working. Single agents maximize utility by choosing labour supply and the allocation between public and private consumption goods

$$\max_{C^g, P^g, L^g} U^g(w^g(C^g, L^g), P^g)$$

subject to

$$C^g + P^g = w^g(h^g) + Y^g, \quad h^g + L^g = T, \quad \text{and } h^g \in H.$$

Using the separability assumption, we appeal to two-stage budgeting in which the individual first chooses the level of public goods expenditure and in the second stage faces the problem

$$\max_{C^g, L^g} u^g(C^g, L^g) \tag{1}$$

⁷Of course there are many aspects of the household's problem that we do not address, including savings and risk sharing behavior. See Mazzocco (2004, 2007) for work on these issues.

subject to the second stage budget constraint

$$C^g = w^g(h^g) + y^g,$$

where $y^g = Y^g - P^g$, $h^g + L^g = T$, and $h^g \in H$.

3.2 Married Couples

Consider a two member household, where each member has distinct preferences over own leisure, own private consumption, and household public consumption. As with singles, we assume that preferences over private consumption and leisure are separable from consumption of the public good. Since public consumption is assumed to be consumed by both household members ($P^f = P^m = P$), it is only necessary to uncover the sub-utility for private consumption and leisure and the sharing rule to determine the share of consumption allocated to each household member. Preferences over public consumption, which we do not estimate, are allowed to vary freely with marital status.

Under the assumptions that preferences are egoistic and that allocations are Pareto efficient, the household's allocation can be represented as the solution to the problem:

$$\max_{C^f, C^m, L^f, L^m, P} \lambda V^f(v^f(C^f, L^f), P) + (1 - \lambda) V^m(v^m(C^m, L^m), P),$$

subject to

$$C^f + C^m + P = w^f(h^f, h^m) + w^m(h^m, h^f) + Y, \quad h^g + L^g = T, \quad \text{and } h^g \in H.$$

where the Pareto weight, λ , represents the female's relative bargaining power within the household. The notation $w^f(h^f, h^m)$ accommodates the fact that, prior to 1990, the tax system in the UK is progressive and based on household as opposed to individual incomes. As a result, after-tax wages and non-labour incomes depend on the labour supply decisions of both spouses.

In the case without joint taxation, Blundell, Chiappori and Meghir (2005) show that the intra-household allocation problem faced by a husband and wife can be decentralized by considering

a two stage process. In the first stage the husband and wife decide on the level of public good consumption (P) and on how to divide the remaining non labour income $y = Y - P$. The assumption that utility from leisure and private consumption are separable from consumption of the public good is key to allowing the allocation of public consumption to occur in the first stage. The joint taxation of incomes complicates the decentralization of the household problem.⁸ To address this complication we define the *conditional* earnings for individuals of gender g , $\omega^g(h^g, h_*^{g'})$, as the after tax earnings of an individual working h^g hours conditional on the actual labour supply of spouse g' , $h_*^{g'}$.

The household's problem can then be decentralized as follows. In the first stage, households agree on an efficient level of public goods expenditures and a sharing rule to divide the remaining non-labour income. Define the sharing rule $\phi(y, \bar{\omega}^f, \bar{\omega}^m, z)$ as the amount of non-labour income that is assigned to the wife. The sharing rule is assumed to depend on conditional earnings for the wife and husband, $\bar{\omega}^f$ and $\bar{\omega}^m$ respectively, when both partners work full-time (40 hours per week).⁹ The distribution factor, z , is a factor that influences the Pareto weight but does not directly affect preferences. In the second stage, each household member chooses labour supply and private consumption to maximize utility. The problem facing the wife in the second stage is:

$$\max_{C^f, L^f} v^f(C^f, L^f) \quad (2)$$

subject to

$$C^f = \omega^f(h^f, h_*^m) + \phi(y, \bar{\omega}^f, \bar{\omega}^m, z), \quad L^f + h^f = T, \quad h^f \in H,$$

and the husband faces the problem

$$\max_{C^m, L^m} v^m(C^m, L^m) \quad (3)$$

subject to

$$C^m = \omega^m(h^m, h_*^f) + y - \phi(y, \bar{\omega}^f, \bar{\omega}^m, z), \quad L^m + h^m = T, \quad h^m \in H.$$

⁸We thank a referee for pointing out this issue. With few exceptions, e.g. Donni (2003) and Vermeulen (2006), the literature on collective models ignores taxation.

⁹The reason the sharing rule is assumed to depend on potential earnings, as opposed to actual earnings, is that the former is exogenous to the labor supply decisions of both spouses.

3.3 Identification

Before discussing identification, we select functional forms for preferences and the sharing rule.

We specify a CES sub-utility function

$$u^g(C^g, L^g) = [\alpha^g(C^g)^{\rho^g} + (1 - \alpha^g)(L^g)^{\rho^g}]^{1/\rho^g}$$

and a linear sharing rule:

$$\phi(y, \bar{\omega}^f, \bar{\omega}^m, z) = \left[\phi_0 + \phi_1 \frac{\bar{\omega}^f}{\bar{\omega}^f + \bar{\omega}^m} + \phi_2 (Age^m - Age^f) \right] y,$$

where the spousal age gap is introduced as a distribution factor. Wages enter the sharing rule here as the female's potential share of conditional earnings, when both spouses work full-time, to capture the notion that relative earnings power is likely to influence the intrahousehold allocation of resources.

As mentioned above, our primary interest is in allocating private consumption between the household members. This requires that we obtain an estimate of the sharing rule $\phi(y, \bar{\omega}^f, \bar{\omega}^m, z)$. Generically, this sharing rule is identified up to a constant (Chiappori; 1988, 1992). Our exercise requires complete identification of the sharing rule which requires an additional restriction. As in Browning, Chiappori, and Lewbel (2006) among others, we assume that some features of preferences do not change following marriage. In particular, we assume the sub-utilities over private consumption and leisure do not change following marriage: $v^g(C, L) = u^g(C, L)$. The preference parameters α^g and ρ^g can then be identified using data on singles, if labour supply, wages, and non-labour incomes for singles are observed. Given identification of sub-utilities, the sharing rule is identified as the share of household non-labour income that rationalizes the observed labour supply choices of married men and women.

4 Data

The data we use comes from the UK Family Expenditure Survey (FES). This data is ideal for the study of consumption inequality for three reasons. First, it contains detailed information on private

and public consumption expenditures for households, on wages and labour supply for individuals, and on demographics including age, education (from 1978 onward) and region of residence. Second, the FES has fewer problems with measurement issues than the leading contenders in the US and elsewhere.¹⁰ The FES uses a weekly diary to collect data on frequently purchased items and uses recall questions to collect data on large and infrequent expenditures. Finally, the FES contains information over the period 1968 to the present, which allows the study of changes in consumption inequality over a long period of time.

Our sample contains single person households and couples without children.¹¹ We restrict the age range in the sample to individuals between the ages of 22 and 65 and eliminate students and the self-employed. For robustness, households in which one of the individuals is in the top one per cent of the wage distribution are also excluded. The resulting sample contains 87,668 individuals.¹² Descriptive statistics for our entire sample are presented in Table 1.

We define consumption and non-labour income measures as follows. Total consumption is defined as total household expenditures. Public consumption is defined as expenditures on housing, light and power, and household durable goods. Private household consumption is total expenditures net of public consumption. Other income is defined as total household expenditures minus net labour income. We use this expenditure based definition of non-labour income, as it is consistent with the assumptions of a two stage budgeting process, time separable preferences, and separability of public goods consumption from leisure and private consumption as in the model.¹³

To construct the level of consumption corresponding to each labour supply decision, including zero hours, we need to assign an earnings level to all individuals. For those who are working we

¹⁰Battistin (2004) documents reporting errors in the US Consumer Expenditure Survey due to survey design.

¹¹We exclude households with children in this paper to abstract from the intra-household allocation of resources for children's consumption. This is obviously an important issue. To this end, our estimates of the sharing rule and the comparison of various inequality measures only apply to households without children. We leave to future work an analysis of consumption inequality for the entire sample of households.

¹²The sample size in 1968 is 2,584 and the sample size in 2001 is 2,757. The sample sizes do not vary markedly across years: the smallest sample is 2,502 in 1979 and the largest is 2,932 in 2000.

¹³In estimation, household expenditures on public goods are subtracted from other income, resulting in non-labour income net of public goods consumption. In addition to the separability assumptions, wage profiles are assumed to be exogenous. This rules out the possibility of job-specific human capital accumulation.

use the usual hourly wage, defined as weekly earnings divided by usual weekly hours. For non-participants we use a predicted wage, computed based on a reduced form selection-corrected wage equation. The log of the wage is estimated as a function of age, birth cohort, year, quarter and regional dummies, plus the age at which full time education was completed and its square. The selection equation is identified by the exclusion from the wage equation of household non-labour income, marital status, and the age, education and the labour income of the spouse.¹⁴ After tax earnings are subsequently computed by converting weekly wage income to an annual base, deducting the appropriate personal allowance and then applying the appropriate tax rate. Personal allowances and marginal tax rates are from the Board of Inland Revenue (1968–2001). All monetary values are expressed in 1987 pounds. The resulting income measure is treated as known and is used to construct the *potential* share of after-tax household labour income contributed by the wife, $\bar{\omega}^f / (\bar{\omega}^f + \bar{\omega}^m)$. Individuals may also be entitled to income related to earnings when working zero hours, for instance unemployment benefits, so we also predict unemployment benefits for those who are working based on the *Official Yearbook of the United Kingdom (1968-2001)*.

Labour supply is measured by a discrete variable that takes on three values: not participating, working part-time and working full-time. Full time is defined as working 35 hours per week or more, and part-time is defined as 1 to 34 hours per week. The choice of these ranges is based on the hours histograms in Figure 4, which suggests a full-time definition of 35 hours a week or more. The average hours worked in the part-time category is approximately 20 hours per week, and approximately 40 hours per week in the full-time category.

In order to ensure consistency between the number of hours worked in each of the three states and the corresponding consumption level we adopt the following convention. If an individual is observed to be working either part-time or full-time we use the reported number of hours to measure labour supply and usual take home pay in constructing consumption. In cases for which we do not observe the labour supply state, we calculate after tax earnings based on 20 hours for the part-time choice and 40 hours for the full-time choice. Constructing individual consumption in this

¹⁴Results are available from the authors upon request.

way ensures our measure of total consumption in the household is consistent with that observed in the data.

5 Econometric Specification

We make the following additions to the model before estimation. First, we introduce several sources of individual specific heterogeneity. We allow the weighting of private consumption relative to leisure to differ across individuals according to a set of demographic characteristics including a quadratic in age, education and dummy variables for decade of birth:

$$\alpha^g(X_i) = \frac{\exp(X_i\gamma)}{1 + \exp(X_i\gamma)}$$

We also introduce additive unobserved individual heterogeneity in preferences η_{ih} , specific to individual i and labour supply choice h

$$\eta_{ih}^g = \nu_i L_{ih} + \varepsilon_{ih}$$

which has two components. The first component is a normally distributed, individual-specific component which allows preferences over leisure to be correlated across labour supply choices, and possibly with non-labour income (discussed below). The second component is *i.i.d.* type I extreme value preference heterogeneity.

Second, we treat non-labour income as endogenous and measured with error. Much of non-labour income depends on past labour income and thus may be endogenous to current labour supply decisions. To control for this potential endogeneity, we instrument nonlabour income using capital gains in the local housing market (as in Hurst and Lusardi, 2004), a cubic in reported asset income with time varying coefficients, an indicator for positive net worth, a quadratic in age for both partners, education for both partners and birth cohort dummies as instruments.¹⁵ Capital gains in the housing market are measured by quarterly year-over-year changes in real house prices in each of 12 regions in the UK, interacted with a home ownership indicator. The estimating equation for

¹⁵We would like to thank a referee for this suggestion.

nonlabour income for household i is

$$Y_i = W_i\beta + \epsilon_i \quad (4)$$

where W_i is the above set of instruments. Predicted non-labour income $\hat{Y}_i = W_i\hat{\beta}$ is used in place of Y_i and unobserved preferences for leisure, through ν_i , are allowed to be correlated with the residual ϵ_i . Finally, we set the total time endowment to $T = 112$ hours per week or 16 hours per day.

Making use of these functional forms, along with the budget and time constraints, we can write the value of labour supply choice $h \in H$ for a single individual as

$$V_h^g(Z, \theta) = (\alpha^g(X) [w^g(h^g) + y]^{\rho_g} + (1 - \alpha^g(X)) [T - h^g]^{\rho_g})^{1/\rho_g} + \nu^g L_h^g + \varepsilon_h^g,$$

and for a married woman and man as

$$\begin{aligned} V_h^f(Z, \theta) &= \left(\alpha^f(X) \left[\omega^f(h^f, h_*^m) + \left(\phi_0 + \phi_1 \frac{\bar{\omega}^f}{\bar{\omega}^f + \bar{\omega}^m} + \phi_2 (Age^m - Age^f) \right) y \right]^{\rho_f} \right. \\ &\quad \left. + (1 - \alpha^f) [T - h^f]^{\rho_f} \right)^{1/\rho_f} + \nu^f L_h^f + \varepsilon_h^f, \\ V_h^m(Z, \theta) &= \left(\alpha^m(X) \left[\omega^m(h^m, h_*^f) + y - \left(\phi_0 + \phi_1 \frac{\bar{\omega}^f}{\bar{\omega}^f + \bar{\omega}^m} + \phi_2 (Age^m - Age^f) \right) y \right]^{\rho_m} \right. \\ &\quad \left. + (1 - \alpha^m(X)) [T - h^m]^{\rho_m} \right)^{1/\rho_m} + \nu^m L_h^m + \varepsilon_h^m, \end{aligned}$$

where Z contains all relevant observables relating to both the individual and the choice and θ contains all preference parameters and sharing rule parameters to be estimated.

Estimation proceeds in the following steps. First, we estimate a selection-corrected wage equation and predict wages for individuals that are not working, as described in Section 4. Second, we estimate the reduced form equation for non-labour income to obtain the predicted non-labour income \hat{Y} and the residuals. Third, we obtain estimates of the preference parameters α^g , ρ^g , and σ_ν^g by estimating a mixed multinomial logit model for the discrete labour supply choice using the subsample of single men and women. Lastly, we obtain estimates of the sharing rule parameters ϕ by estimating a mixed multinomial logit model for labour supply using the subsample of married

men and women (conditional on $\hat{\alpha}^g$, $\hat{\rho}^g$, and $\hat{\sigma}_\nu^g$).¹⁶ The reported standard errors are bootstrapped to account for the multistage estimation procedure.

6 Estimation Results

We begin with estimates of the preference parameters, presented in Table 2. At the parameter estimates the utility function is increasing and quasi-concave for all the data. The elasticity of substitution ($\frac{1}{1-\rho}$) indicates the degree of substitutability between private consumption and leisure is similar across gender, 1.64 for women and 1.58 for men. The share parameters are also quite similar for women (0.2314) and men (0.2707) at the mean, with a larger share going to leisure than private consumption, although the share parameter for males tends to vary across type to a greater extent than for females. Males also display substantially more variation in unobserved preferences over leisure, as indicated by the variance of ν . Finally, the results suggest that unobserved preferences for leisure are positively correlated, and to the same degree, with the unobserved component of nonlabour income for both men and women.

We now turn to the estimates of the sharing rule parameters, the parameters that allow us to infer the share of consumption attributed to each adult in the household. As discussed in Section 3, under the assumption that the sub-utility over private consumption and leisure is the same for married and single individuals, we can construct each of the sharing rule parameters independently from the labour supply decisions of the wife and the husband. The sharing rule parameters recovered separately from the wife's and husband's labour supply decision are presented in the first and second columns of Table 3, respectively. The estimated sharing rule parameters constructed

¹⁶The contribution of an individual i to the likelihood function is the probability of observing individual i making labour force decision h , which has the mixed multinomial logit form (McFadden and Train, 2000):

$$\mathcal{L}(h, Z_i, \theta) = \int \frac{1}{\sum_{j=0}^H \exp(V_j^g(Z_i, \theta) - V_h^g(Z_i, \theta))} dF(\nu|\epsilon).$$

We partition θ into the set of preference parameters, $\theta_0 = \{\alpha, \rho, \sigma_\nu\}$ and the set of sharing rule parameters $\theta_1 = \phi$. Then $\hat{\theta}_0 = \arg \max \sum_{i \in S} \ell_i(h, Z_i, \theta_0)$, and $\hat{\theta}_1 = \arg \max \sum_{i \in M} \ell_i(h, Z_i, \theta_1 | \hat{\theta}_0)$, where S and M are the subsets of single and married individuals, and $\ell_i(h, Z_i, \theta) = \log(\mathcal{L}(h, Z_i, \theta))$.

separately from the wife's and husbands estimates are qualitatively and quantitatively similar. In both specifications, the positive sign on ϕ_1 indicates that an increase in the female's share of potential earnings increases her share of net nonlabour income in the household. The estimates also indicate that the spousal age gap has an economically and statistically insignificant effect on the intra-household allocation.

The test statistics associated with several tests of the model predictions are presented in the bottom four rows of Table 3. A Wald test on the full set of restrictions from the model does not reject the model at the 5 percent significance level, but does reject at the 10 percent level. We also test whether each of the individual restrictions from the female's problem are consistent with the corresponding restrictions from the male's problem. The test statistics indicate that none of the model restrictions are rejected at the 5 percent level and that the restrictions on ϕ_1 and ϕ_2 are not rejected at any conventional significance levels. The marginal p-value for the restriction on the intercept in the sharing rule may be evidence of an intercept shift in preferences following marriage; unfortunately, it is not possible to separately identify such a shift in preferences and the intercept of the sharing rule in our specification. Overall, the test statistics provide some support for our version of the collective model.

We next estimate a version of the model that imposes the across-spouse restrictions on the sharing rule. The results of this exercise are presented in column three of Table 3. The estimates suggest that a 10 percent increase in the share of potential earnings attributed to the wife results in a 24 percent increase in the share of non-labour income she receives. This result is consistent with an increase in the wife's threat point within a bargaining model.

6.1 Adult Equivalence Scales Revisited

One of the main goals of this paper is to determine whether measures of consumption inequality using standard adult equivalence scales provide an accurate estimate of consumption inequality across individuals. Recall, adult equivalence scales assume that husbands and wives share in household consumption equally. In this section, we determine the conditions under which our

model would yield the same measures of consumption inequality as measures using adult equivalence scales. We set the age difference between spouses to the average age difference in the data. We then use the sharing rule estimates to determine what value of the female's share in potential household earnings satisfies:

$$\frac{1}{2} = \hat{\phi}_0 + \hat{\phi}_1 \cdot \frac{\bar{\omega}^f}{\bar{\omega}^f + \bar{\omega}^m} + \hat{\phi}_2 \cdot (2.09).$$

Using estimates for ϕ_0 , ϕ_1 and ϕ_2 of -0.6645 , 2.3670 and 0.0022 , respectively, yields 49%. In other words, the model predicts that consumption is split equally across the husband and wife when they have the same earnings!¹⁷ It is worth emphasizing that this result is derived not from a model in which equal sharing is assumed: the only assumptions imposed in estimation are that households make Pareto efficient decisions, that public consumption is separable from private consumption, and that the marginal rate of substitution between leisure and private consumption is the same when single as when married.

6.2 Sensitivity Analysis

In this section, we consider the sensitivity of our results to both the sample used to estimate the model and the robustness of our estimation results to several modifications. First, we consider whether the trend in inequality measured in the literature for the entire population differs from the trend for our sample of one- and two-person households. Upon examination of Figure 5, we see that the trends in between household inequality using adult equivalence scales are virtually the same across samples. Thus, it does not appear that our results are driven exclusively by trends in inequality that are unique to our sample. That said, we are not able to say how the trends in within household consumption inequality vary between our sample and the entire population without estimating an extended version of our model.

With regards to the robustness of our results, the first check we consider is whether the results are sensitive to our definitions of public and private consumption. We first estimate the model

¹⁷To be precise, husbands and wives will split consumption equally when they have approximately the same wages and hours.

under the assumption that there are no public goods and then sequentially add housing, heat and lighting, household durables, transport and services to public good consumption.¹⁸ The results of this exercise are reported in Table 4. The parameter estimates are quite robust across specifications: an increase in the wife's share of potential household earnings of 10% results in an increase in her consumption share of between 14% and 15% and women receive between 51% and 58% of consumption in households where both spouses choose the same hours of work and have the same wage.

The next specification we estimate allows for differences in the sharing rule parameters for each birth cohort in our pooled sample. The sample covers a long time period and a wide age range in every year; we thus estimate sharing rules for each ten-year cohort in the data. The parameter estimates are presented in Table 5. There is some variability in the parameter estimates across cohorts, but no clear trend across time. For the cohorts between 1910 and 1960, an increase in the wife's share of potential household earnings increases her share of non-labour income between 7% and 34% and the estimated effect of an increase in the husband's age by one year fall within the range of -0.3% and 0.2% . With the exception of 1960, the share received by women when the husband and wife have the same earning potential is between 40% and 60%, with the share received by women tending to decline for more recent cohorts.

7 Consumption Inequality

In this section, we compare the inequality measure implied by our model to a conventional measure of consumption inequality. We use this sharing rule to divide non-labour income between the husband and wife in each household. We subsequently construct private consumption based on the individual's share of non-labour income and his or her personal net labour earnings from each individual's private budget constraint. Our *sharing rule* measure of individual consumption, for married individuals, is then equal to individual private consumption plus household public

¹⁸Estimating the full model with unobserved heterogeneity is computationally demanding. For this reason the results pertaining to the sensitivity to the definition of public goods are obtained assuming a degenerate distribution for unobserved heterogeneity. Full estimation results are available from the authors upon request.

consumption:

$$C^f = \omega^f(h_f, h_*^m) + \left[\hat{\phi}_0 + \hat{\phi}_1 \frac{\bar{\omega}^f}{\bar{\omega}^f + \bar{\omega}^m} + \hat{\phi}_2 (Age_m - Age_f) \right] y + P$$

and

$$C^m = \omega^m(h_m, h_*^f) + \left[1 - \hat{\phi}_0 - \hat{\phi}_1 \frac{\bar{\omega}^f}{\bar{\omega}^f + \bar{\omega}^m} - \hat{\phi}_2 (Age_m - Age_f) \right] y + P.$$

Single individuals consume their entire labour and non-labour income. For comparison purposes, we construct another measure of individual consumption, *equal division*, which assumes that all consumption is divided equally between the husband and wife. In the equal division case, individual consumption is calculated as household public consumption plus one half of household private consumption. In both the *sharing rule* and the *equal division* case, we double count public consumption. This accomplishes the same end as using an equivalence scale to assign household consumption to individual members.¹⁹

Having constructed these two measures of individual consumption, we can construct a time series of inequality measures and decompose them into changes in between and within household inequality. While the Gini coefficient is a well known and widely used inequality index, it does not allow overall inequality to be exactly decomposed into within and between group contributions. As this is one of the main objectives of this paper we also compute the Mean Logarithmic Deviation (MLD)²⁰ in consumption, defined as

$$I(C) = \frac{1}{n} \sum_{i=1}^n \log \left(\frac{\mu_C}{C_i^g} \right), \quad (5)$$

where μ_C is the mean level of consumption. The index of total inequality using the MLD can be additively decomposed into within and between household inequality:

$$I^T(C) = I^W(C) + I^B(C), \quad (6)$$

¹⁹It should be noted that the correlation between our equal division consumption inequality measure and a measure of inequality using equivalence scales is 0.99.

²⁰The MLD is a member of the Generalized Entropy Class, the only class of additively decomposable inequality indices (Shorrocks, 1984).

where $I^W(C)$ is within household inequality and $I^B(C)$ is between household inequality. Under the assumption of equal division, within household inequality is zero; therefore, we can calculate $I^B(C)$ by using equal division. Using individual consumption constructed with the sharing rule we obtain the total inequality index $I^T(C)$. We can then recover intra-household inequality using Equation (6).

7.1 Between and Within Household Consumption Inequality

The time-series trend of total and between household inequality for the years 1968 to 2001 is presented in Figure 6. The Gini index measures are presented in the first panel and the MLD measures of inequality are presented in the second panel. Inequality was stable from 1968 to 1980 at which time it increased substantially until around 1990 and has been falling slightly from 1990 through 2001. The compression of marginal tax rates appears to have played a role in generating the sharp rise in between-household inequality during the 1980s. The top and bottom marginal tax rates are plotted in Figure 7, where the top marginal rate falls from 83% in 1978 to 60% in 1979, and then falls again to 40% in 1988. The increase in between household consumption inequality is closely linked to the increase in after tax income inequality that occurred over the 1980s. Of particular interest are two findings. First, ignoring intra-household inequality underestimates consumption inequality in 1968 substantially. This is due to the large differences in earnings between husbands and wives in 1968, differences that translate into an unequal distribution of consumption in the household. It is not surprising that our measure of inequality in 1968 is higher than the conventional measure: by definition, taking within household inequality into account will increase total inequality. However, the magnitude of the difference is striking: consumption inequality, as measured using adult equivalence scales, is underestimated by approximately 30% (15%) when inequality is measured using the MLD (Gini index). To put this figure into perspective, the difference between the level of inequality in 1968 using our measure of inequality compared to the conventional measure is as large as the entire increase in inequality between 1968 and 2001.

Second, the rise in consumption inequality under equal division, or between household inequal-

ity, may be over-stated by almost two-thirds, as illustrated by the trend in the MLD presented in Figure 8. The reason our measure of inequality is so different from the equal division measure is due to the large fall in within-household inequality. The stylized facts presented in Section 2 point to the two main reasons for the decline in within household inequality: the fall in the gender wage gap and the rise in female labour supply. As women's wages rose and as married women increased their labour supply, the share of income contributed to the household by the wife increased. The share of consumption allocated to wives increased accordingly.

Consider the distribution of consumption inferred from our model for 1968 and 2001 in Figure 9. The dispersion in within household inequality decreased between 1968 and 2001. The fact that there was a high degree of dispersion in 1968 was a major contributor to the high level of inequality at the beginning of the sample period. Despite the fall in dispersion, the righthand panel of Figure 9 shows that there is still a substantial deviation from equal division by 2001. Incorporating within household inequality thus changes the picture of inequality dramatically.

7.2 Accounting for the trends in consumption inequality

In this section, we examine several explanations for the rise in consumption inequality observed in the data. We focus on the years 1978 to 2001, as the major changes in inequality occurred over the 1980s. Results are presented in Table 6. The first two rows contain the benchmark inequality measures for 1978 and 2001, followed by the absolute change over time in the third row. The rest of the table presents the percentage of the change in the observed inequality measures attributed to each explanation we consider.

7.2.1 Wages and Labour Supply

According to the stylized facts, two of the most salient trends over time are the closing of the gender gap in wages and the rise in female labour supply. To what extent do changes in the distribution of wages account for the rise in consumption inequality? To answer this question, we conduct two exercises. In the first exercise, we start with the wage distribution in 2000. We then

re-weight the observations in the 1978 data so that the wage distribution in 1978 matches that of 2001. In particular, we construct histograms of log wages for 1978 and 2001. The histograms used to re-weight the wage distributions have 10 bins each. We re-weight 1978 data so that the histograms of log wages are the same in both years. This experiment captures the fall in the gender wage gap and aggregate changes in the wage distribution. In the second experiment, we focus on changes in the wage distributions within households. We re-weight the joint spousal distribution of wages in 1978 to match the joint spousal distribution of wages in 2000 to capture the effect of sorting on inequality. Both experiments are subsequently repeated for labour supply. The results are presented in Table 6.

What is interesting about the results on wage and hours sorting is that they can simultaneously explain both the rise in consumption inequality across households and the fall in consumption inequality within households: sorting on wages alone can explain approximately 39% of the rise in between household inequality and 64% of the fall in within household inequality. It is also interesting to note that it is wage sorting within households in particular that is important, not changes to the aggregate wage distribution, as changes to the aggregate wage distribution explain little of the changes in inequality.

With respect to sorting on hours, 32% of the rise in between household inequality and 85% of the fall in within household inequality can be explained by increased marital sorting. Over time, the distribution of marriages shifted from ‘specialized’ families, with one income or a mix of low and high earners within the household, to a distribution with a larger proportion of both high earnings couples and low earnings couples. Regardless of the measure of consumption inequality considered, the exercises conducted above illuminate the dramatic role of sorting in determining the distribution of consumption across individuals. The evidence presented here is consistent with the existing literature on marital sorting and inequality that finds a positive relationship between marital sorting, on characteristics such as education, and inequality (Kremer, 1997; Dahan and Gaviria, 1999; Fernández and Rogerson, 2001; Fernández, Guner and Knowles, 2005).

7.2.2 Demographics and Household Composition

Next, we consider the hypothesis that the rise in consumption inequality is capturing cohort effects due to the changes in the age structure of the population. To this end, we re-weight the 1978 data so that the age structure is the same as that in 2001, holding all else constant. The results of this exercise, presented in the fifth row of the bottom panel of Table 6, suggest that changes in the age distribution between 1978 and 2001 had virtually no effect on consumption inequality. Thus, it does not appear that cohort effects are the driving force behind the trends in inequality.

The second explanation we consider is the large change in household composition that occurred alongside the rise in inequality. In particular, with delays in marriage and a rise in divorce rates, the fraction of households with one adult increased relative to the fraction of two adult households. Although single person households have no within household inequality by definition, it is still the case that there may exist substantial inequality between single adult households. To assess the importance of changing household composition, we re-weight the 1978 data so that the fraction of married couples, the fraction of single women, and the fraction of single men in the population match the proportions in 2001. The results of this exercise suggest that changes in household composition can explain up to 17% of the change in household inequality according to the sharing rule estimates and 16% of the change in consumption inequality when measured using adult equivalence scales. Together, a combination of a changing age distribution and the change in household composition over time can explain 14% of the change in the MLD over time, most of this effect coming through household composition. In summary, our experiments indicate that the main driving force behind the trends in consumption inequality are changes in marital sorting, not changes in demographics. This finding reaffirms the fact that our understanding of consumption inequality is incomplete when intra-household behavior is ignored.

8 Conclusion

The literature on consumption inequality has focused on the question of how changes in income inequality translate into changes in consumption inequality at the level of the individual. In this paper, we show that current measures of consumption inequality only reflect inequality at the household level, as it is assumed there is no inequality within households. We provide evidence that this assumption produces a very inaccurate picture of both the level and trend in consumption inequality for two reasons. First, the large dispersion in incomes in the household are highly inconsistent with equal division of consumption. When equal division is relaxed, there is substantial inequality within the household. This suggests previous work underestimates the level of individual consumption inequality by 30%. Second, the earnings gap within households has closed over the past 30 years, resulting in less inequality in the household over time. As a result, we estimate that the rise in inequality documented in the literature is overstated by 65%. Our results show that the conventional approach for measuring inequality is only appropriate for measuring inequality for single individuals and for couples with the same earnings.

Our work highlights the fact that looking inside the household is as important as looking between households for the study of consumption inequality across individuals. What happens in the household not only changes our estimates of the level and trend in inequality; it also changes our understanding of the forces behind the trends. We find that increased marital sorting on earnings can explain both the fall in within household inequality and the rise in between household inequality over time. These results are complementary to those of Fernández and Rogerson (2001), Fernández, Guner and Knowles (2005) and Dahan and Gaviria (2001), among others, on sorting and income inequality and suggest an important avenue for further research.

Table 1: Descriptive Statistics from the FES

1968 to 2001	Male				Female			
	Single		Married		Single		Married	
	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev
Age (22 to 65)	43.92	13.39	48.60	13.51	50.41	13.31	46.51	13.60
No hours dummy	0.28	0.45	0.19	0.40	0.43	0.49	0.35	0.48
Part time dummy	0.05	0.22	0.04	0.20	0.16	0.37	0.25	0.43
Full time dummy	0.68	0.47	0.77	0.42	0.41	0.49	0.40	0.49
Hourly wage	4.94	2.43	4.74	2.27	3.86	1.96	3.33	1.66
Total Expend.	118.37	99.10	192.51	129.48	99.53	75.63	192.51	129.48
Housing Expend.	39.57	41.62	59.61	62.93	39.07	37.91	59.61	62.93
Observations	10,958		31,871		12,967		31,871	
Observed wages	7,663		25,208		7,271		20,291	

Table 2: Estimates of the Preference Parameters.

	Women	Men
ρ	0.3919 (0.0155)	0.3693 (0.0200)
α (at mean of data)	0.2314 (0.0042)	0.2707 (0.0052)
γ :		
Age	1.3298 (0.0163)	2.5736 (0.0141)
Age ²	-2.4251 (0.0138)	-4.8846 (0.0139)
Education	-0.1010 (0.0243)	-0.0285 (0.0329)
1910 Cohort	0.6214 (0.0176)	2.5868 (0.0084)
1920 Cohort	0.3903 (0.0179)	1.5159 (0.0099)
1940 Cohort	-0.4233 (0.0272)	-1.2546 (0.0201)
1950 Cohort	-0.7580 (0.0329)	-1.5184 (0.0186)
1960 Cohort	-0.8182 (0.0335)	-1.9055 (0.0146)
γ_0	-1.2003 (0.0234)	-0.9910 (0.0260)
σ_ν^2	0.6577 (0.0526)	4.8676 (0.1478)
$corr(\nu, u)$	0.2448 (0.0276)	0.1911 (0.0577)

Note: $\alpha_i = \frac{X_i \gamma}{1 + X_i \gamma}$. Bootstrapped standard errors in parentheses.

Table 3: Estimates of the Sharing Rule.

	Wives	Husbands	Restricted
ϕ_0	-0.7729 (0.1176)	-0.3011 (0.2233)	-0.6645 (0.0954)
ϕ_1	2.5712 (0.2800)	1.8491 (0.5094)	2.3670 (0.2322)
ϕ_2	0.0031 (0.0025)	0.0027 (0.0026)	0.0022 (0.0017)
$\phi_0 + \frac{1}{2}\phi_1 + 2.09\phi_2$	0.5237 (0.0521)	0.5192 (0.0580)	0.6291 (0.0726)
		$\chi^2(3)$	p-value
$\phi^f = \phi^m$		6.4823	0.0905
		t	p-value
$\phi_0^f = \phi_0^m$		-1.9491	0.0516
$\phi_1^f = \phi_1^m$		1.3436	0.1794
$\phi_2^f = \phi_2^m$		0.1572	0.8752

Note: Bootstrapped standard errors in parentheses.

Table 4: Sharing Rule Estimates Under Alternative Measures of Public Goods

	No Public Goods	Public Goods (i) (housing)
ϕ_0	-0.1542 (0.0110)	-0.1651 (0.0134)
ϕ_1	1.3805 (0.0293)	1.3420 (0.0331)
ϕ_2	-0.0003 (0.0008)	-0.0003 (0.0007)
$\phi_0 + \frac{1}{2}\phi_1 + 2.09\phi_2$	0.5354 (0.0076)	0.5053 (0.0073)
% of Total Consumption	0%	17%
	Public Goods (ii) (i + heat)	Public Goods (iii) (ii + durables + transport + services)
ϕ_0	-0.1859 (0.0154)	-0.1552 (0.0216)
ϕ_1	1.3845 (0.0444)	1.4524 (0.0483)
ϕ_2	-0.0005 (0.0010)	0.0042 (0.0019)
$\phi_0 + \frac{1}{2}\phi_1 + 2.09\phi_2$	0.5053 (0.0216)	0.5798 (0.0208)
% of Total Consumption	24%	56%

Note: Bootstrapped standard errors in parentheses.

Table 5: Sharing Rule Estimates by Birth Cohort.

Birth Cohort			Birth Cohort		
1910	ϕ_0	-0.8375	1920	ϕ_0	-1.0278
	$N : 12,211$	(0.1162)		$N: 18,660$	(0.6900)
	ϕ_1	2.8719		ϕ_1	3.3587
		(0.2968)			(1.8565)
	ϕ_2	0.0012		ϕ_2	0.0023
		(0.0021)			(0.0065)
	$\phi_0 + \frac{1}{2}\phi_1 + 2.09\phi_2$	0.6010		$\phi_0 + \frac{1}{2}\phi_1 + 2.09\phi_2$	0.6564
		(0.0773)			(0.4725)
1930	ϕ_0	-0.8417	1940	ϕ_0	-0.2050
	$N: 16,219$	(0.0722)		$N: 15,284$	(0.0296)
	ϕ_1	2.8238		ϕ_1	1.1935
		(0.2198)			(0.0812)
	ϕ_2	0.0017		ϕ_2	0.0018
		(0.0023)			(0.0017)
	$\phi_0 + \frac{1}{2}\phi_1 + 2.09\phi_2$	0.5738		$\phi_0 + \frac{1}{2}\phi_1 + 2.09\phi_2$	0.3955
		(0.0475)			(0.0249)
1950	ϕ_0	-0.8660	1960	ϕ_0	-0.0529
	$N: 11,692$	(0.2538)		$N: 7,974$	(0.0704)
	ϕ_1	2.6061		ϕ_1	0.6802
		(0.5621)			(0.1692)
	ϕ_2	0.0005		ϕ_2	-0.0031
		(0.0068)			(0.0054)
	$\phi_0 + \frac{1}{2}\phi_1 + 2.09\phi_2$	0.4381		$\phi_0 + \frac{1}{2}\phi_1 + 2.09\phi_2$	0.2807
		(0.0623)			(0.0507)

Note: Bootstrapped standard errors in parentheses. N indicates the sample size for each birth cohort.

Table 6: Decomposition of the Change in Between and Within Consumption Inequality.

Absolute Change	Gini Index		Mean Logarithmic Deviation		
	Total	Between	Total	Between	Within
1978	0.332	0.285	0.196	0.137	0.059
2001	0.373	0.337	0.254	0.204	0.050
Change	0.041	0.052	0.058	0.067	-0.009
Percentage of change attributable to:					
Wages	2.5	5.8	1.3	4.7	26.5
Wage Sorting	51.2	50.8	34.9	38.9	64.3
Labor Supply	38.5	36.3	23.7	27.1	48.6
Labor Supply Sorting	41.4	44.2	23.8	32.1	84.8
Age Distribuion	0.4	0.2	0.0	0.0	0.0
Household Composition	28.7	21.5	17.4	16.4	10.2
Age and Household Composition	29.9	32.5	14.5	23.1	77.8

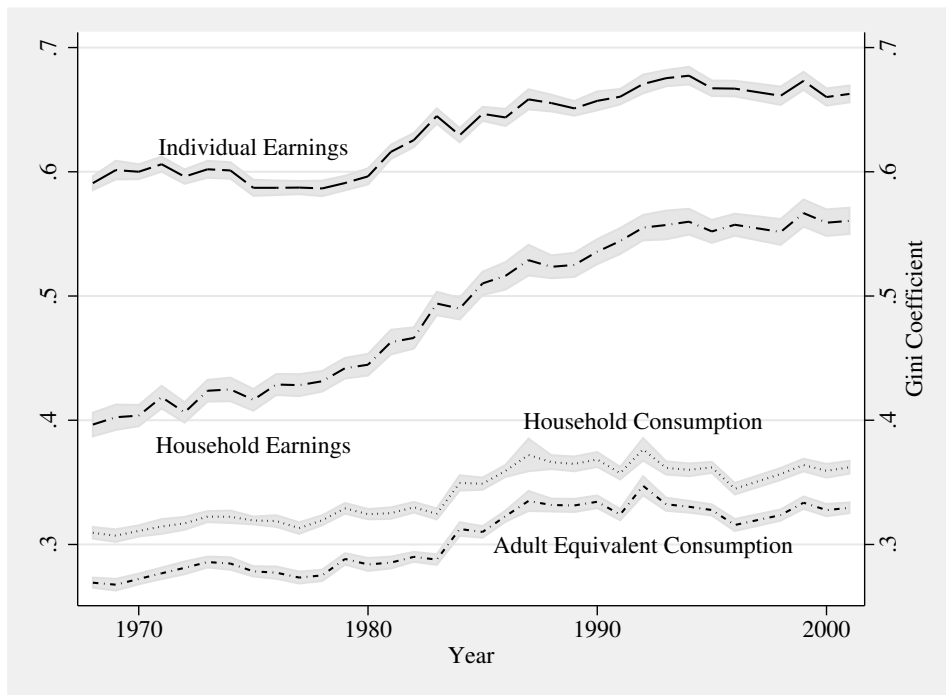


Figure 1: **Trends in the Gini index for earnings and consumption.**
 Note: Own calculations from the FES. Shaded area represents \pm two standard errors.

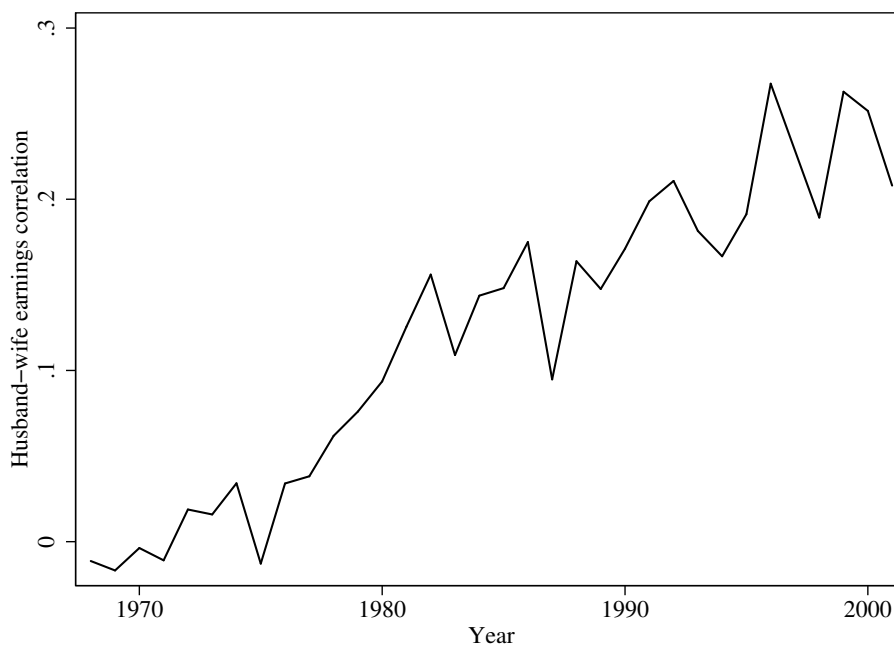


Figure 2: **Correlation in earnings across husbands and wives.**
 Note: Own calculations from the FES.

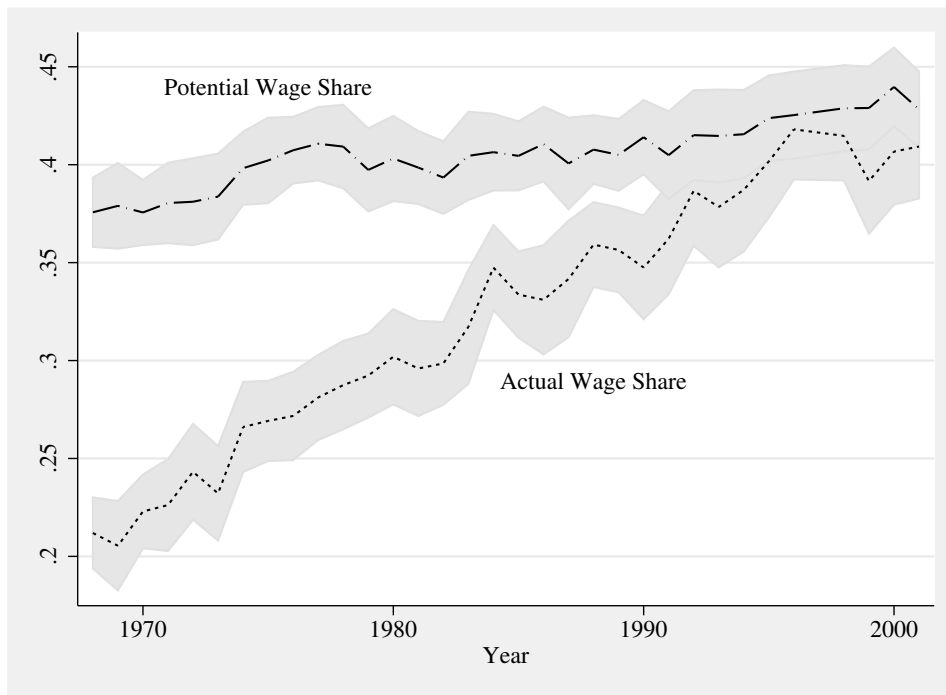


Figure 3: **Fraction of actual household earnings provided by wife.**
 Note: Own calculations from the FES. Shaded area represents \pm two standard errors.

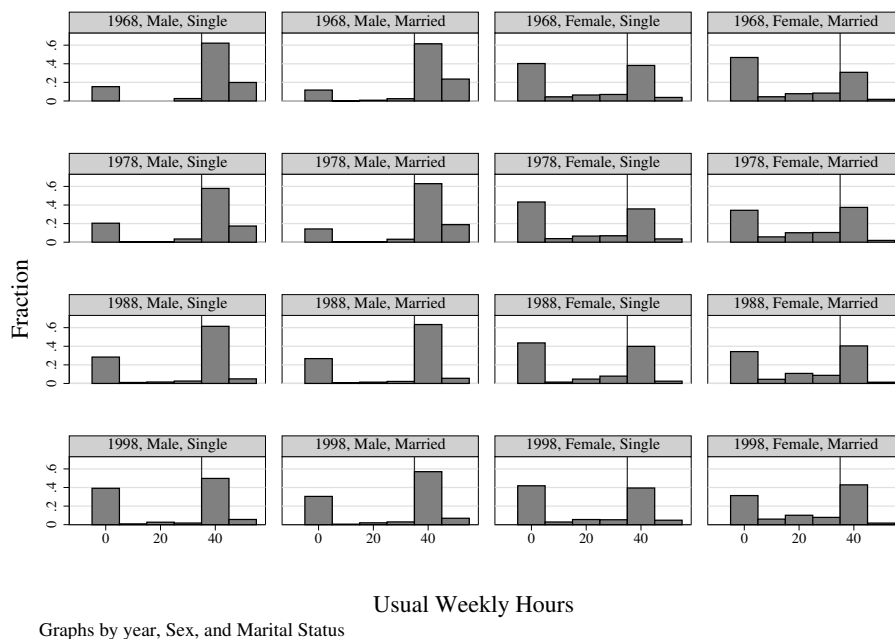


Figure 4: **Histogram of usual weekly hours.**
 Note: Own calculation from the FES.

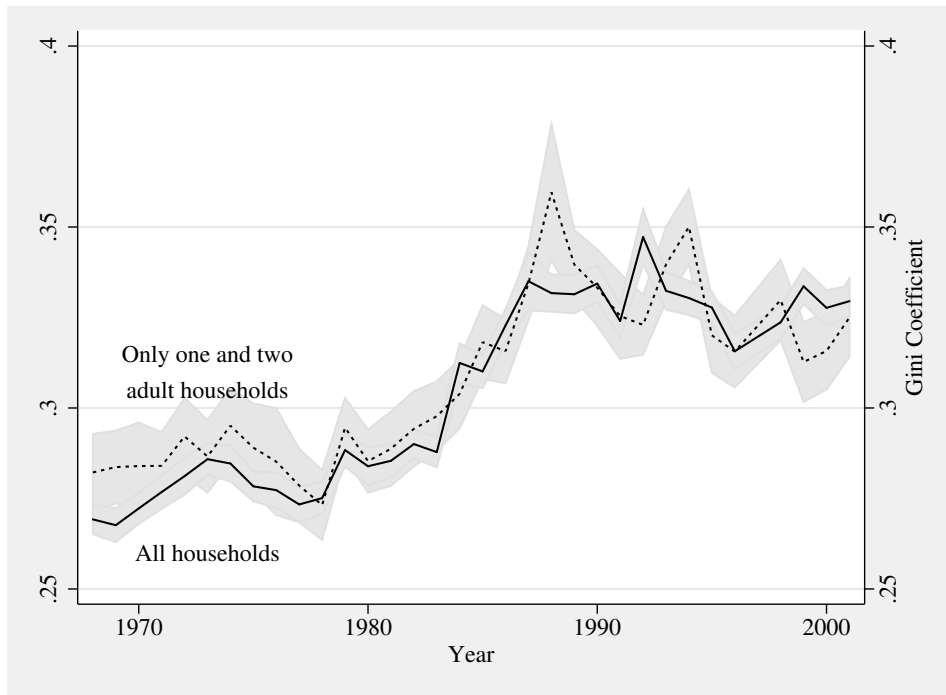


Figure 5: **Consumption inequality for all households and one- and two-adult households.**
 Note: UK National Statistics (1968–2001). Shaded area represents \pm two standard errors.

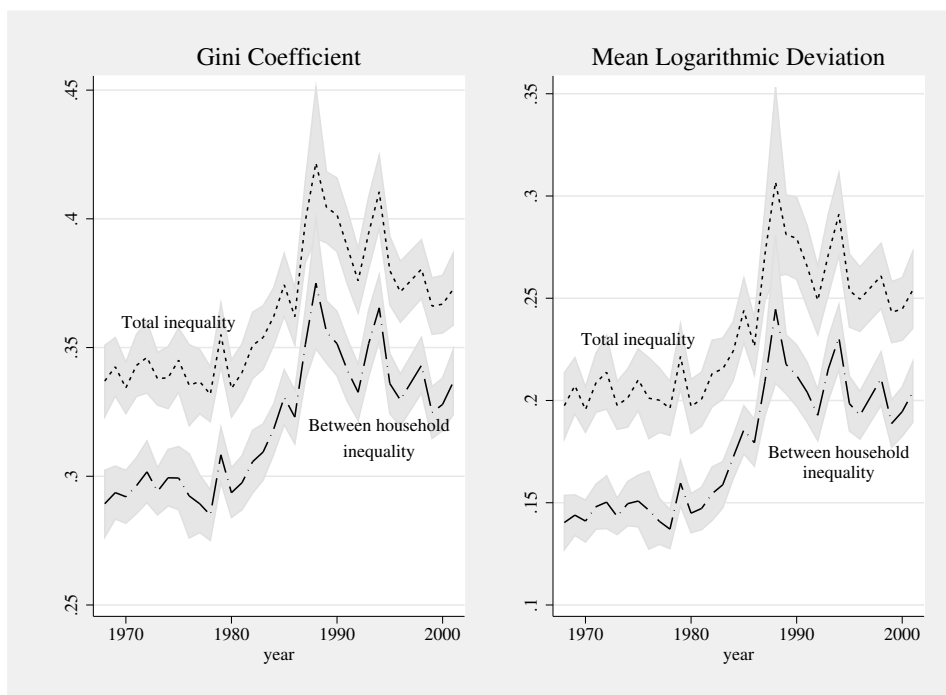


Figure 6: **Total and between household decomposition of consumption inequality trends.**
 Note: Own calculations from the FES. Shaded area represents \pm two standard errors.

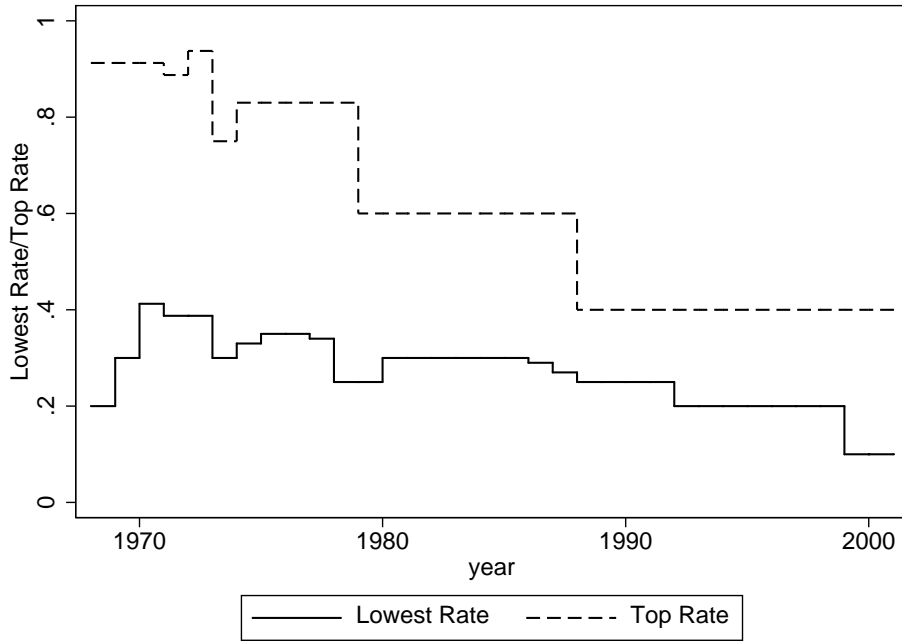


Figure 7: **Bottom and top marginal tax rates.**
 Source: UK National Statistics (1968–2001).

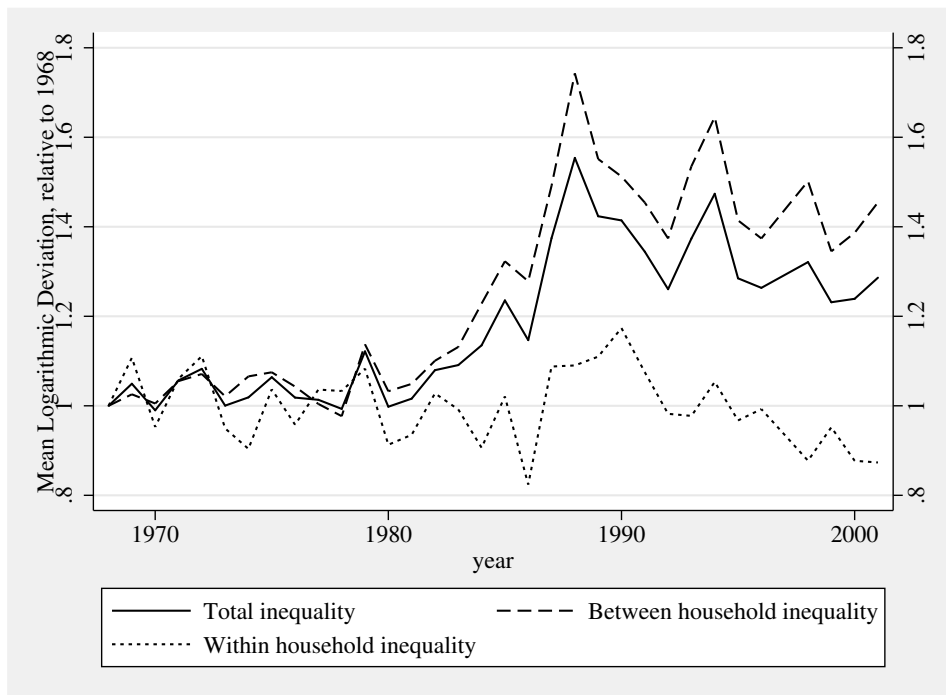


Figure 8: **Relative changes in between and within household inequality trends.**
 Source: Own calculation from the FES.

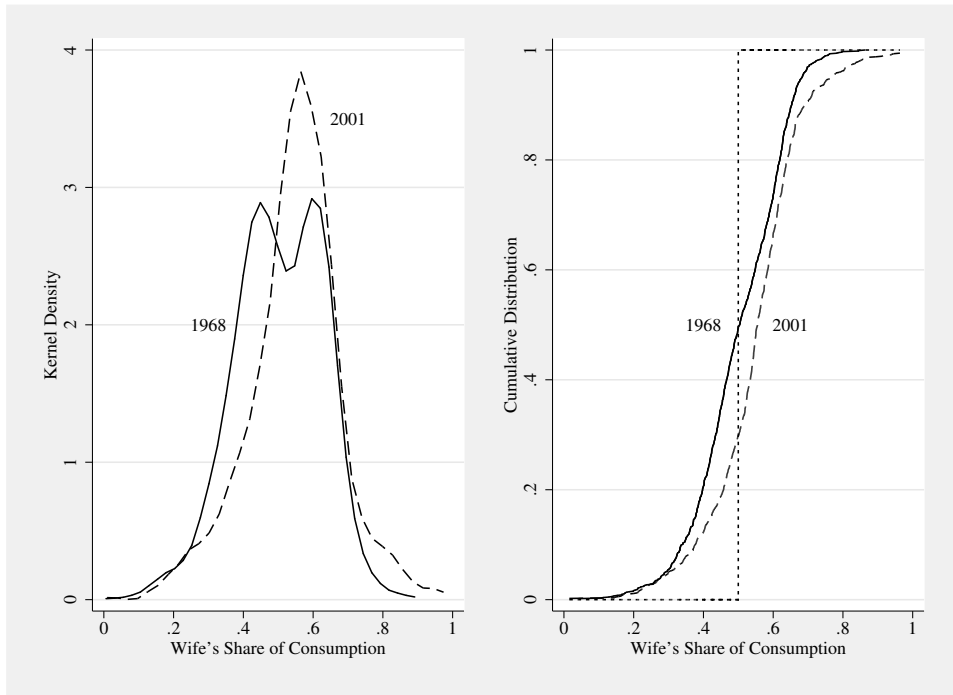


Figure 9: **Distribution of consumption inequality within households.**

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