

The Microeconomic Analysis of Consumption, Savings and Labour Supply

Short Course, Northwestern University

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UCL & IFS,

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 - The final lecture will draw out some of the underlying ideas from Nemmers lecture which I have been asked to write up as a monograph.
- In this session I will run through the main ideas behind each of the Lectures I, II and III and pick out some of the key modelling challenges to be addressed in each case.

Lecture 0/I: Labour Supply Models and Policy Analysis

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- Collective Models and Family Labour Supply (maybe...).

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References from my webpage, including

- ① Blundell (2012, JEEA), empirical approaches.. lessons from Mirrlees.
- ② Blundell and Shephard (2012, REStud), microeconomic choice models and optimal design...
- ③ Blundell, Bozio and Laroque (2011, AER), the role of the extensive margin..
- ④ Blundell, Costa-Dias, Meghir and Shaw (2016, Econometrica), human capital and experience dynamics..
- ⑤ Blundell, Chiappori, Magnac and Meghir (2007, REStud), collective models with heterogeneity.

Developing the empirical foundations for policy reform & design.

Reflecting on the *Mirrlees Review*, consider the role of evidence loosely organised under five headings:

- 1 Key margins of adjustment.
- 2 Measurement of effective incentives.
- 3 The importance of information and complexity.
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- Draw from experience in the evaluation of labour supply and tax policy.

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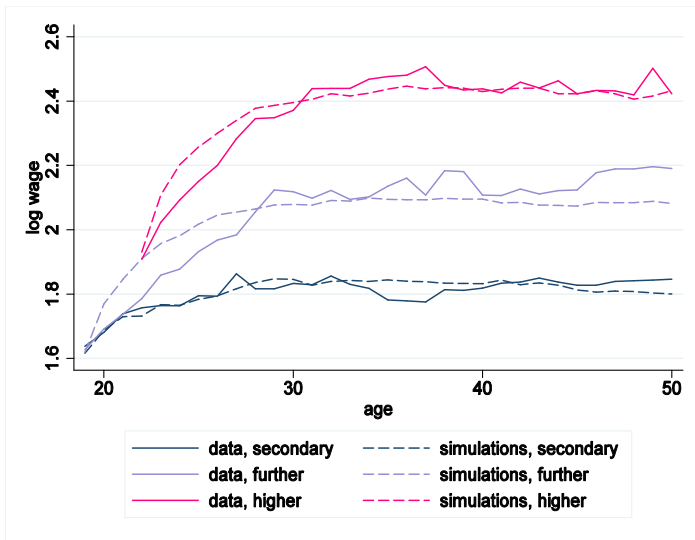
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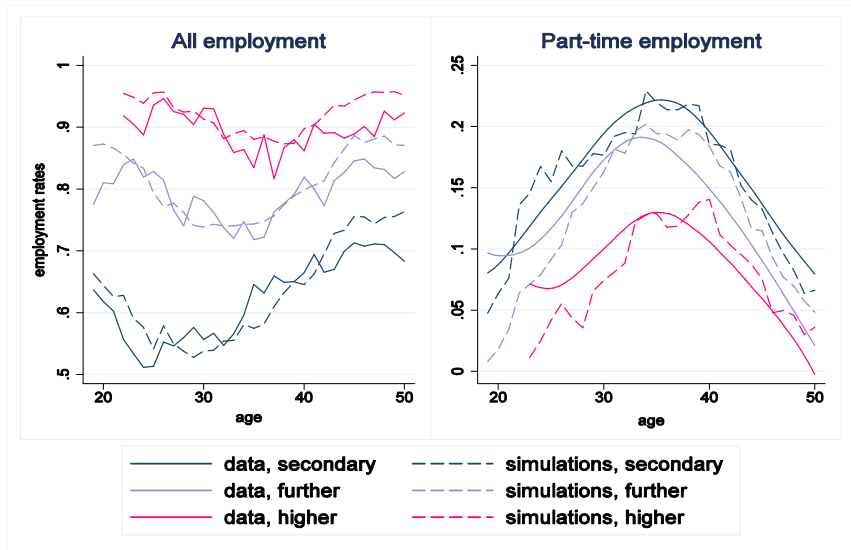
Some key facts about wages, employment and hours....

Average Log Wages of Women by Age



Notes: UK Women, BHPS. Source: Blundell, Dias, Meghir and Shaw (2016)

Female Labour Market Attachment and Part-time Work



Notes: UK Women, BHPS. Source: Blundell, Dias, Meghir and Shaw (2016)

Some key facts

- **A lifetime view of employment and hours**
 - differences by *extensive and intensive* margin accentuated at particular ages and for particular demographic groups,
 - higher attachment to the labor market for higher educated, career length matters, see also Blundell, Bozio and Laroque (2011).
- **Wages grow stronger and longer over the lifetime for higher educated**
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 - return to this later in the lecture.
- Also motivates the analysis of intertemporal labor supply, human capital and experience dynamics...explore more in Lecture I but first run through some of the key modelling challenges to be addressed in the lectures.

Lecture I: Intertemporal Labor Supply, Human Capital and Experience Dynamics.

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- Estimate on household panel data with linked family histories.
- One key challenge is identifying and precisely estimating the role of human capital investments in the pay-off to current employment, - dealing with selection and assessing the importance of complementarities. For example, the structural wage equation...

Wage equation embedded in a dynamic choice model

Consider the following 'structural' wage equation: for woman ' i ', age ' t ', in each birth cohort; with school level ' s ', experience ' e ', labour supply ' l ',

$$\ln w_{sit} = \ln W_{sit} + \gamma_{si} \ln(e_{sit} + 1) + v_{sit} + \xi_{sit}$$

$$v_{sit} = \rho_s v_{sit-1} + \mu_{sit}$$

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- γ_{si} varies with schooling level s and family background factors x_i
- v_{sit} persistence of shocks - distinguish heterogeneity from state-dependent experience effects. ζ_{sit} is a transitory shock.
- correlation of initial permanent shock with preferences heterogeneity.
- concave profile of experience effects that differs by schooling level and background factors.
- $g_s(l_{sit})$ set to unity for full-time $g_s(FT) = 1$, the part-time experience value $g_s(PT)$ is estimated.
- δ_s depreciation of human capital - cost of not working.

- Adopt a structural dynamic panel data approach:
 - using the time series of tax, tax credit, welfare benefit and tuition reforms for new cohorts of women to identify parameters,
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- Use to evaluate the impact, and design, of earned income tax credits

Lecture II: Consumer Behaviour and Revealed Preference

- Models of Consumer Behaviour and Welfare Measurement.
- Rationality and Revealed Preference.
- Heterogeneity and the Distribution of Counterfactual Demands.
- Taste Change and (environmental) Quality Change.
- What next for the microeconometrics of RP?

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References from my webpage, including

- Blundell, Browning and Crawford [BBC1, 2] (Ecta 2003, 2008)
- Blundell, Horowitz and Parey [BHP1, 2] (QE 2013, REStat 2016)
- Blundell, Kristensen and Matzkin [BKM1, & 2] (JoE 2014, WP 2017)
- Blundell, Browning, Crawford, Vermeulen [BBCV] (AEJ-Mic 2015)
- Adams, Blundell, Browning and Crawford [ABBC] (IFS-WP, 2016)
- Blow and Blundell [BB] (ERE, 2017)

Rationality and Revealed Preference

- 'Modern' RP analysis takes a nonparametric approach. To quote McFadden: “parametric models interpose an untidy veil between econometric analysis and the propositions of economic theory”.
- Inequality restrictions from revealed preference are used to assess rationality and to improve the estimation of demand responses.

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- There were two early criticisms of the empirical application of revealed preference theory to consumer behaviour:
 - when it **does not reject**, it doesn’t provide precise predictions; and
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 - when it **does not reject**, it doesn’t provide precise predictions; and
 - when it **does reject**, it doesn’t help us characterize the nature of irrationality or the degree/direction of changing tastes.
- We will see that recent developments in the microeconomic application of revealed preference have rendered these criticisms unfounded. For example, the use of expansion paths....

Figure 1a: RP Rejection

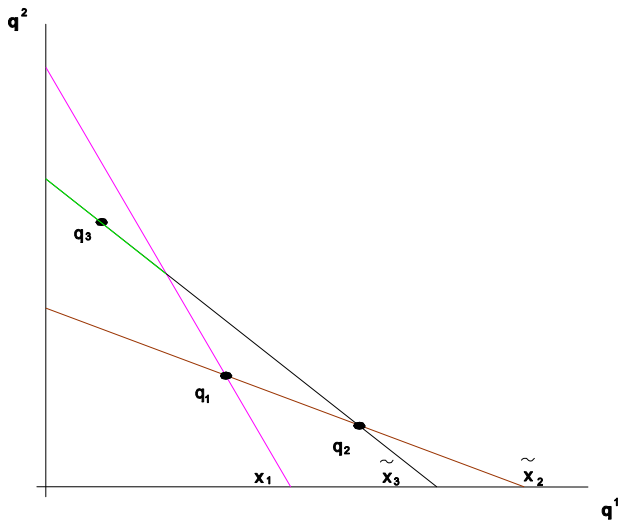


Figure 1a: RP Rejection?

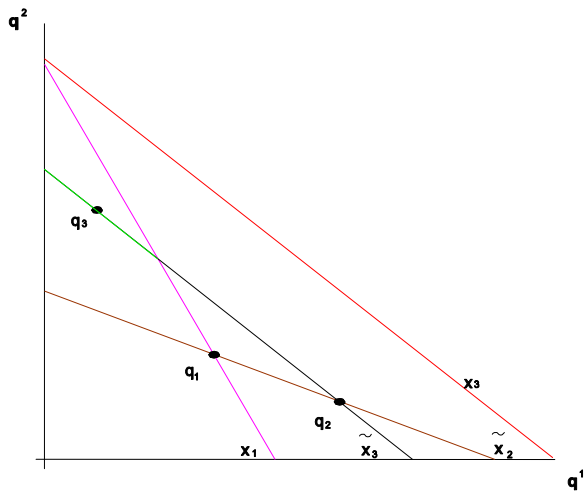
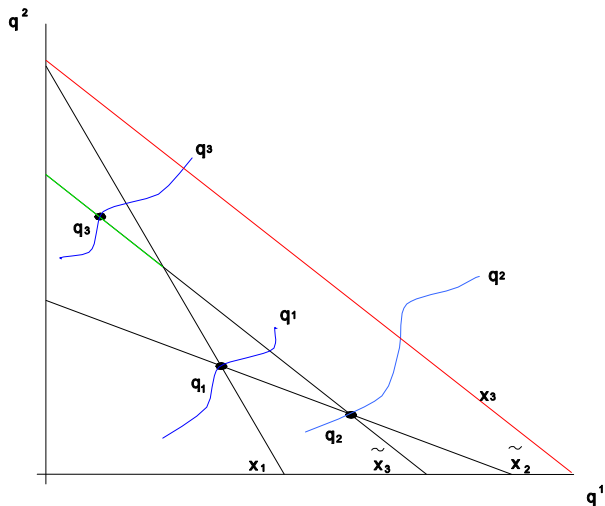


Figure 1b: Using Expansion Paths



- The analysis extends to..
 - Labor supply and nonlinear taxation,
 - Collective choice,
 - Habits,
 - Intertemporal choice,
 - Characteristics models.

Challenges to address:

- The [Afriat-Diewert-Varian Theorem](#) allows us to characterise 'well behaved' preferences through a set of inequalities on observed behaviour $(\mathbf{p}^t, \mathbf{q}^t)$,
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- How do we incorporate unobserved individual heterogeneity?
 - Assume every consumer is characterised by unobserved heterogeneity (ε) and responds to a given budget (\mathbf{p}, \mathbf{x}) , with a unique, positive J -vector of demands $\mathbf{q} = \mathbf{d}(\mathbf{p}, \mathbf{x}, \varepsilon)$, and assume conditions on preferences that ensure invertibility in ε ,
 - with $J > 2$, new results on multiple goods with nonseparable heterogeneity, for $J = 2$ invertibility is equivalent to monotonicity in ε .

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- Also ask - how can we account for taste change?

Lecture III: Consumption Smoothing and Partial Insurance

- Panel Data Models of Earnings Dynamics.
- The Relationship Between Earnings Dynamics and Consumption Inequality.
- Consumption Inequality and Mechanisms of Partial Insurance.
- Nonlinear Models of Income Persistence and Consumption Dynamics.
- The Role of Time Use and Family Labor Supply.

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References from my webpage, including

- Blundell, Pistaferri & Preston[BPP], partial insurance.... (*AER*, 2008)
- Blundell, Low & Preston[BLP], decomposing income risk... (*QE*, 2013)
- Blundell, Graber & Mogstad[BGM], social insurance.. (*JPubE*, 2015; 2017)
- Arellano, Blundell & Bonhomme[ABB], nonlinear persistence.... (*Ecta*, 2017)
- Blundell, Pistaferri & Saporta-Eksten[BPS1,2], family labor supply.... (*AER*, 2016; *JPE*, 2017)

Some (three!) key challenges:

- 1 Consumption measurement.
- 2 Modelling the distributional dynamics of income.
- 3 Integrating family labour supply and the tax and welfare-benefit system.

1. New data on consumption...

I. **Administrative linked data:** e.g. Norwegian population register.

- Linked registry databases with unique individual identifiers, e.g. every Norwegian from 1967 to 2006.
 - Detailed demographic and socioeconomic information (market income, cash transfers). Recent links to real estate and assets; and to hours of work. Develop new consumption measurements.
- Family identifiers allow to match spouses and children.
 - see [Blundell, Graber and Mogstad \(2015\)](#).

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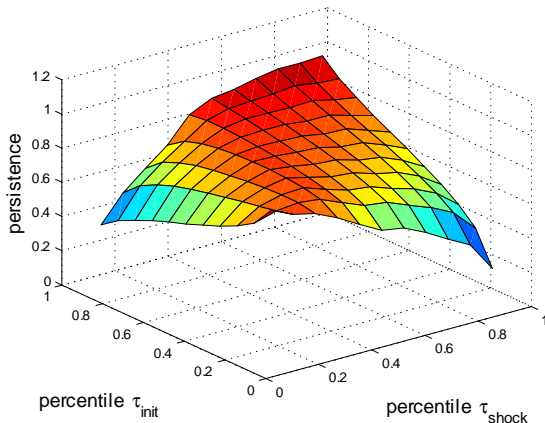
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II. **Newly designed panel surveys:** e.g. PSID since 1999.

- Collection of consumption and assets had a major revision in 1999
 - 70+% of consumption expenditures. Good match with NIPA. The sum of food at home, food away from home, gasoline, health, transportation, utilities, clothing etc.
- Earnings and hours for all earners; Assets measured in each wave.
 - see Blundell, Pistaferri and Saporta-Eksten (2016).

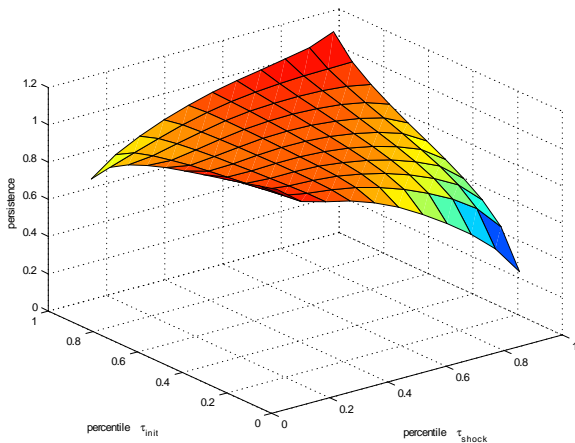
2. Nonlinear Persistence

Nonlinear Persistence in the PSID



Notes: Pre-tax household labor earnings, Age 30-60 1999-2009 (US). Estimates of the average derivative of the conditional quantile function.

Nonlinear Persistence in the Norwegian Register Data



Notes: Norwegian Population Register, Family Earned Income. Estimates of the average derivative of the conditional quantile function.

Nonlinear Persistence and Unusual Shocks...

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- And delivering a new measure of **nonlinear persistence**.
- The final lecture will use this new nonlinear framework to explore **the complete distributional dynamics of income**,
- and then **the implications for consumption and savings decisions....**

3. Family Labour Supply and Consumption Smoothing?

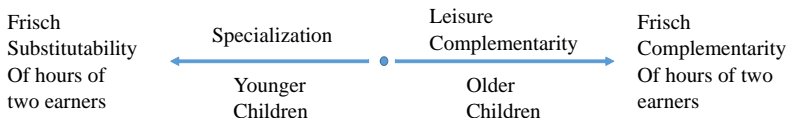
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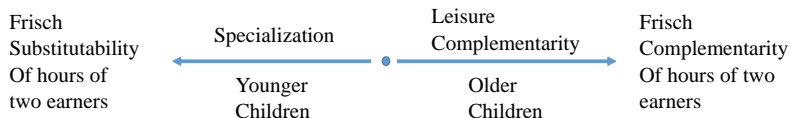
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- When wealth effects are present (Marshallian elasticities): added worker is defined by adjustments in family labor supply as insurance against permanent shocks to spouses earnings.

Finish this introductory part of these by returning to some observations on the empirical foundations for policy reform & design.

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- ③ The importance of information and complexity.
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- Drawing from experience in the evaluation of earnings tax policy.
- Headings 4 and 5 lead in to Lecture I.

1. Key margins. . . .

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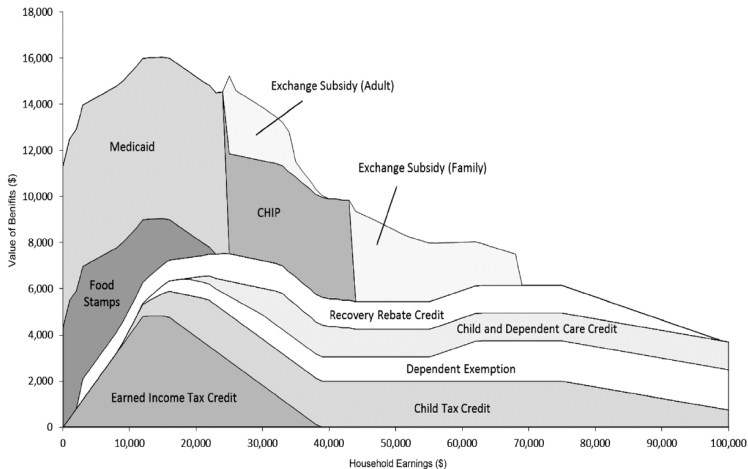
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 - human capital profiles in work appear to be complementary to education investments.
- **The extensive – intensive distinction is important for a number of reasons: The size of extensive and intensive labor supply responses are key parameters for earnings tax design, Saez (2002), Laroque (2005),...**
- A 'large' extensive elasticity at low earnings can 'turn around' the impact of declining social weights, implying a higher optimal transfer to low earning workers than to those out of work - *earned income tax credits*, see Blundell and Shephard (2012).

2. Measurement of effective incentives

- Precisely how do tax and welfare-benefit policies impact on the incentives?
- Requires detailed institutional knowledge.
- e.g. overlapping taxes, tax credits and welfare benefits.
 - What are the effective tax rates?
 - What is the 'treatment' effect in quasi-experimental analyses?

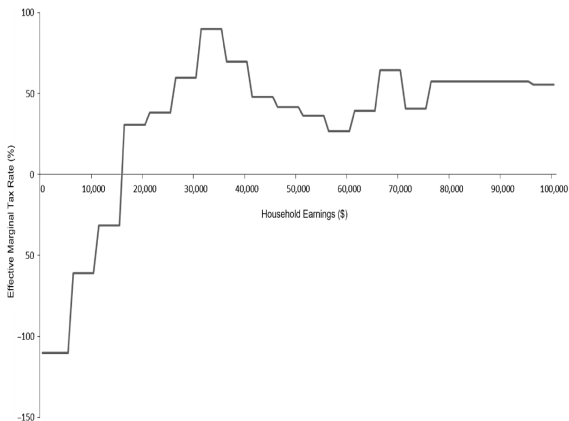
Universally Available Tax and Transfer Benefits (US Single Parent with Two Children, 2008)



Source: Urban Institute (NTJ, Dec 2012).

Notes: Value of tax and value transfer benefits for a single parent with two children.

Impact on Effective Marginal Tax Rates (US Single Parent with Two Children, 2008)

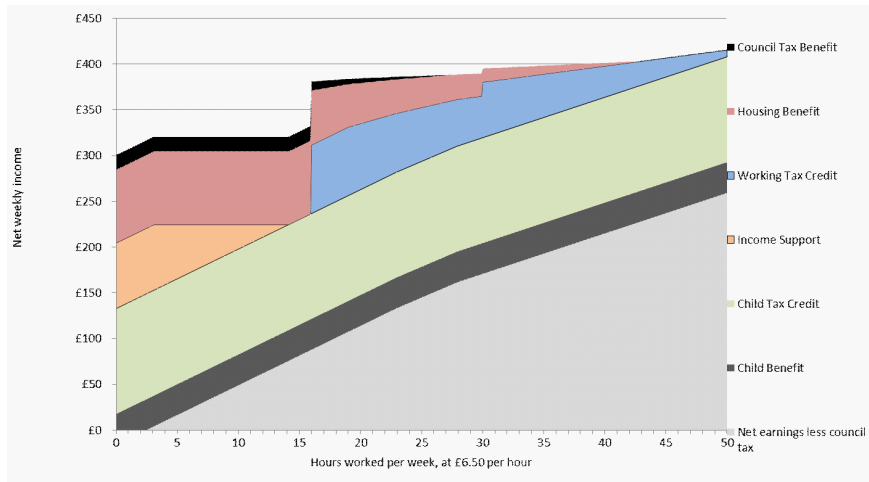


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Notes: Value of tax and value transfer benefits for a single parent with two children.

The interaction of WFTC with other benefits in the UK

Example: Budget Constraint for Single Parent



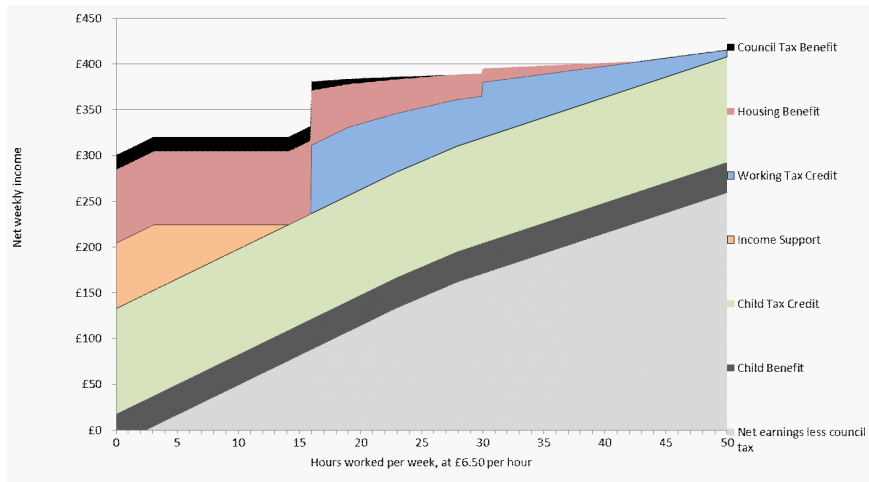
Source: Mirrlees Review (2011)

3. The importance of information and complexity

- How is policy likely to be understood by the agents involved?
- For example, how 'salient' are the various tax and welfare benefit incentives?
 - 'Take-up' of welfare and tax credits among eligible families.
 - 'Bunching' at kink points.

The interaction of WFTC with other benefits in the UK

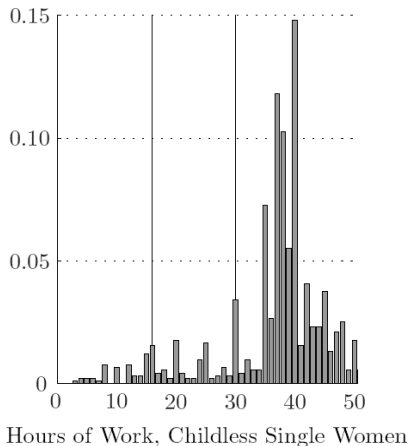
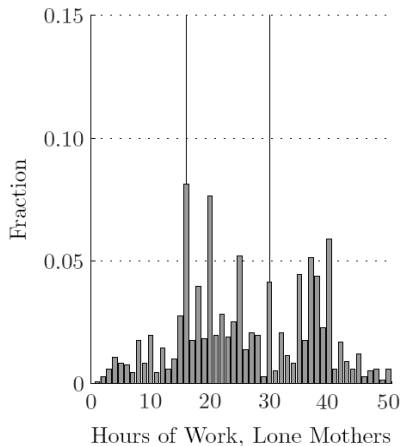
Example: Budget Constraint for Single Parent



Source: Mirrlees Review (2011)

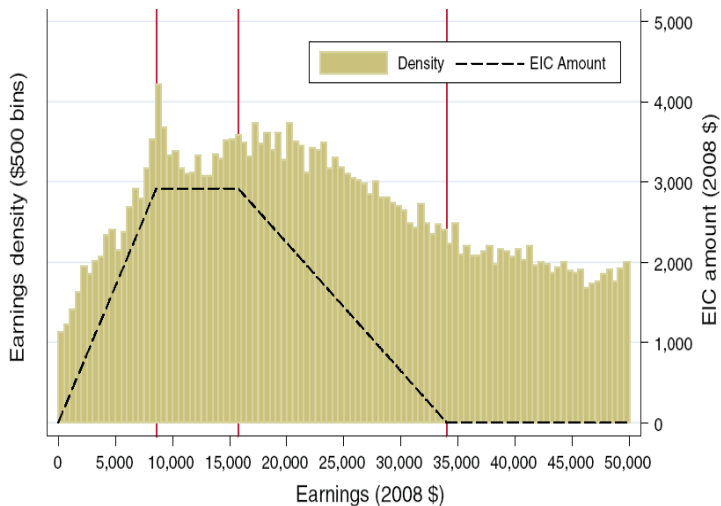
Are the hours rules in the UK tax credit system salient?

Single Women (aged 18-45), 2002



Source: Blundell and Shephard (2012)

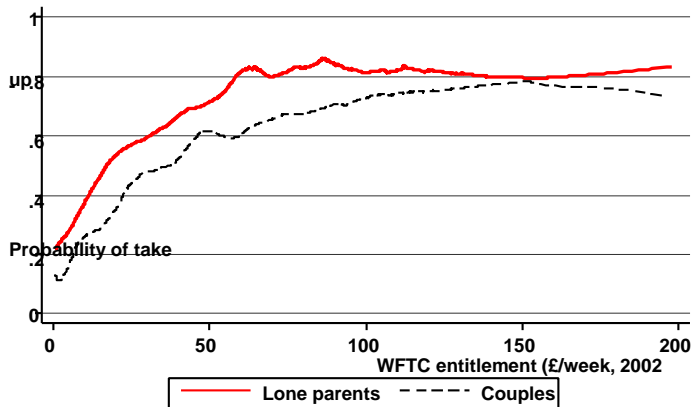
Bunching at EITC kink points in the US?



Source: Saez (2010)

Variation in tax credit 'take-up' with value of entitlement

Example: Budget Constraint for Single Parent



Source: Mirrlees Review (2011)

4. Evidence on the size of responses

This is where the microeconomic analysis comes into play. Eclectic mix of two approaches.

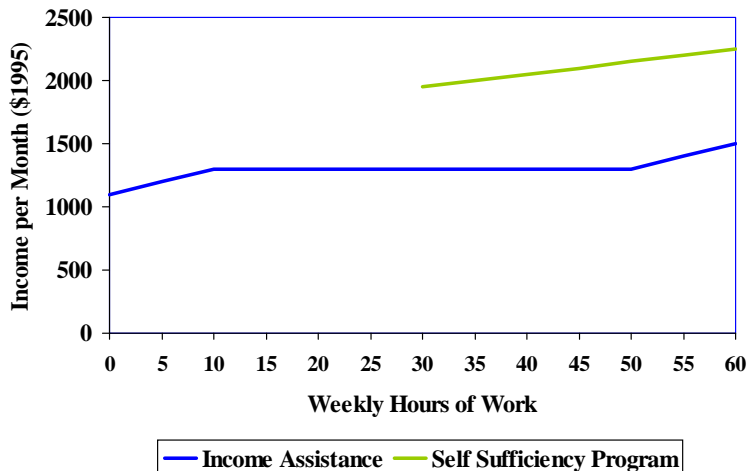
- ① RCT/RD/diff-in-diff (typically) quasi-experimental evaluations of the impact of specific reforms/treatments
 - 'robust' but limited/local in scope.
 - ② A 'structural' estimation based on revealed preference theory/ choice pay-offs and constraints
 - comprehensive in scope,
 - allows counterfactual policy simulation and policy design (step 5), but 'fragile',
 - needs to account for facts (step 1), effective tax rates (step 2), and salience/stigma (step 3).
- A strong complementarity between both approaches... e.g.
 - RCT in Canada...

Randomised-Control experimental design:

- Do financial incentives encourage work among low skilled lone parents?
- The aim was to encourage employment among welfare recipients, specifically single parents on welfare
 - 50% earnings supplement – as a tax credit
 - at least 30 hours per week job
 - On earnings up to an annual limit of \$36000
- provided to the individual, not the employer, as in EITC & WFTC.

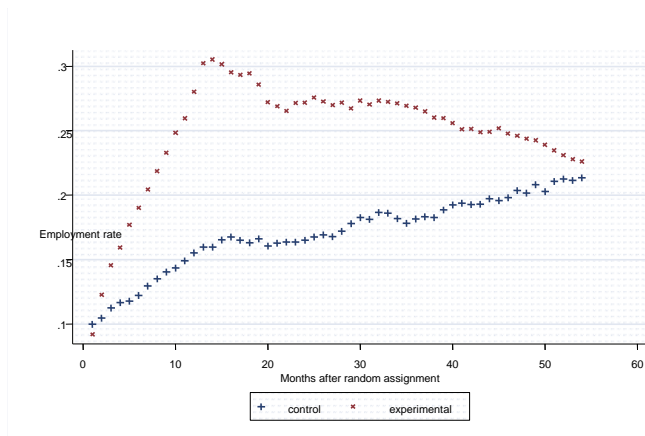
Canadian Self Sufficiency Program

Budget Constraint for a Single Parent on Minimum Wage



Canadian Self Sufficiency Program

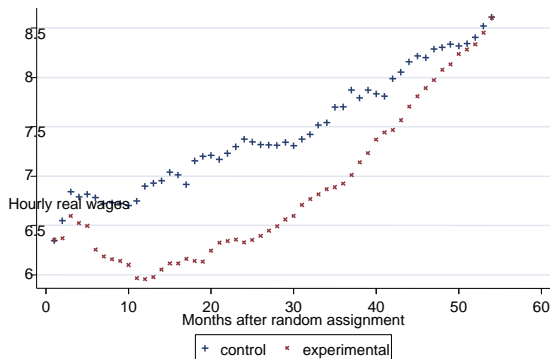
Employment Rate of single mothers by months after RA



Source: Blundell and Moffitt (2010)

Canadian Self Sufficiency Program

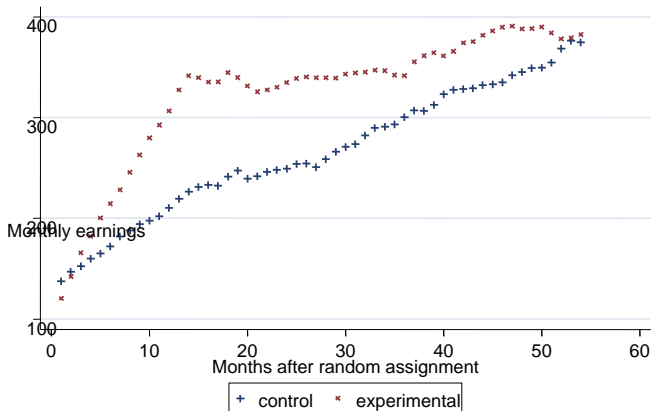
Hourly wages by months after RA



Source: Blundell and Moffitt (2010)

Canadian Self Sufficiency Program

Monthly earnings by months after RA



Source: Blundell and Moffitt (2010)

Key elements of a baseline structural labor supply model, Blundell and Shephard (2012)

- 1 budget constraint - tax/tax-credit and benefit interactions.
- 2 preferences - multinomial choice across discrete hours.
- 3 heterogeneity - observed demographics; unobserved heterogeneity.
- 4 fixed costs of work - observed and unobserved heterogeneity, again.
- 5 stigma/hassle costs - take-up versus eligibility; unobs het.
- 6 childcare use and price - key 'quasi-fixed costs' of work.
- 7 restrictions on choice sets - e.g. 'consideration set' models, work with Guy Laroque.

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 - 7 restrictions on choice sets - e.g. 'consideration set' models, work with Guy Laroque.
- Leads naturally to the structural model of labour supply in Lecture 1.
 - Generalise the baseline model to incorporate human capital decisions and experience dynamics.

But first a cautionary note from Frisch (1933!)

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- If we are not to get lost in the overwhelming, bewildering mass of statistical data that are now becoming available, we need the guidance and help of a powerful theoretical framework. Without this no significant interpretation and coordination of our observations will be possible.

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- ...[S]o long as we confine ourselves to statements in general terms about one economic factor having an 'effect' on some other factor, almost any sort of relationship may be selected, postulated as a law, and 'explained' by a plausible argument."

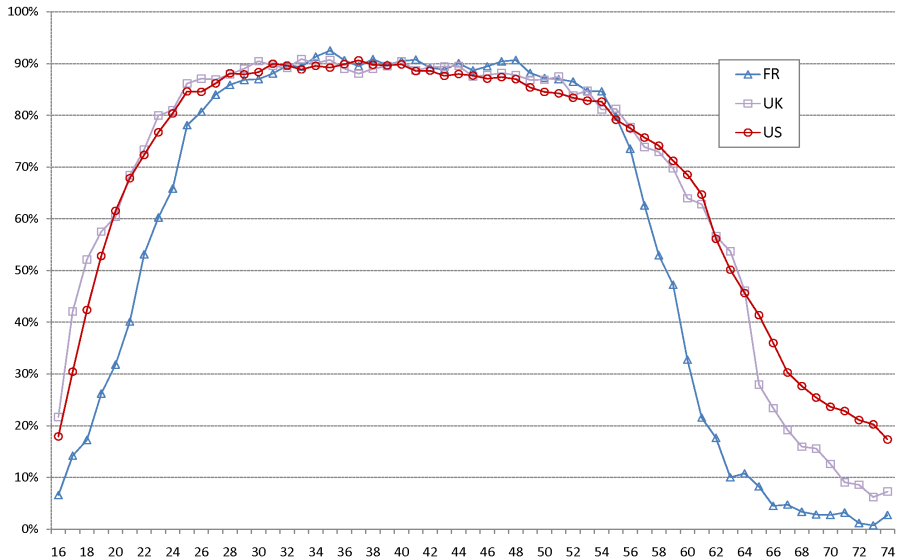
Outline of the rest of the Lectures...

- Explore empirical approaches to the analysis of consumption, savings and labour supply.
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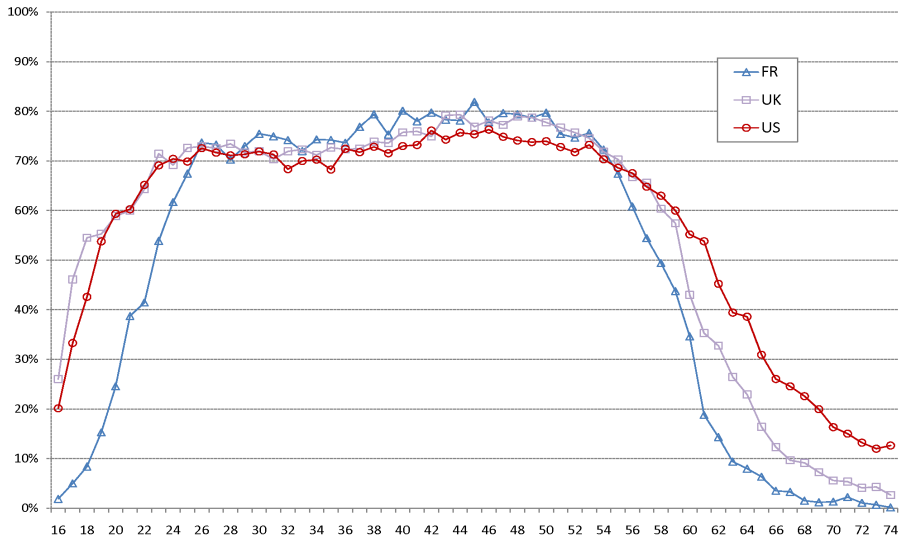
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- References on my website: <http://www.ucl.ac.uk/~uctp39a/>

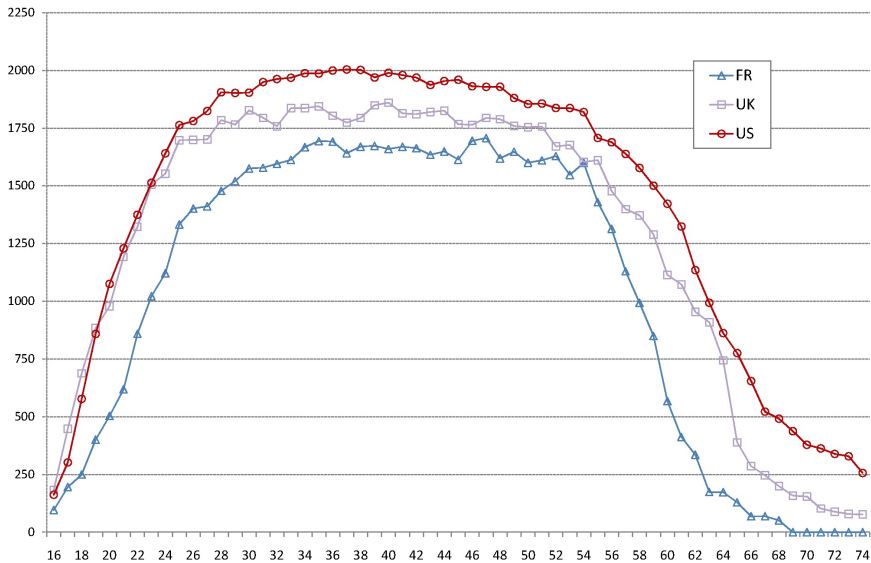
Male Employment by Age in 2007 (Source: Blundell, Bozio and Laroque AER 2011, FS 2013)



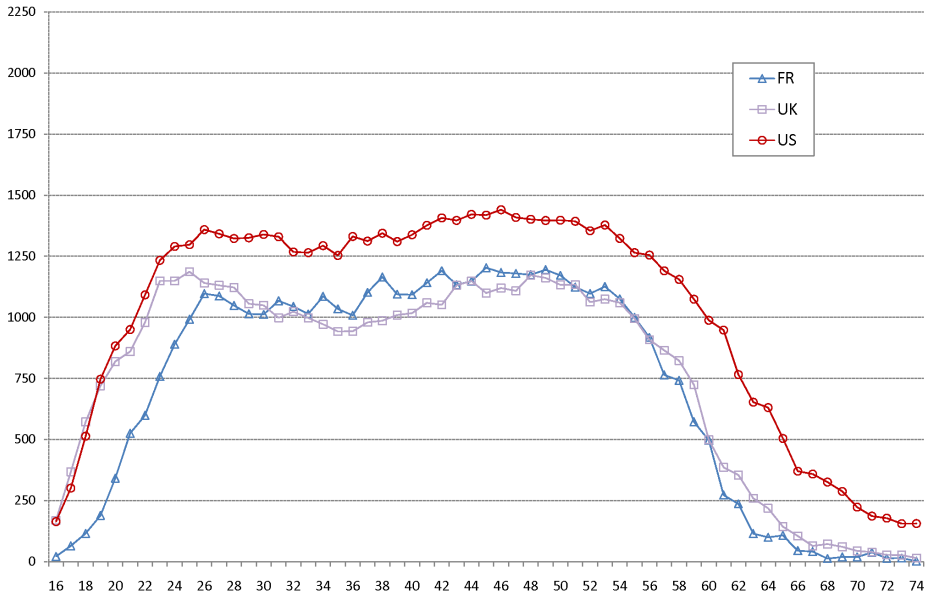
Female Employment by Age



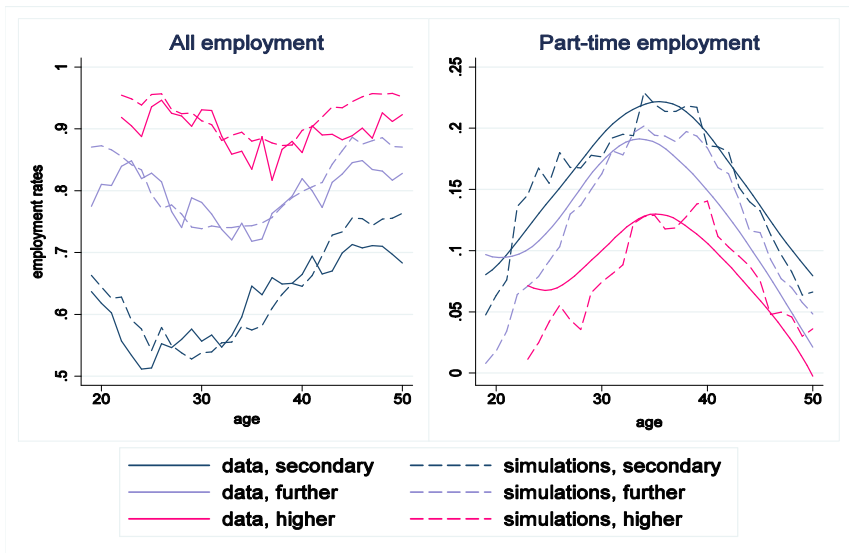
Male Annual Hours by Age



Female Annual Hours by Age

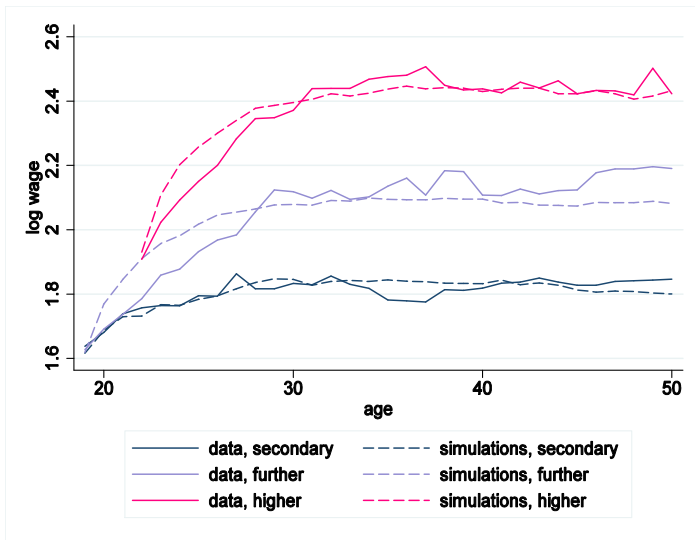


Female Labour Market Attachment and Part-time Work



Notes: UK Women. Source: Blundell, Dias, Meghir and Shaw (2016)

Average Log Wages of Women by Age



Notes: UK Women, BHPS. Source: Blundell, Dias, Meghir and Shaw (2016)