Labor Supply

Based on Blundell and MaCurdy (1999), Keane (2011), Blundell et al (2007) and Lise and Seitz (2011)

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Outline

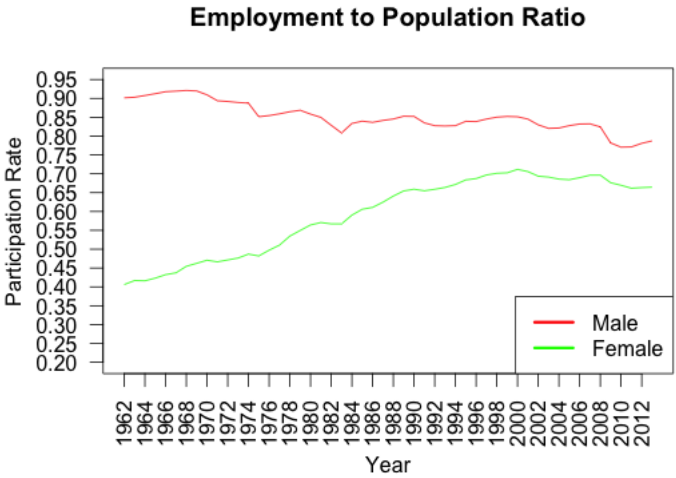
Survey Papers

- Part one of the presentation is based on two survey papers: Blundell and MaCurdy (1999) and Keane (2011). Blundell and MaCurdy (1999) provides a framework for understanding labor supply. And Keane (2011) gives the most updated summary of the empirical results on the estimation of labor supply elasticities.
- Estimation of labor supply elasticities is crucial for examining the costs and benefits of tax polices and welfare transfers.
  - Tax policies: federal income taxes, state income taxes, social security tax, health and insurance taxes, etc.
  - Welfare transfers to low income families: Aid to Families with Dependent Children (AFDC), Food Stamp Program (FSP), Supplemental Security Income (SSI), Housing Assistance, Medicaid, Earned Income Tax Credit (EITC), etc.
- Other survey papers are also useful for this topic: Heckman and Killingsworth (1986), Moffit (2003), Pancavel (1986), Saez, Slemrod, and Giertz (2012).

Four Additional Papers

- Although studying the elasticities of labor supply is important, it is not the only focus of the research on labor supply.
- Studying labor supply could also help us to better understand people's lifecycle decision making on, e.g. human capital investment, marriage, fertility, retirement, etc and issues on intra and inter-household inequality.
- Therefore, we discuss four interesting papers in addition to the survey papers: Blundell, Chiaporri, Magnac, and Meghir (2007), Lise and Seitz (2011), Keane and Wolpin (1997) and Keane and Wolpin (2010).

Participation Rates



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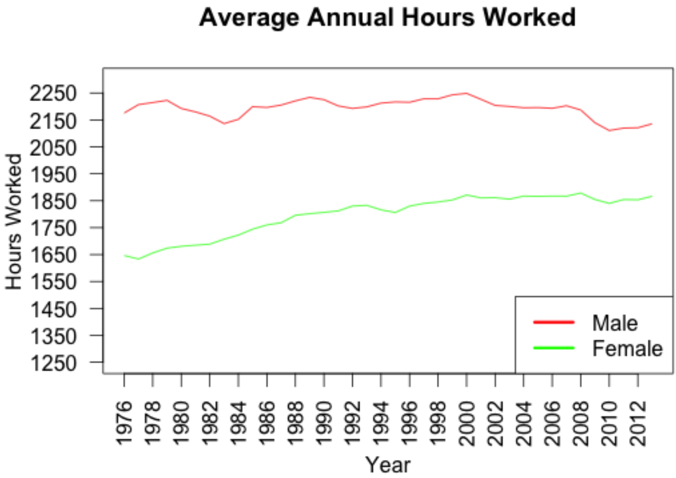
Hours of Work



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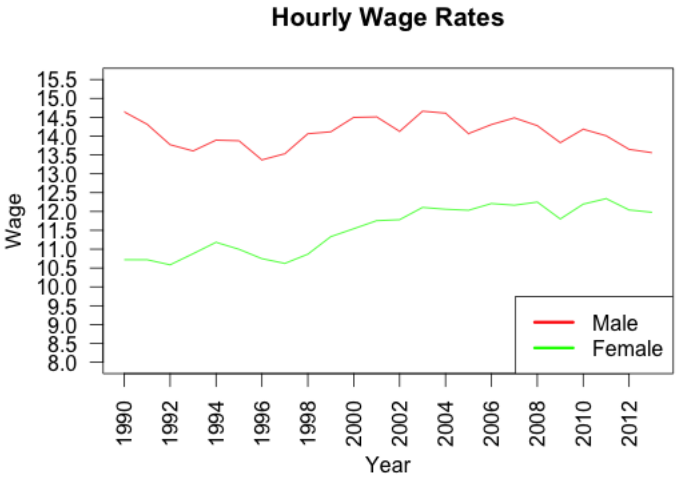
Real Wages



Data source: IPUMS-CPS

The Static Labor Supply Model

- A worker's utility maximization problem is:

$$\max_{C_t, L_t} U(C_t, L_t, X_t)$$

in which C_t, L_t and X_t are within-period consumption, leisure hours and individual attributes, in period t.

- Subject to the "full income" budget constraint:

$$C_t + W_t L_t = Y_t + W_t T$$

where W_t is hourly wage rate, Y_t is non-labor income, T is the total time available.

Marshallian Elasticity of Labor Supply

- FOCs for an interior solution:

$$\begin{aligned} U_C(C_t, L_t, X_t) &= \lambda_t \\ U_L(C_t, L_t, X_t) &= \lambda_t W_t \end{aligned}$$

- An equivalent representation of the FOCs is:

$$\frac{U_C(C_t, L_t, X_t)}{U_L(C_t, L_t, X_t)} = \frac{1}{W_t}$$

- Solving the FOCs yields the Marshallian demand functions for consumption and leisure:

$$\begin{aligned} C_t^{M*} &= C^M(W_t, Y_t, X_t) \\ L_t^{M*} &= L^M(W_t, Y_t, X_t) \end{aligned}$$

Marshallian Elasticity of Labor Supply

- The Marshallian labor supply function is:

$$\begin{aligned} H_t^{M*} &= T - L^M(W_t, Y_t, X_t) \\ &\equiv H^M(W_t, Y_t, X_t) \end{aligned}$$

- The Marshallian (uncompensated) elasticity of labor supply is defined as:

$$E_t^M = \left. \frac{\partial \ln H^M(W_t, Y_t, X_t)}{\partial \ln(W_t)} \right|_{Y_t = \bar{Y}_t}$$

Hicksian Elasticity of Labor Supply

- A dual problem for a worker is the expenditure minimization problem:

$$\min_{C_t, L_t} C_t + W_t L_t$$

subject to a given utility level:

$$U(C_t, L_t, X_t) = U_t$$

- Solving the minimization problem gives the Hicksian demand functions for consumption and leisure:

$$\begin{aligned} C_t^{H*} &= C^M(W_t, U_t, X_t) \\ L_t^{H*} &= L^M(W_t, U_t, X_t) \end{aligned}$$

Hicksian Elasticity of Labor Supply

- The Hicksian labor supply function is:

$$\begin{aligned} H_t^{H*} &= T - L^M(W_t, U_t, X_t) \\ &\equiv H^H(W_t, U_t, X_t) \end{aligned}$$

- The Hicksian (compensated) elasticity of labor supply is defined as:

$$E_t^H = \left. \frac{\partial \ln H^H(W_t, U_t, X_t)}{\partial \ln W_t} \right|_{U_t = \bar{U}_t}$$

Elasticities of Labor Supply

- Two concepts of the elasticity of labor supply in the static model:
  - The Marshallian elasticity of labor supply:

$$E_t^M = \left.\frac{\partial \ln H^M(W_t, Y_t, X_t)}{\partial \ln(W_t)}\right|_{Y_t = \bar{Y}_t}$$

    is the percentage change in worker's hours of work when the wage rate increases by 1%, holding the amount of **non-labor income** constant.
  - The Hicksian elasticity of labor supply:

$$E_t^H = \left.\frac{\partial \ln H^H(W_t, U_t, X_t)}{\partial \ln W_t}\right|_{U_t = \bar{U}_t}$$

    is the percentage change in worker's hours of work when the wage rate increases by 1%, holding the **utility level** constant.

Relative Size of Elasticities of Labor Supply

- What about the relative size of the two elasticities?
- From:

$$H^H(W_t, U_t, X_t) = H^M(W_t, e(W_t, U_t, X_t), X_t)$$

- We can derive the Slutsky equation:

$$\frac{\partial H^H(W_t, U_t, X_t)}{\partial W_t} = \frac{\partial H^M(W_t, e(W_t, U_t, X_t), X_t)}{\partial W_t} - \frac{\partial H^M(W_t, e(W_t, U_t, X_t), X_t)}{\partial Y_t} H_t$$

- The Slutsky equation in elasticity form is:

$$\underbrace{\frac{\partial \ln H^H(W_t, U_t, X_t)}{\partial \ln W_t}}_{Hicksian} = \underbrace{\frac{\partial \ln H^M(W_t, Y_t, X_t)}{\partial \ln W_t}}_{Marshallian} - \underbrace{\frac{\partial \ln H^M(W_t, Y_t, X_t)}{\partial \ln Y_t} \frac{H_t W_t}{Y_t}}_{Income\ \ effect}$$

- So if leisure is a normal good, we have:

$$E_t^H > E_t^M$$

The Dynamic Model of Labor Supply

- A full lifecycle model is characterized by a utility function of the form:

$$U(C_1, L_1, X_1, ..., C_T, L_T, X_T)$$

- This full model is empirically intractable, so all studies assume some form of separability in time:

$$\tilde{U}(U(C_1, L_1, X_1), ..., U(C_T, L_T, X_T))$$

- Subject to the intertemporal budget constraint:

$$A_{t+1} = (1 + r_t)A_t + W_t H_t + Y_t - C_t$$

where A_t is the real value of assets and r_t is the real rate of return earned on assets.

Two-Stage Budgeting

- The dynamic problem can be broken down into two sub-problems:
  - (Stage 2) In each subperiod, the agent maximizes the period utility as follows:

$$
\begin{aligned}
&\max_{C_t, L_t} U(C_t, L_t, X_t) \\
s.t.\ C_t + W_t L_t &= W_t T + Y_t + (1 + r_t) A_t - A_{t+1} \\
&\equiv W_t T + Y_t^C
\end{aligned}
$$

  - Notice that this looks exactly the same as in the static case, only except that Y_t is replaced by Y_t^C. So the within-period marginal rate of substitution conditions continue to characterize behavior.
  - (Stage 1) Choose the optimal Y_t^C for each period.

Marshallian and Hicksian Elasticities in the Dynamic Setting

- The Marshallian elasticity can be derived in the same way as in the static framework. The only difference here is to condition on Y_t^C instead of Y_t.
- And the Hicksian elasticity can be recovered through the Slutsky equation.

The Recursive Representation

- Representing the problem by using the Bellman Equation:

$$V(A_t) = \max_{C_t, L_t}[U(C_t, L_t, X_t) + \kappa V(A_{t+1})]$$

$$s.t.\ A_{t+1} = (1 + r_t)A_t + W_t H_t + Y_t - C_t$$

  where κ is a discount factor.

- FOCs:

$$\begin{aligned} U_C(C_t, L_t, X_t) &= \lambda_t && (1) \\ U_L(C_t, L_t, X_t) &= \lambda_t W_t && (2) \\ \kappa V'(A_{t+1}) &= \lambda_t && (3) \end{aligned}$$

- The Envelop Theorem implies:

$$V'(A_t) = \lambda_t(1 + r_t)$$

Frisch Elasticities

- Combining Equation (3) and the Envelop Theorem condition gives the Euler condition:

$$\lambda_t = \kappa(1 + r_{t+1})\lambda_{t+1}$$

- Beside the Euler equation, the other FOCs are the same as in the static case. The Euler equation determines how to allocate wealth across periods.
- Solving the FOCs (1) and (2) (two equations and two unknowns) gives Frisch demand functions for consumption and leisure:

$$\begin{aligned} C_t^{F*} &= C^F(W_t, \lambda_t, X_t) \\ L_t^{F*} &= C^F(W_t, \lambda_t, X_t) \end{aligned}$$

in which the marginal utility of wealth parameter serves as the sufficient statistic which captures all the information from other periods that is needed to solve the current period maximization problem.

Frisch Elasticities

- And the Frisch labor supply function is:

$$\begin{aligned} H_t^{F*} &= T - C^F(W_t, \lambda_t, X_t) \\ &= H^F(W_t, \lambda_t, X_t) \end{aligned}$$

- The Frisch elasticity of labor supply is defined as:

$$E_t^F = \left. \frac{\partial \ln H^F(W_t, \lambda_t, X_t)}{\partial \ln W_t} \right|_{\lambda_t = \bar{\lambda}_t}$$

which is the percentage change in worker's hours of work when the wage rate increases by 1%, holding the **marginal utility of wealth**, λ_t, constant.

The Euler Condition

- Recall the Euler Equation is:

$$\kappa(1 + r_{t+1})\lambda_{t+1} = \lambda_t$$

- This implies a time path for λ:

$$\begin{aligned} \ln \lambda_t &= \ln \lambda_{t-1} - \ln \kappa(1 + r_t) \\ &\equiv \ln \lambda_{t-1} + b_t \end{aligned}$$

- Repeating substitution yields:

$$\ln \lambda_t = \sum_{j=1}^{t} b_j + \ln \lambda_0$$

- Therefore, holding λ_t constant is the same as holding the initial level of the marginal utility of wealth, λ_0, constant.

Three Definitions of Elasticities in the Dynamic Model

- Marshallian elasticity of labor supply holds the **consumption-based income variable**, Y_t^C, constant:

$$E_t^M = \left.\frac{\partial \ln H^M(W_t, Y_t^C, X_t)}{\partial \ln(W_t)}\right|_{Y_t^C = \bar{Y}_t^C}$$

- Hicksian elasticity of labor supply holds the **period utility level,** U_t, constant:

$$E_t^H = \left.\frac{\partial \ln H^H(W_t, U_t, X_t)}{\partial \ln W_t}\right|_{U_t = \bar{U}_t}$$

- Frisch elasticity of labor supply holds the **marginal utility of wealth**, λ_t, constant:

$$E_t^F = \left.\frac{\partial \ln H^F(W_t, \lambda_t, X_t)}{\partial \ln W_t}\right|_{\lambda_t = \bar{\lambda}_t}$$

- MaCurdy (1981) and Browning et al. (1985) show that the Frisch elasticity is the largest of the three:

$$E_t^F > E_t^H > E_t^M$$

The Basic Empirical Specifications

- A prototype empirical specification:

$$\ln H_t = \alpha \ln W_t + \beta Q_t + e_t$$

  where α and β are parameters, Q_t is a vector of controls, and e_t is a stochastic unobservable term.
- The interpretation of the parameter α depends on the chosen vector Q_t.

Static Specifications

- Control variables in the conventional static specification:

$$\beta Q_t = \rho X_t + \theta Y_t$$

  in which X_t is a vector of "taste shifter" variables and Y_t is a measure of non-labor income.
- If the static model is correct, α is the Marshallian wage elasticity. But we need to assume that either the consumers behave completely myopically, or the capital markets are completely constrained.

Two-Stage Budgeting Specifications

- The Marshallian wage elasticity in the dynamic model can be estimated by controlling for:

$$\beta Q_t = \rho X_t + \theta Y_t^C$$

  in which Y_t^C is the consumption-based income measure. So α estimates the wage effect holding the first-stage income allocation constant.
- This captures the impact of anticipated wage movements through time, but does not capture the impact of shifts of the wage profile.

Frisch Specifications

- It can be shown that if the labor supply and consumption are explicitly additive in the utility function, the Frisch elasticity of labor supply can be estimated by:

$$\Delta \ln H_t = b + \rho \Delta X_t + \alpha \Delta \ln W_t + \Delta e_t$$

  in which λ_0 is individual specific fixed effect and cancelled out by using the first difference.
- Like in the two-stage budgeting specification, this is not an estimate for the impact of wage variation across consumers or unanticipated shifts of an individual's wage profile.

Lifecycle Specifications

- Which elasticities are policy relevant?
- Many tax policies and benefit reforms can be considered as unanticipated shifts in today's and all future real wages.
- It may be more relevant to model the effect of changes in the entire wage profile on λ_0 rather than holding λ_0 fixed.
- Assume that

$$\ln \lambda_0 = D_0 \psi_0 + \sum_{j=0}^{T} \gamma_{0j} E_0\{\ln W_j\} + \theta_0 A_0 + a_0$$

in which D_0 is a vector of demographic characteristics, and a_0 is an error term.

Lifecycle Specifications

- Then it can be shown that in this case, the control variables are:

$$\beta Q_t = D_0\psi_0 + \sum_{j=0}^{T} \gamma_{0j} E_0\{\ln W_j\} + \theta_0 A_0 + bt + X_t\rho$$

- The estimated wage effect, $\alpha + \gamma_{0t}$, measures the effect of an exogenous shift in the wage profile.

Econometric Issues on Estimating the Empirical Specifications

$$\ln H_t = \alpha \ln W_t + \beta Q_t + e_t$$

- Endogeneity of wages, W_t, arising from the correlation with tastes for work
  - IV approach: e.g. mineral prices may be correlated with wages but uncorrelated with tastes
- Endogeneity arising from simultaneity
  - Cannot tell whether we are estimating a labor supply curve, or demand curve or just some combination of the two
  - Using raw material prices or tax rules as instruments for after-tax wages
- The treatment of taxes
  - Progressive tax schedule creates the issue of reverse causality
  - Progressive tax schedule creates kinks on people's budget constraint, which makes solving the worker's optimization problem harder

Econometric Issues on Estimating the Empirical Specifications

- Measurement error in wages and nonlabor income
  - Classical measurement error will cause OLS estimates to be biased toward zero
  - If wages rates are constructed by taking the ratio of annual earnings to annual hours, this leads to the "denominator bias". Thus, the negative correlation between measured hours and the ratio wage measure causes the wage coefficient to be underestimated.
- Need instruments to correct for the measurement error bias

Econometric Issues in Estimating the Static Model

- Wages are not observed for people who choose not to work, which leads to the problem of selection bias.
- Solutions:
    - Heckit
    - Control function approach
    - Explicitly modeling individual's participation decisions

Estimation Results on Labor Supply Elasticities for Males

- Saez, Slemrod, and Giertz (2009) states: "with some exceptions, the profession has settled on a value for the Hicksian elasticity close to zero".
- The mean value of the Hicksian elasticity across twenty-two studies reviewed in Keane (2011) is 0.31, which is large enough to generate substantial efficiency costs of taxation.
- Among the twenty-two studies, fourteen produce relatively low estimates and eight produce relatively high estimates (see the graph).
- There is no clear connection between the methods adopted and the estimation results obtained.

Estimation Results on Labor Supply Elasticities for Males

- Instead, the divergent results may be better explained by the data used:
  - Among the eight large value studies, six use a direct wage measure, and the other two correct for the denominator bias.
  - Eight of the fourteen use ratio wage measures, which may lead to downward biased estimates.
  - The mean value of the Hicksian elasticity among studies using direct wage measures is 0.43.
- Keane (2011) concludes that the consensus on a small Hicksian elasticity for males is not justified.

Estimation Results on Labor Supply Elasticities for Males

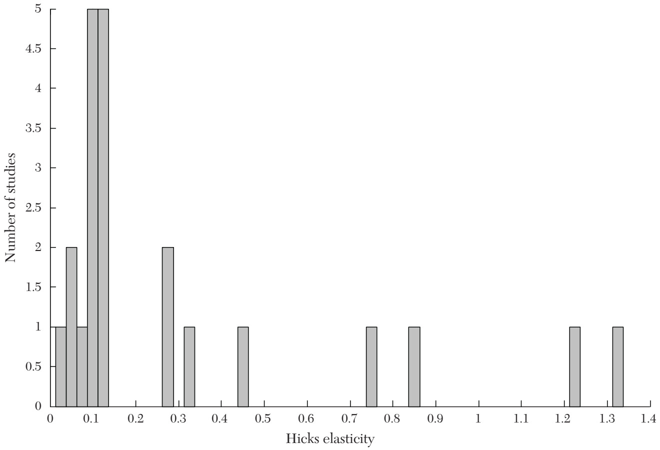


Figure 5. Distribution of Hicks Elasticity of Substitution Estimates

Estimation Results on Labor Supply Elasticities for Females

- Labor supply elasticity estimates for women are generally quite large.
- DCDP models give uniformly large long run elasticities ranging from 2.8 to 5.6.
- The life-cycle models of Heckman and MaCurdy (1982) and Kimmel and Kniesner (1998) give large Frisch elasticities: 2.35 to 3.05.
- Cogan (1980) give large Marshallian elasticity of 0.89.

Interesting Papers on Labor Supply

- Static models with semi-reduced form estimations: Blundell, Chiappori, Magnac and Meghir (2007) and Lise and Seitz (2011)
- Dynamic models with fully structural estimations: Keane and Wolpin (1997 and 2010) (See the other slides)

Extending the Unitary Labor Supply Model

- The standard unitary labor supply model has many limitations:
  - The income pooling assumption is rejected in many empirical literature (e.g. Thomas, 1990)
  - Cannot study intrahousehold allocation and within-household inequality
  - Policy makers are also interested in individual well-being
  - Need to study how changes in outside options would affect behaviors and welfare
- A collective framework modeling household joint decisions on labor market participation tends to address these limitations.

The Collective Model

- Use the framework in Blundell et al (2007)
- The collective model:

$$\max_{h^f, h^m, C^f, C^m} U^f[1 - h^f, C^f]$$

$$U^m[1 - h^m, C^m] \geq \bar{u}^m(w_f, w_m, y)$$

$$C = w_f h^f + w_m h^m + y$$

$$0 \leq h^f \leq 1$$

$$h^m \in \{0, 1\}$$

- $\bar{u}^m(w_f, w_m, y)$ is the level of utility member m can achieve given w_f, w_m, and y.

Solving the Collective Model

If Male Participates

- Conditional on male's participation:

$$U^m(C^m, 0) = \bar{u}^m(w_f, w_m, y)$$

- Invert the mapping $U^m(\cdot, 0)$ gives the **sharing rule:**

$$C^m = V^m[\bar{u}^m(w_f, w_m, y)] \equiv \Psi(w_f, w_m, y)$$

Solving the Collective Model

If Male Participates

- Thus member f 's optimization problem is:

$$\max_{h^f, C^f} U^f[1-h^f, C^f]$$

$$C^f = w_f h^f + y + w_m - \Psi(w_f, w_m, y)$$

$$0 \leq h^f \leq 1$$

- This gives female labor supply function conditional on male's participation:

$$h^f_W(w_f, w_m, y) = H^f[w_f, y + w_m - \Psi(w_f, w_m, y)]$$

- Thus an implication of the collective model is:

$$\frac{1-\Psi_{w_m}}{1-\Psi_y} = \frac{h^f_{w_m}}{h^f_y} = A(w_f, w_m, y) \tag{4}$$

Solving the Collective Model

If Male Doesn't Participate

- Conditional on male's non-participation:

$$U^m(C^m, 1) = \bar{u}^m(w_f, w_m, y) = V_m^{-1}(\Psi(w_f, w_m, y))$$

- Invert the mapping $U^m(\cdot, 1)$ gives the **sharing rule**:

$$C^m = W^m[V_m^{-1}(\Psi(w_f, w_m, y))] \equiv F(\Psi(w_f, w_m, y))$$

- f's utility maximization gives the female labor supply function conditional on male's non-participation:

$$h_N^f(w_f, w_m, y) = H^f[w_f, y - F(\Psi(w_f, w_m, y))]$$

- So the second implication of the collective model is:

$$\frac{-F'\Psi_{w_m}}{1 - F'\Psi_y} = \frac{h_{w_m}^f}{h_y^f} = B(w_f, w_m, y) \tag{5}$$

The Participation Decision

- The participation frontier, L, is characterized by:

$$\forall(w_f, w_m, y) \in L,\ \Psi(w_f, w_m, y) - F(\Psi(w_f, w_m, y)) = w_m$$

- Let $\gamma(w_f, y)$ be the reservation wage. So:

$$\Psi(w_f, \gamma(w_f, y), y) - F(\Psi(w_f, \gamma(w_f, y), y)) = \gamma(w_f, y)$$

- This gives two more implications of the collective model:

$$(\Psi_y + \gamma_y \Psi_{w_m}) = \frac{\gamma_y}{(1 - F')} \tag{6}$$

$$\Psi_{w_f} = \frac{\gamma_{w_f}}{\gamma_y} \Psi_y \tag{7}$$

Restrictions From the Collective Model

- Four restrictions from the collective model (Equations (4) - (7)):

$$\frac{1-\Psi_{w_m}}{1-\Psi_y} = \frac{h^f_{w_m}}{h^f_y} = A(w_f, w_m, y) \tag{8}$$

$$\frac{-F'\Psi_{w_m}}{1-F'\Psi_y} = \frac{h^f_{w_m}}{h^f_y} = B(w_f, w_m, y) \tag{9}$$

$$(\Psi_y + \gamma_y \Psi_{w_m}) = \frac{\gamma_y}{(1-F')} \tag{10}$$

$$\Psi_{w_f} = \frac{\gamma_{w_f}}{\gamma_y}\Psi_y \tag{11}$$

- The preferences and the sharing rules can be recovered up to an additive constant everywhere where $h_f > 0$.
- In Lise and Seitz (2011), the location of the sharing rule is identified by assuming that when husbands and wives have equal wages, they share resources equally.

Data

- The U.K. Family Expenditure Surveys from 1978 to 2001
- Households without children: males aged between 22 and 60; females aged between 35 and 60.
- Exclude self-employed
- Represent 10%-12% of the population of all households where the heads is 23-59 years old.

Main Findings
Female Labor Supply

TABLE 1

Restricted labour supply estimates

Female labour supply—restricted estimates				
	Male works		Male out of work	
Male wage	−0·50	0·48	2·64	2·46
Female log wage	7·36	1·70	9·00	8·17
Other income	−1·13	0·14	−2·01	0·38

Asymptotic standard errors in italics.

- The sign of the male wage effect on female labor supply changes with the husband's work status.
- The female wage effect is lower when the husband works than when the husband does not work.

Main Findings

Between and Within-Household Consumption Inequality

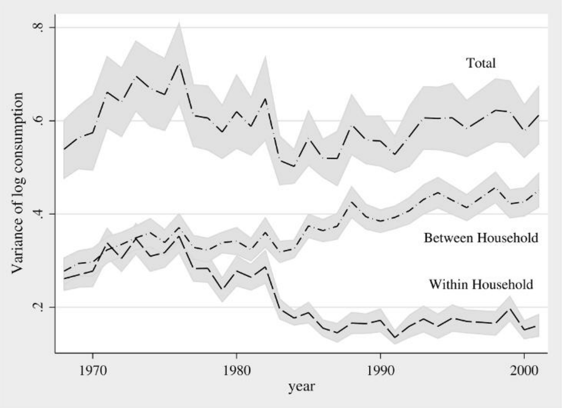


FIGURE 7

Total, between-, and within-household decomposition of trends in the variance of log consumption

Note: Own calculations from the FES. Shaded area represents ± two standard errors

References I

- Blundell, Richard, Pierre-Andre Chiappori, Thierry Magnac, and Costas Meghir. "Collective labour supply: Heterogeneity and non-participation." The Review of Economic Studies 74, no. 2 (2007): 417-445.
- Blundell, Richard, and Thomas MaCurdy. "Labor supply: A review of alternative approaches." Handbook of labor economics 3 (1999): 1559-1695.
- Cogan, John. "Fixed costs and labor supply." (1980).
- Killingsworth, Mark R., and James J. Heckman. "Female labor supply: A survey." Handbook of labor economics 1, no. 1 (1986): 103-204.
- Heckman, James J., and Thomas MaCurdy. "Corrigendum on a life cycle model of female labour supply." The Review of Economic Studies 49, no. 4 (1982): 659-660.

References II

- Keane, Michael P. "Labor supply and taxes: A survey." Journal of Economic Literature 49, no. 4 (2011): 961-1075.
- Keane, Michael P., and Kenneth I. Wolpin. "The career decisions of young men." Journal of political Economy 105, no. 3 (1997): 473-522.
- Keane, Michael P., and Kenneth I. Wolpin. "THE ROLE OF LABOR AND MARRIAGE MARKETS, PREFERENCE HETEROGENEITY, AND THE WELFARE SYSTEM IN THE LIFE CYCLE DECISIONS OF BLACK, HISPANIC, AND WHITE WOMEN*." International Economic Review 51, no. 3 (2010): 851-892.
- Kimmel, Jean, and Thomas J. Kniesner. "New evidence on labor supply:: Employment versus hours elasticities by sex and marital status." Journal of Monetary Economics 42, no. 2 (1998): 289-301.

References III

- Lise, Jeremy, and Shannon Seitz. "Consumption inequality and intra-household allocations." The Review of Economic Studies 78, no. 1 (2011): 328-355.
- Moffitt, Robert A. "Welfare programs and labor supply." Handbook of public economics 4 (2002): 2393-2430.
- Pencavel, John. "A cohort analysis of the association between work hours and wages among men." Journal of Human Resources (2002): 251-274.
- Saez, Emmanuel, Joel Slemrod, and Seth H. Giertz. "The elasticity of taxable income with respect to marginal tax rates: A critical review." Journal of Economic Literature 50, no. 1 (2012): 3-50.
- Thomas, Duncan. "Intra-household resource allocation: An inferential approach." Journal of human resources (1990): 635-664.