

# Earned Income Tax-Credit Reform:

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## Impact and Optimality

*IIPF Maastricht*

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(based on joint work with Andrew Shephard, IFS WP 08/01)

# Earned Income Tax-Credit Reform

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- Here we look at both the *impact* and the *optimal design*
- Two questions:
  - How should we measure the impact of tax and tax-credits on work decisions?
  - How should we assess the optimality of tax and tax-credit proposals?
- Feed in to the: *The Mirrlees Review*
  - Reforming the Tax System for the 21st Century  
<http://www.ifs.org.uk/mirrleesreview>

# Summary

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- An analytical framework is developed that allows explicitly for an extensive margin in work choices and also the partial observability of hours of work.
- The analysis is based on a structural labour supply model which incorporates unobserved heterogeneity, fixed costs of work and the detailed non-convexities of the tax and transfer system.
- The results lend support for the broad structure of the British tax credit reforms.
- However, they also provide a strong case for a further reduction of marginal rates for lower earners with a focus on hours conditions and age conditions.

# Some Related Literature

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- The design of tax and transfer systems has increasingly focused on the use of work conditions:
  - Beaudry, Blackorby and Szalay (2006), Besley and Coate (1992), Chone and Laroque (2005), Laroque (2005), Moffitt (2006), Phelps (1994) and Saez (2002).
  - Immervol et al.(2006) implement Saez (2002) and find tax-credits as optimal for a wide set of economies.
  - As part of the Mirrlees Review; Brewer, Shephard and Saez (2008) also apply this approach.
- This lecture will focus on the robustness of the empirical specification and look deeper at: *work conditions, hours-of-work conditions and age conditions*

## An Analysis in Two Steps

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- The first step is a positive analysis of household work decisions. There are two empirical approaches - both prove useful:
  - (a) A ‘quasi-experimental’ evaluation of the impact of historic reforms
  - (b) A ‘structural’ estimation of individual behaviour based on a general discrete choice model with unobserved heterogeneity
- The second step is the normative analysis or optimal policy analysis

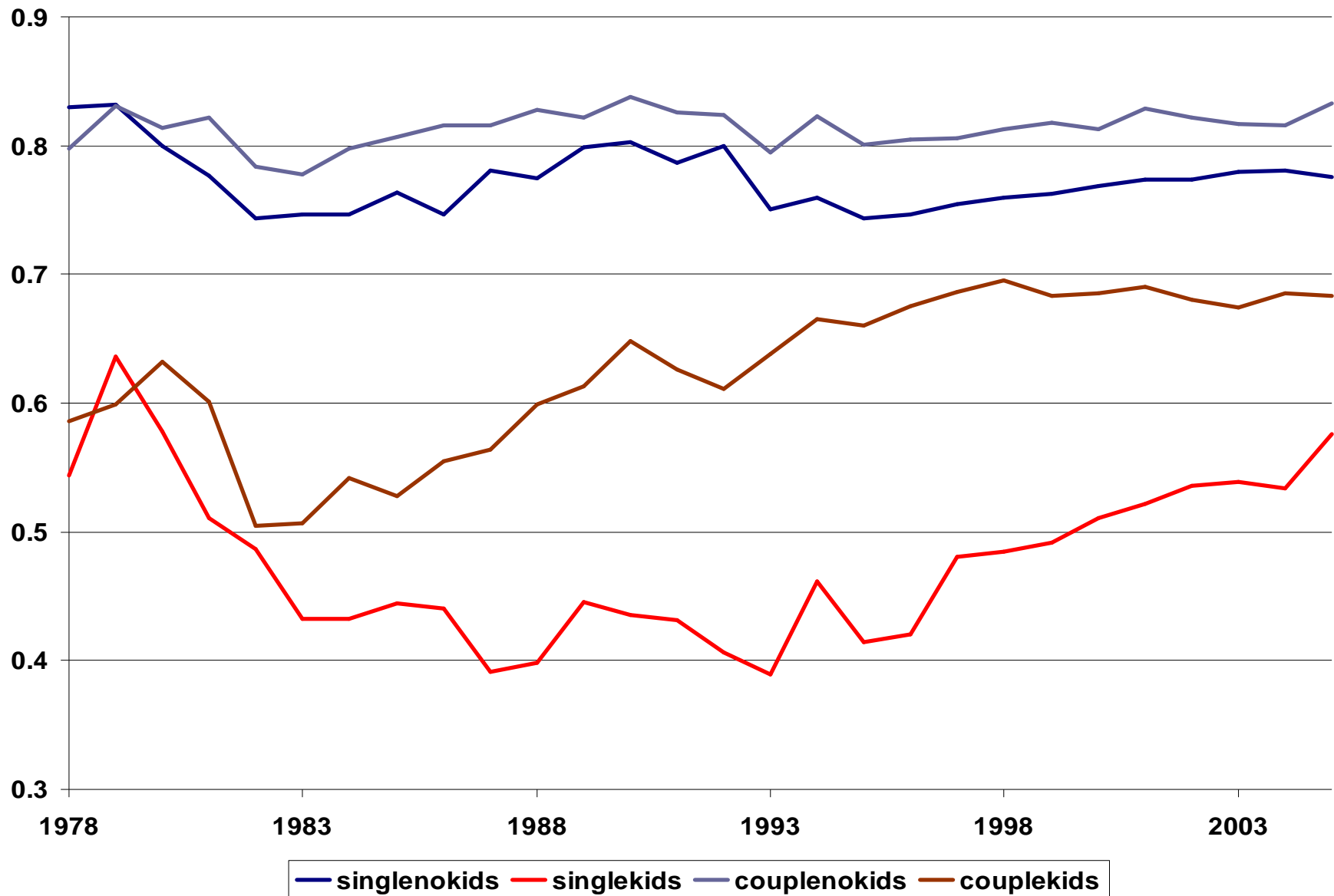
# Setting the Scene

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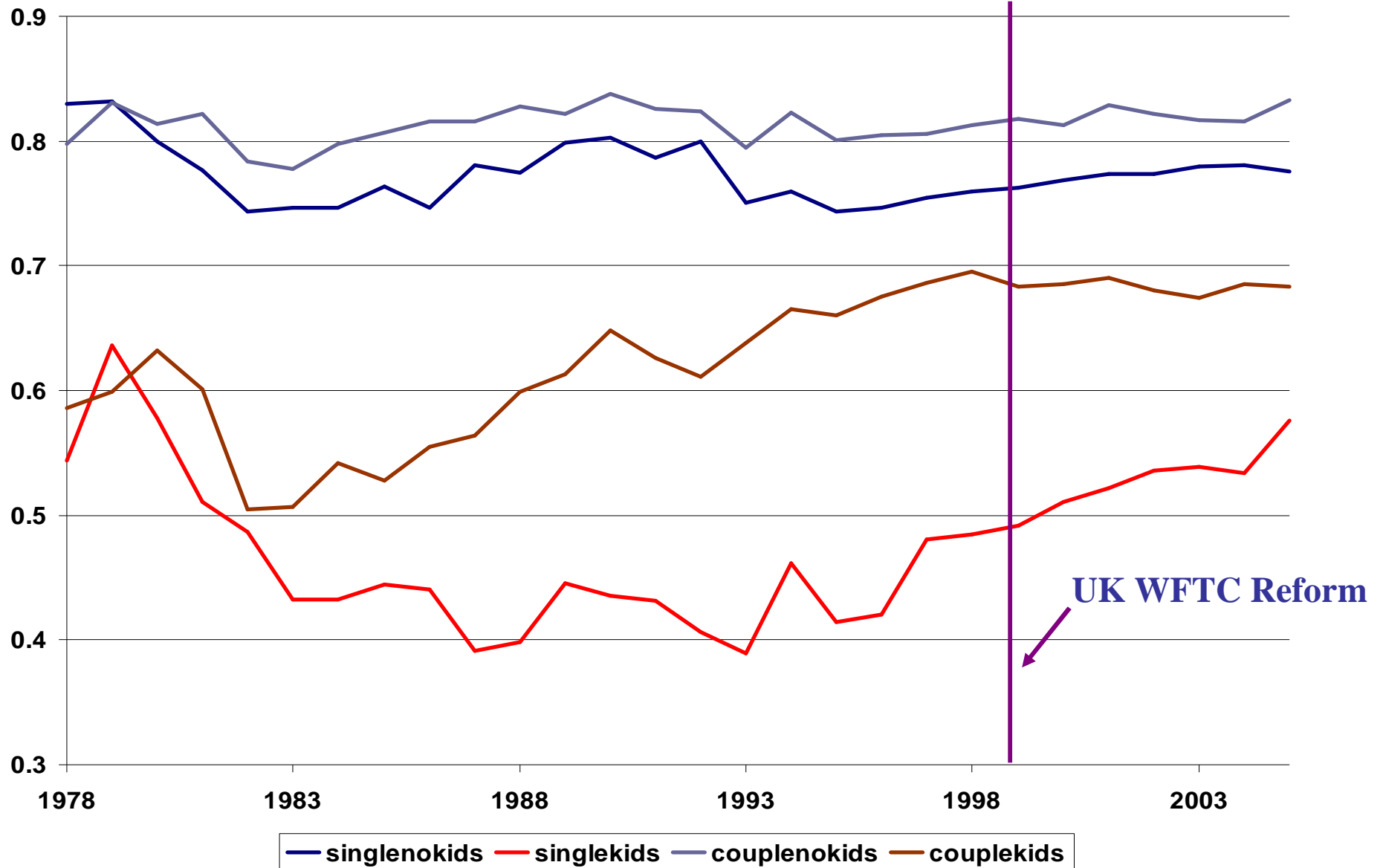
The policy issues:

- declining labour market attachment and low wages of lower skilled workers
  - young low educated
  - older low skilled
  - low income families
- growth in child poverty
- UK reforms of the late 1990s

# Employment Trends for UK Women: 1978-2005



# Employment Trends for UK Women: 1978-2005



# Key Policy Comparisons

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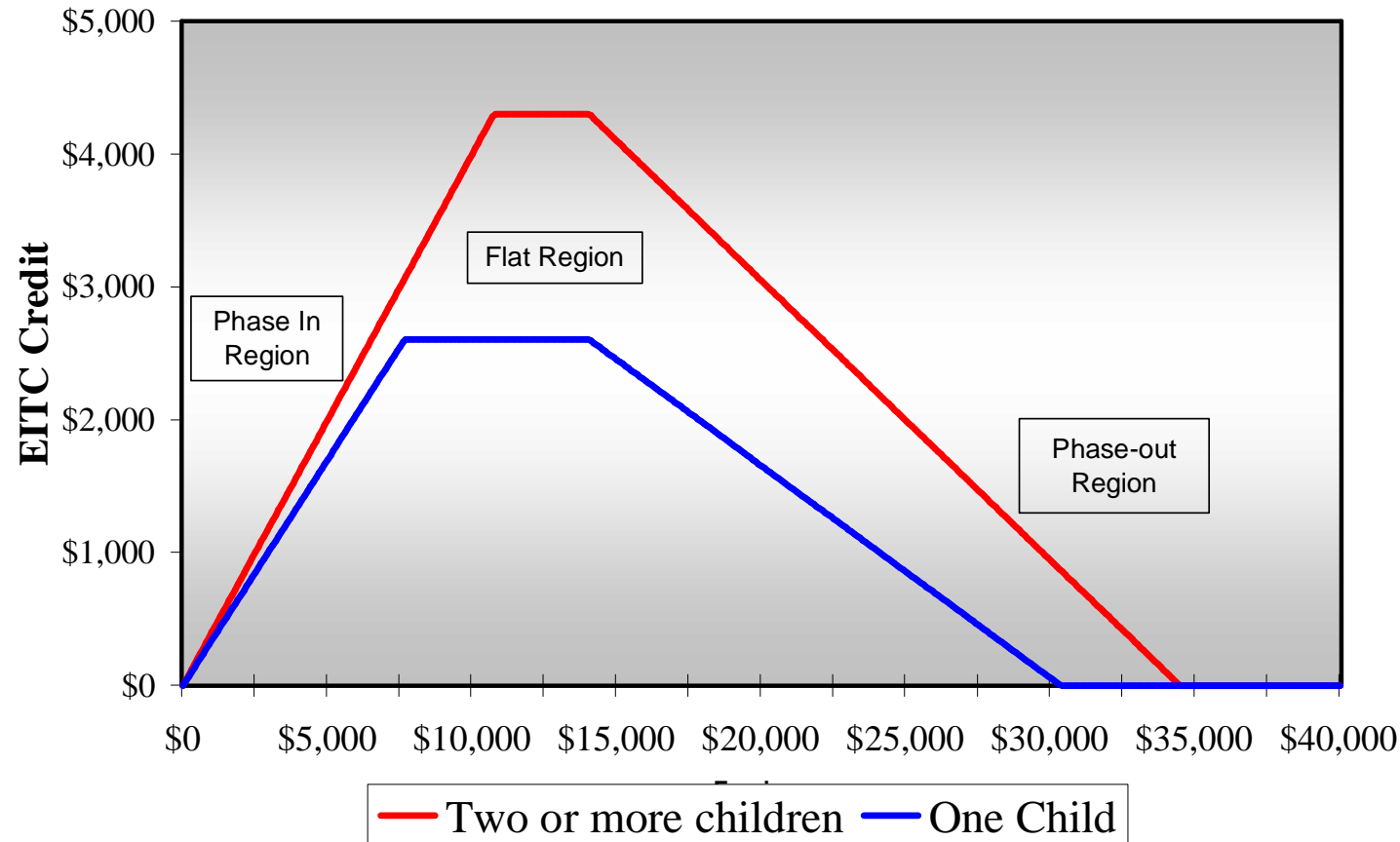
- Three related tax-credit reforms and designs I want to examine:
  - The FC/WFTC reform(s) in the UK
  - The EITC reform(s) in the US
  - The SSP (randomised) experiment in Canada

## General form of Earned Income Tax Credits

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- Credit depends on *earnings* and *number of children*:
  - Phase-in: credit is flat percentage of earned income or jump in at minimum hours threshold
  - Flat range: receive maximum credit
  - Phase-out: credit is phased out at a flat rate
- Credit based on *family* earnings
  - Creating ‘interesting’ incentives among couples

# EITC Schedule in US – Single Parent Families, 2004



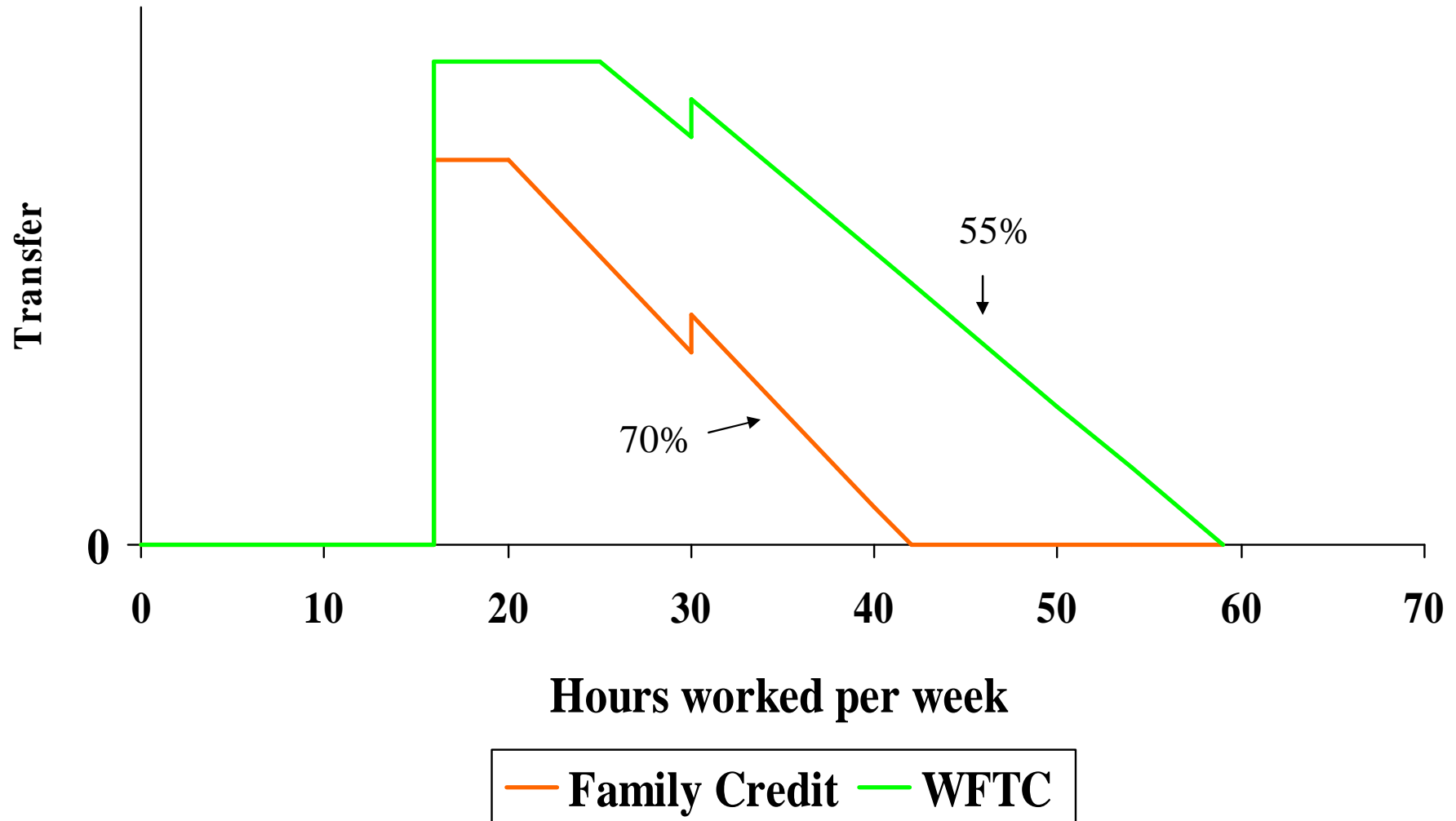
Ø Larger credit, covering higher earners for families with two or more children.

# The WFTC

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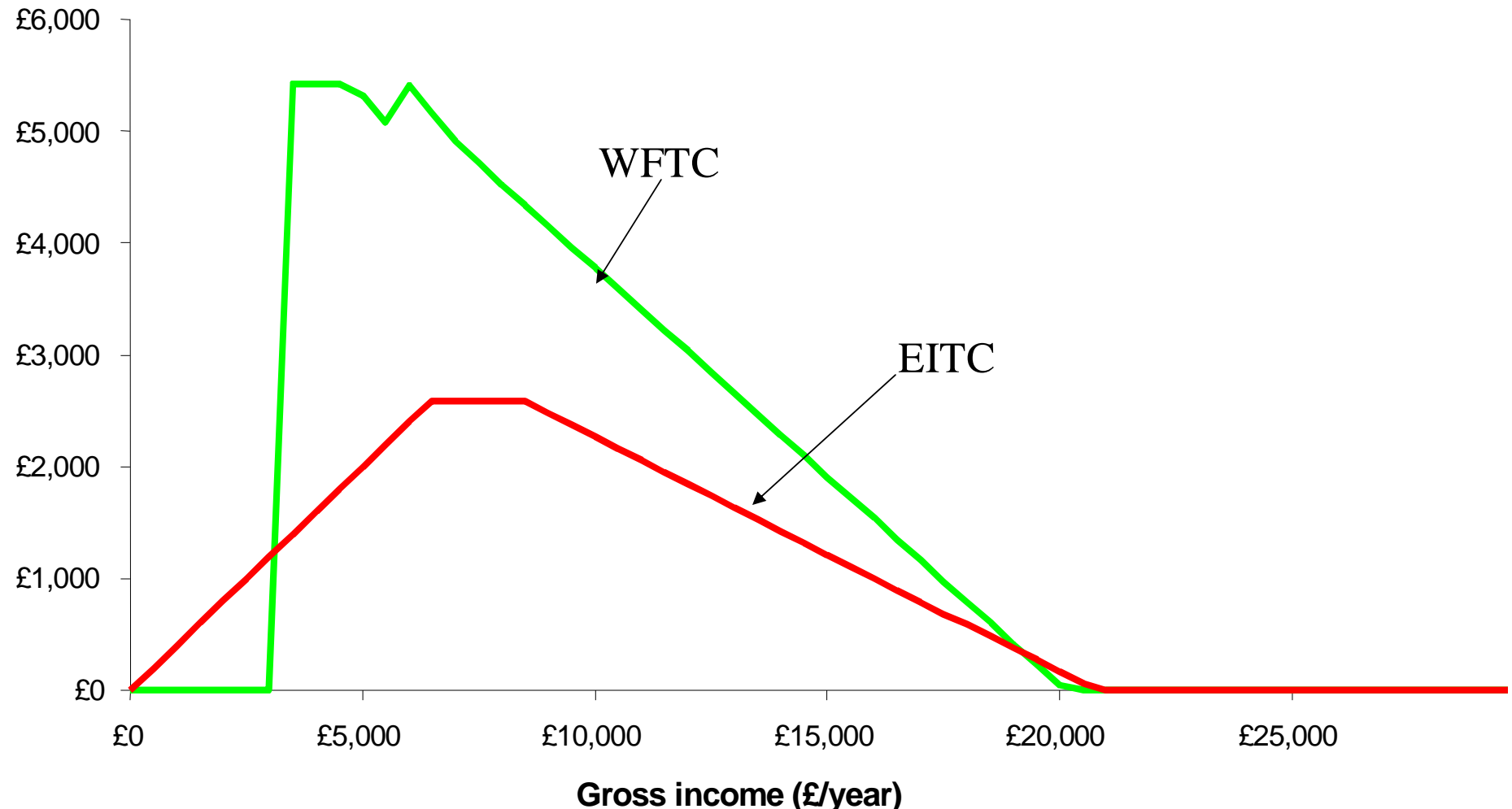
- introduced in Spring 2000
- hours of work condition
  - 16 or more hours per week
- family eligibility
  - children (in full time education or younger)
- income eligibility
  - family net income below a certain threshold, adult credit plus amounts for each child
  - if income is above the threshold then the credit is tapered away at 55% – previously 70%

# The UK FC/WFTC Reform



transfers per week for a min. wage lone parent

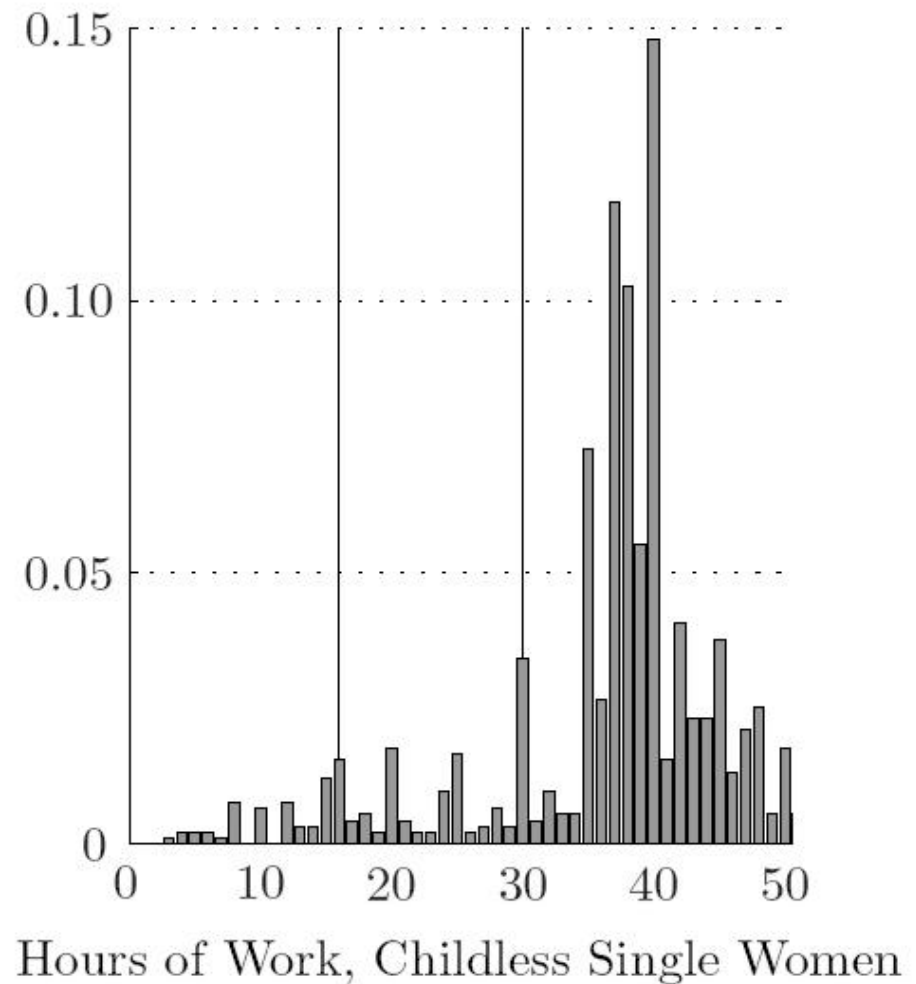
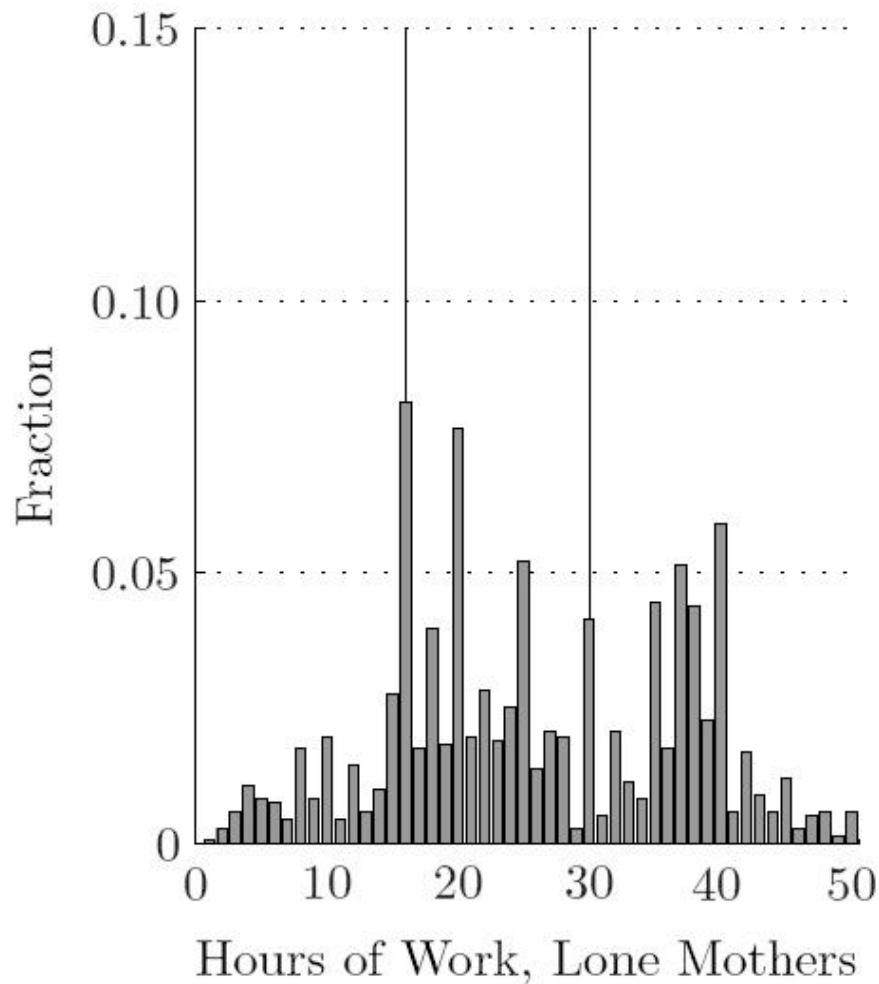
# The US EITC and the UK WFTC compared



- **Puzzle: WFTC about twice as generous as the US EITC but with about half the impact. Why?**

# Can the reforms explain weekly hours worked?

## Low Education Single Women (aged 18-45) - 2002



## Can a tax-credit design be ‘optimal’?

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- Does the WTFC represent an optimal transfer for low income families?
- Recent insights from optimal tax theory show some negative marginal tax rates can be an optimal design
- Labour supply estimation suggest extensive margin is more responsive to incentives than intensive margin
- This turns out to be a key observation for optimal tax design

## A optimal design framework

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- Two ‘new’ approaches:
- take approximations in terms of underlying elasticities and welfare weights on different incomes – e.g. Diamond/Saez
- solve directly given the microeconomic estimates of discrete choice behaviour and tax-benefit constraints
- extend the standard Mirrlees framework to allow for responses at the extensive and intensive margin

## A (simple) optimal tax framework

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- Assume earnings are all that is observable to the tax authority
  - relax this to allow for ‘course’ observability of hours below
- Index  $J$  available hours choices  $h_j$
- Fixed costs of work  $C$

$$c \equiv wh - T(wh, h; X) - C \cdot 1\{j > 0\}$$

- where  $T$  is a net tax/transfer function
- richer specification of fixed costs in empirical model

## A (simple) optimal tax framework

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Suppose  $U$  is the ‘utility’ of a single mother

$$U(c, h_j; X, \varepsilon) \text{ for } j = 0, 1, \dots, J.$$

where  $\varepsilon$  represents unobserved characteristics.

Choose  $h_j$  from a set of discrete alternatives reflecting part-time work, full-time work etc.

$$h^* = \arg \max \{U(wh_j - T - C, h_j; X, \varepsilon)\}^{j=0,1,\dots,J}$$

## A simple optimal tax/tax-credit framework

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Social welfare, for individuals of type  $X$

$$W = \sum_{w, X} \int \int \Gamma(u(wh^* - T(w, h^*; X), h^*; X, \varepsilon)) dF(\varepsilon) dG(w; X)$$

where  $\Gamma$  is the ‘social welfare’ transformation.

The tax structure  $T(\cdot)$  is chosen to maximise  $W$ ,  
subject to:

$$\sum_{w, X} \int \int T(wh^*, h^*; X) dF(\varepsilon) dG(w; X) = \bar{T} (= -R)$$

## Simplified expressions - for intuition, Saez (2002)

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- Suppose we distinguish between earnings groups
  - ‘no’ earners: group 0
  - ‘higher’ earners groups  $i = 1, 2, \dots$
- Suppose the social welfare weight is higher for group 0, and monotonically decreasing
- Choose taxes (and transfers)  $T$  to maximise welfare
- Can derive expressions in terms of elasticities and social welfare weights across the income distribution

# Simplified optimality results

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Optimal design gives:

$$\frac{T_i - T_0}{c_i - c_0} = \frac{1 - g_i}{\zeta_i}$$

where

- $\zeta_i$  is the labour supply elasticity
- $-T_i$  is the subsidy given to group  $i$
- $c_i$  is the net of tax income for that group
- $g_i$  is the social welfare weight for group  $i$   
and  $g_0 > 1$ , with the weighted sum of  $g$ 's = 1

# The intensive and extensive margin

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Suppose we now introduce different levels of earnings with an intensive and extensive margin

$$\frac{T_i - T_{i-1}}{c_i - c_{i-1}} = \frac{1}{\zeta_i h_i} \sum_{j=i}^I h_j [1 - f_j]$$

where

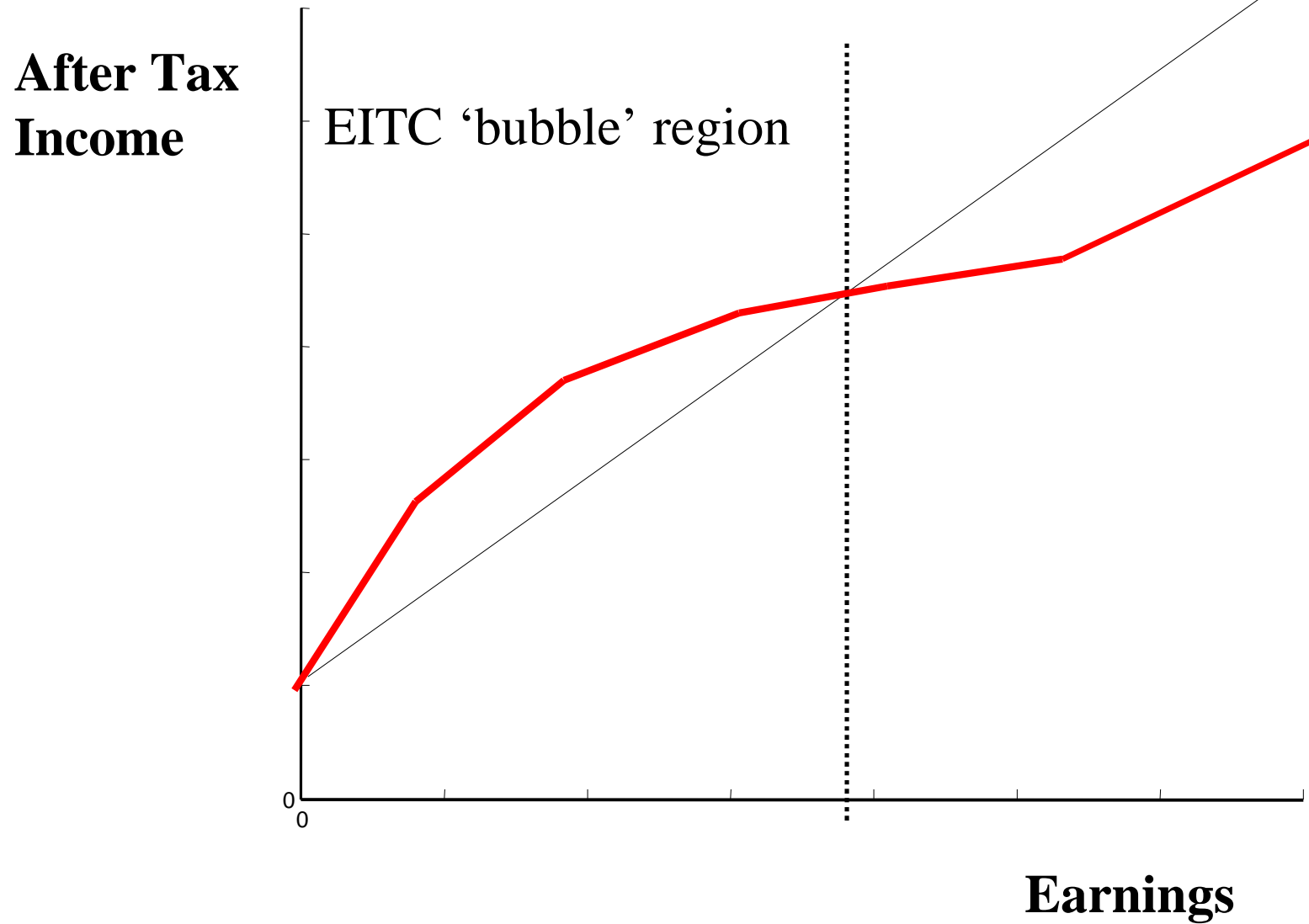
$$f_j = g_j + \eta_j \frac{T_j - T_0}{c_j - c_0},$$

$\zeta_i$  is the intensive elasticity

and  $\eta_j$  is the extensive elasticity

Implies a ‘large’ extensive elasticity can ‘turn around’ the impact of social weights - implying a higher transfer to low wage workers than to those out of work – an EITC

# An Optimal Schedule



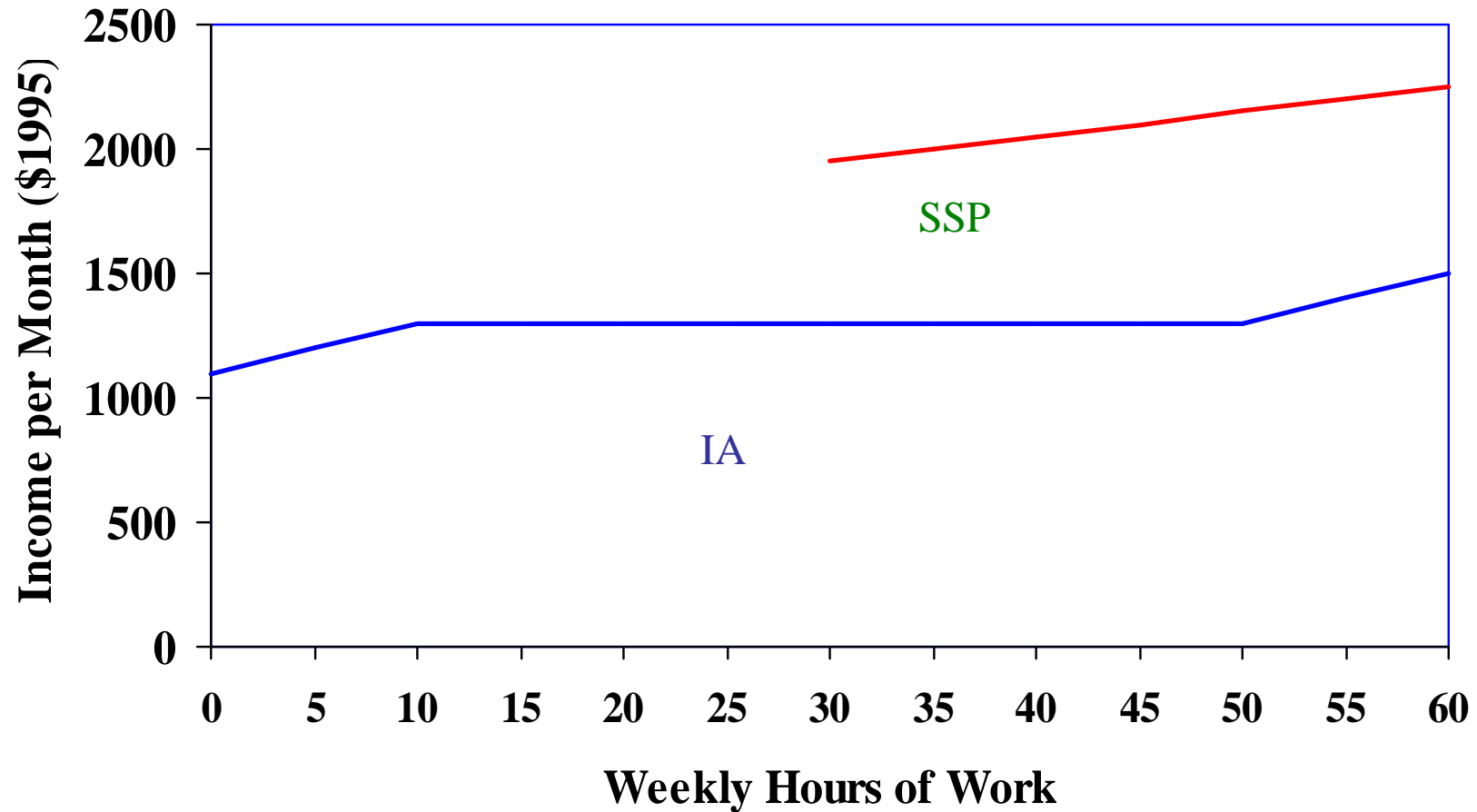
## Alternative approaches to impact measurement:

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- Difference-in-differences/quasi-experiment
  - Compares outcomes of eligibles and non-eligibles
  - Estimates ‘average’ impact of past reform
  - Only indirectly related to what is needed for optimal design
- Structural labour supply ‘micro-simulation’ model
  - Estimate the income-hours trade-off through discrete choice model
  - Simulate effect of actual or hypothetical reforms
  - Useful for optimal design too, but, robust?
- Is there a randomised experiment?

# Canadian Self Sufficiency Program - Experiment

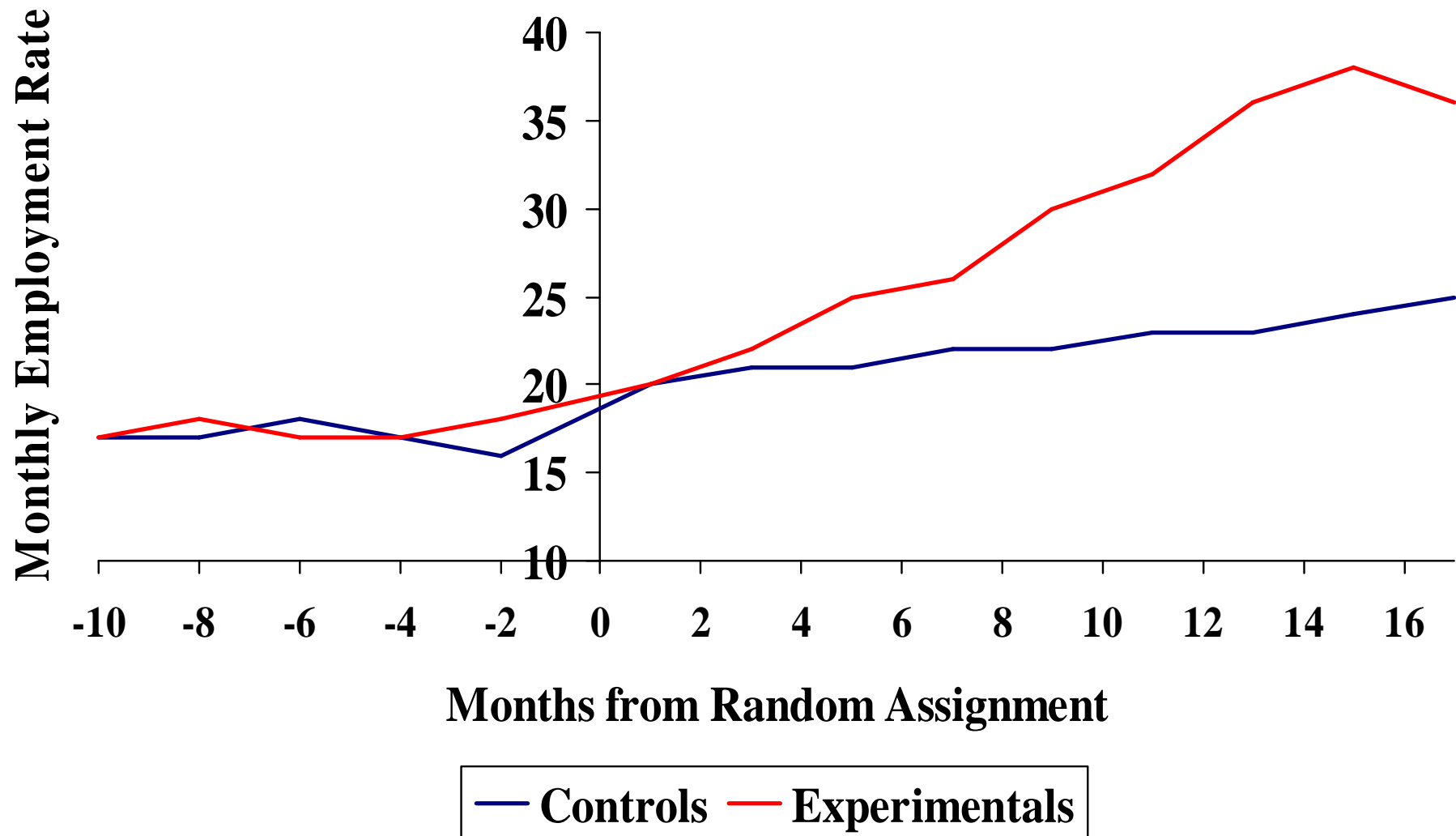
*Budget Constraint for a Single Parent on Minimum Wage*



— Income Assistance — Self Sufficiency Program

# Canadian Self Sufficiency Program - Experiment

Monthly Employment Rate for a Single Parent with One Child in BC



# WFTC Evaluation: Matched Difference-in-Differences

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## Average Impact on Employment Rate

<i>Single Women</i>	<b>Marginal Effect</b>	<b>Standard Error</b>	<b>Sample Size</b>
<b>Family Resources Survey</b>	<b>3.5</b>	<b>1.55</b>	<b>25,163</b>
<b>Labour Force Survey</b>	<b>3.6</b>	<b>0.55</b>	<b>233,208</b>

Data: FRS, 45,000 adults per year, Spring 1996 – Spring 2002.

Outcome: employment. Average impact x 100, employment percentage.

Matching Covariates: age, education, region, ethnicity,...

Drop: Summer 1999 – Spring 2000 inclusive

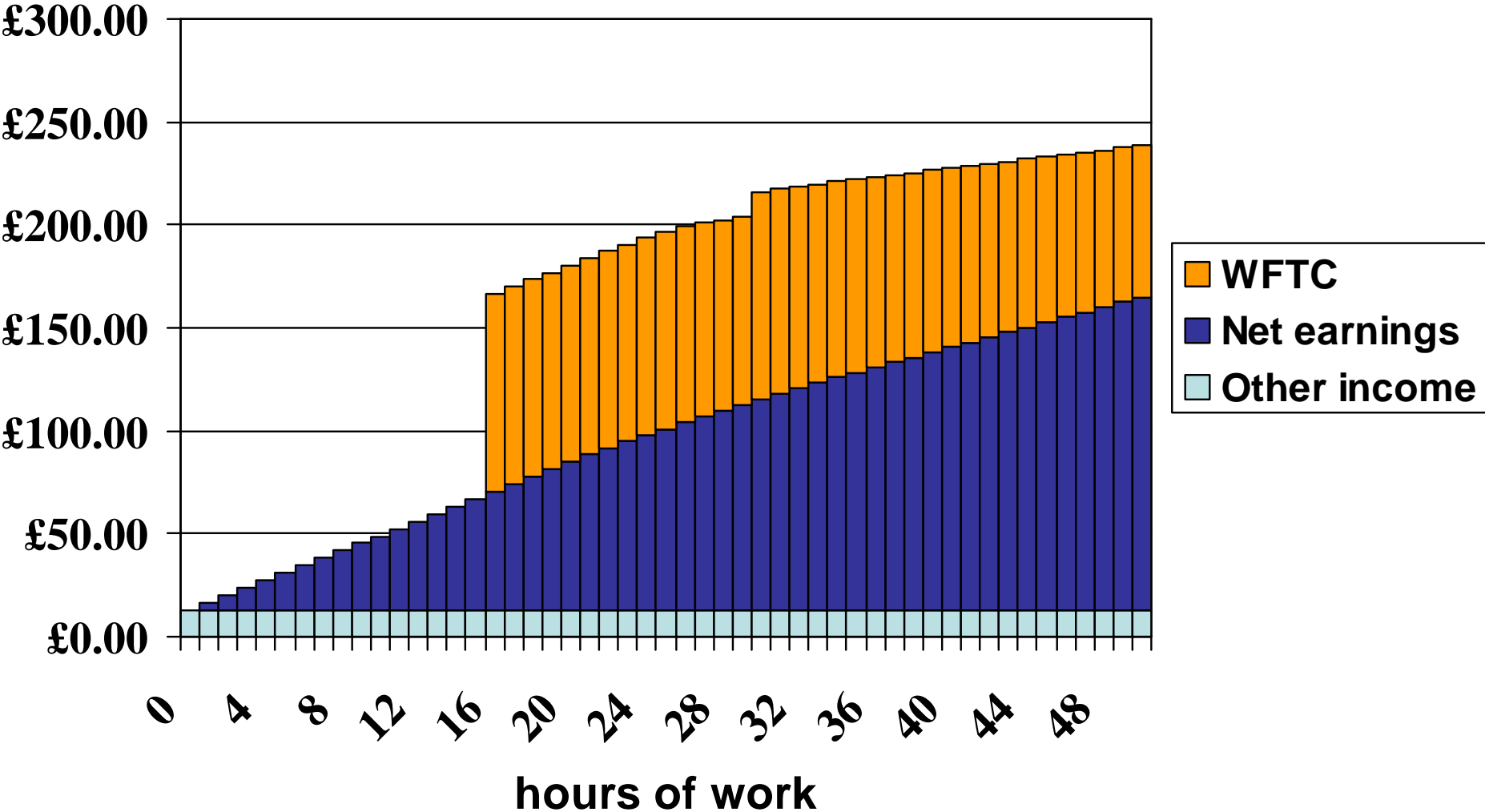
# Resolving the WFTC and EITC puzzle

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- Compare with an employment effect of EITC of about 8-10 percentage points for single mothers
- **Puzzle:** WFTC about twice as generous as the US EITC but with half the impact. Why?
  - Preferences?
  - Labour market institutions?
  - Integration with existing taxes and welfare system?
  - Other reforms?
- Need to know to assess the appropriate design

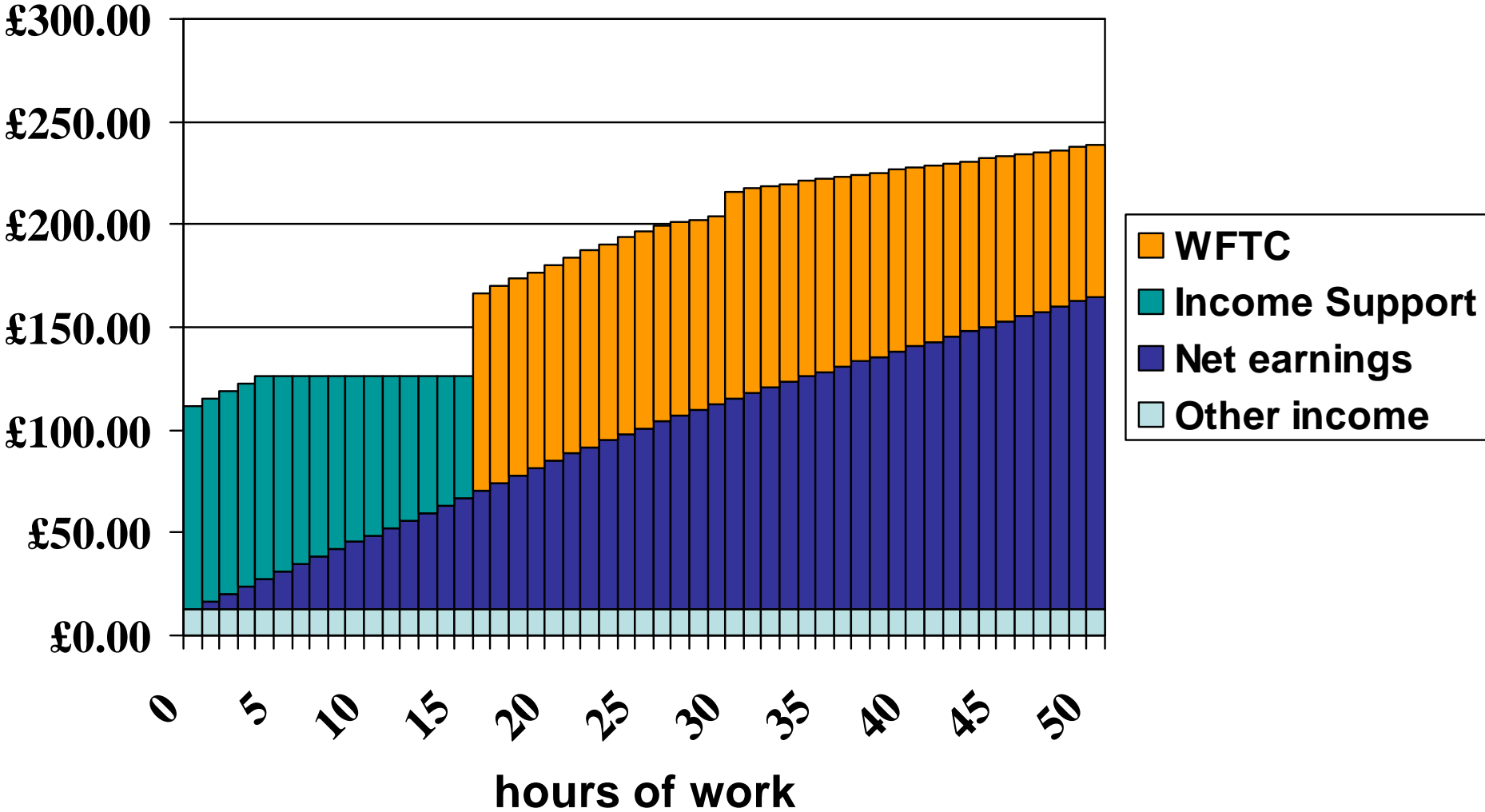
# The interaction with other benefits

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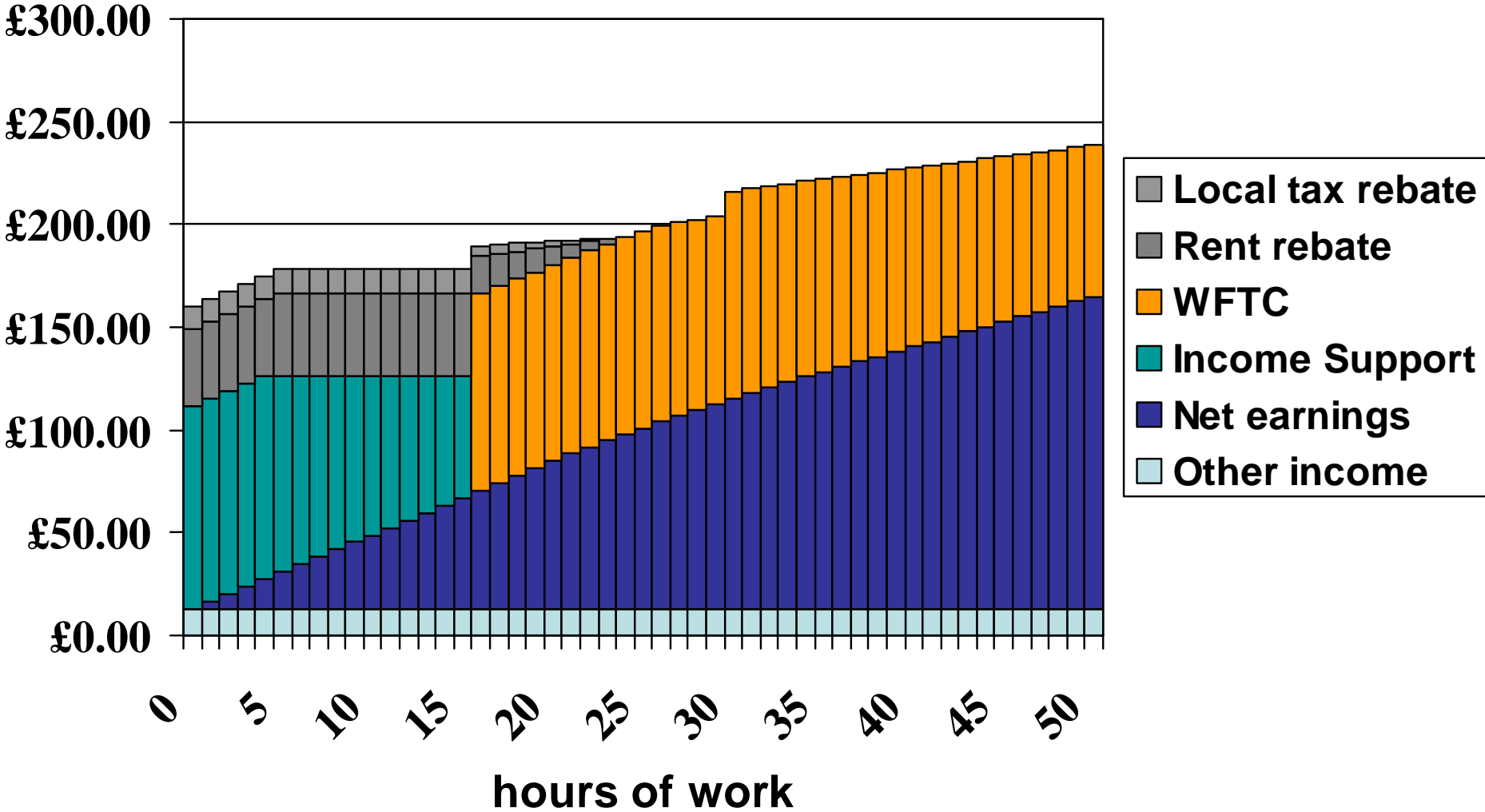


# The interaction with other benefits

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# The interaction with other benefits



Unlike the US EITC the UK tax credit is based on net (rather than gross) family income

- Interaction with other benefits and taxes matter
  - differing size of the ‘impact effect’ across eligibles
- Also coincident reforms to out of work income assistance ‘Income Support’ (IS)
  - different direction of these reforms to US

## Child Rates of *Income Support*

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	child 0 to 10	child 11 to 15	child 16 to 18
Mar-99	£21.90	£28.00	£33.50
Oct-99	£27.00	£28.00	£33.50
Mar-00	£28.40	£28.40	£33.80
Mar-01	£33.00	£33.00	£33.80
Oct-01	£34.50	£34.50	£35.40
Mar-02	£34.50	£34.50	£35.40
Increase	57.50%	23.30%	5.70%

Note: All monetary amounts are expressed in April 2003 prices.

## Adult and Child Elements of the WFTC

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	Adult	Child Awards by Age		
		child	child	child
		0 to 10	11 to 15	16 to 18
Mar-99	£58.80	£16.40	£22.60	£28.00
Oct-99	£56.60	£21.50	£22.60	£28.00
Mar-00	£56.60	£22.60	£22.60	£28.00
Jun-01	£61.90	£27.30	£27.30	£28.00
Jun-02	£64.40	£27.30	£27.30	£28.00
Increase	19.70%	66.40%	20.50%	0.00%

Note: All monetary amounts are expressed in April 2003 prices.

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- To understand the impact of reforms we need to carefully model the complete budget constraint across individuals.
  - Also need a ‘realistic’ structural model to assess the impact of changes in the budget constraint

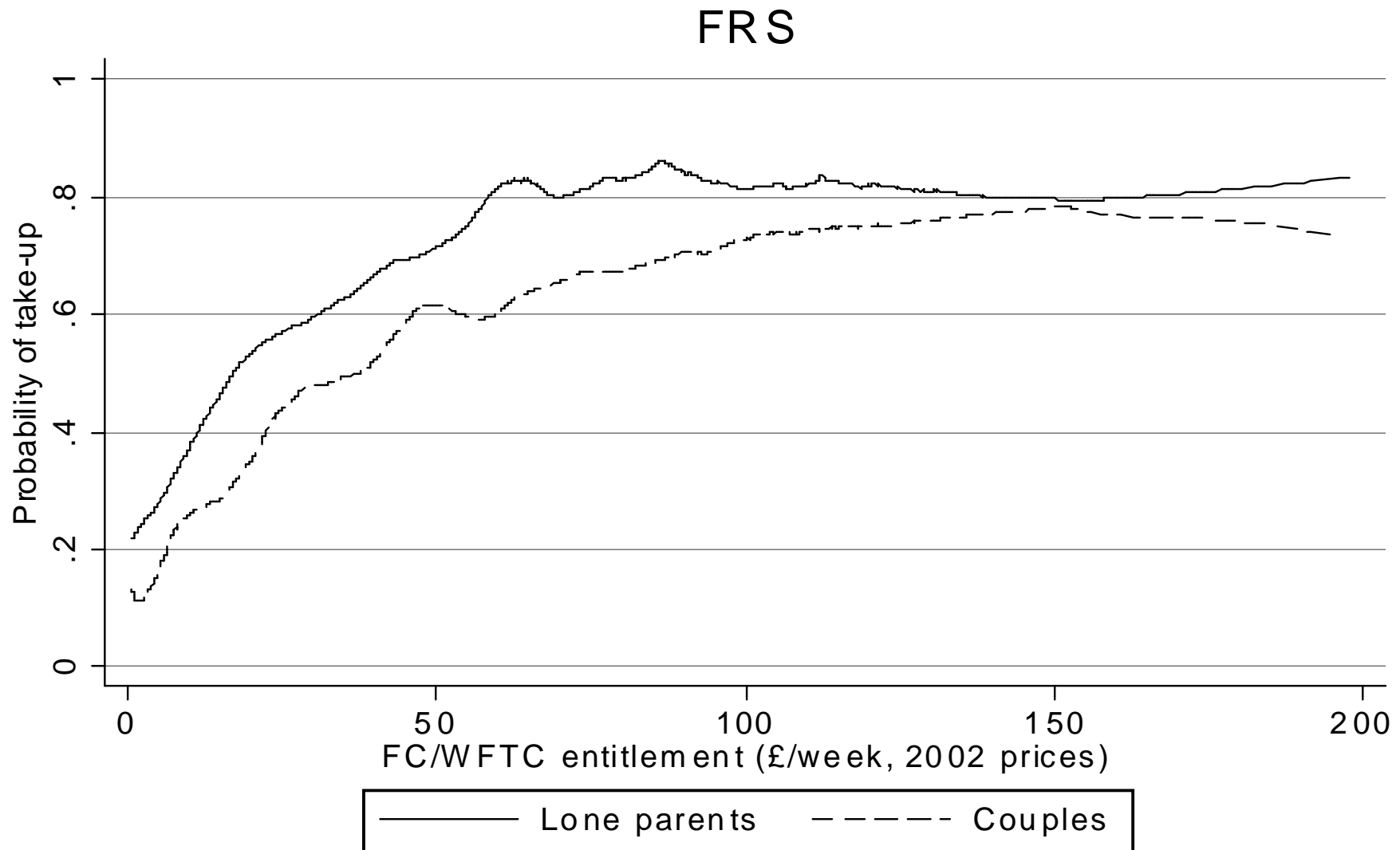
## Key features of a 'realistic' structural model

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- budget constraint that allows for tax/benefit interactions
- discrete decisions over hours worked
- heterogeneity – demographics, ethnicity, ..
- fixed costs of work
- stigma/hassle costs – take-up versus eligibility
- childcare costs

# Take-up and WFTC

Variation in take-up probability with entitlement to FC/WFTC



## Basic Structural Model

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Preferences approximated by polynomials,

$$U(y_h, h; X, \varepsilon) = \alpha_{11}y_h^2 + \alpha_{22}h^2 + \alpha_{12}y_hh + \beta_1y_h + \beta_2h + \varepsilon_h$$

- Individuals choose from  $h = \{0, 10, 19, 26, 33, 40\}$  with hours specific error  $\varepsilon_h$
- **Model also allows for**
  - unobserved work-related fixed costs,  $C$
  - childcare costs
  - programme participation ‘take-up’ costs
  - observed and unobserved heterogeneity in  $\beta$

# Structural Model Estimation

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- Data from 1995-2003 (Family Resources Survey)
  - 1995-1999: pre-reform estimation data (ex-ante)
  - 2002-2003: ‘post-reform’ validation sample

## Structural Micro-Simulation Results:

### WFTC Expansion – ‘large’ impact

	All	y-child	y-child	y-child	y-child
		0 to 2	3 to 4	5 to 10	11 to 18
Change in employment rate:	<b>5.95</b>	3.09	7.56	7.54	4.96
	<b>0.74</b>	<i>0.59</i>	<i>0.91</i>	<i>0.85</i>	<i>0.68</i>
Average change in hours:	1.79	0.71	2.09	2.35	1.65
	<i>0.2</i>	<i>0.14</i>	<i>0.23</i>	<i>0.34</i>	<i>0.2</i>

Notes: Simulated on FRS data; Standard errors in italics.

All: 5.12 without change in take-up – key impact effect

# Structural Micro-Simulation Results:

## All Reforms

	All	y-child	y-child	y-child	y-child
		0 to 2	3 to 4	5 to 10	11 to 18
Change in employment rate:	<b>3.66</b>	0.65	4.53	4.83	4.03
	<b><i>0.84</i></b>	<i>0.6</i>	<i>0.99</i>	<i>0.94</i>	<i>0.71</i>
Average change in hours:	1.02	0.01	1.15	1.41	1.24
	<i>0.23</i>	<i>0.21</i>	<i>0.28</i>	<i>0.28</i>	<i>0.22</i>

Notes: Simulated on FRS data; Standard errors in italics.

All: 5.12 without change in take-up – key impact effect

# Difference-in-Differences: Impact on Employment

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<i>Single Women</i>	<b>Marginal Effect</b>	<b>Standard Error</b>	<b>Sample Size</b>
<b>Family Resources Survey</b>	<b>3.57</b>	<b>0.81</b>	<b>74,959</b>
<b>Labour Force Survey</b>	<b>3.81</b>	<b>0.33</b>	<b>233,208</b>

Data: Spring 1996 – Spring 2003.

Drop: Summer 1999 – Spring 2000 inclusive; individuals aged over 45.

Outcome: employment. Average impact x 100, employment percentage.

Matching Covariates: age, education, region, ethnicity,...

# Evaluation of the ex-ante model

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- The *simulated* diff-in-diff parameter from the structural evaluation model is precise and does not differ significantly from the diff-in-diff estimate
- Compare *simulated diff-in-diff moment* with *diff-in-diff*
  - .29 (.73), chi-square p-value .57
- Consider additional moments
  - education: low education: 0.33 (.41)
  - youngest child interaction
    - Youngest child aged < 5: .59 (.51)
    - Youngest child aged 5-10: .31 (.35)

# Interpretation of the empirical results

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- Small impact effects of WFTC are due to
  - interaction with other taxes and benefits
  - and the rise in family allowances (all reforms)
  - rather than ‘small’ response elasticities.
- Reconciles the different employment impacts of the WFTC reforms and the EITC expansion
- Also shows the structural model predictions are quite accurate

## What of the ‘optimal’ design?

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- Given the structural estimates and the implied elasticities at extensive and intensive margin, we can pose the question:
  - what is the optimal tax and transfer schedule?
  - is the WFTC ‘optimal’ for reasonable social welfare weights?

$$\Gamma(U | \theta) = \frac{1}{\theta} \{ (\exp U)^\theta - 1 \}$$

- When  $\theta$  is negative, the function favors the equality of utilities; We solve the schedule for a series of values – central estimates us -0.2

# Structural Model Elasticities

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## (a) Youngest Child Aged 11-18

<i>Earnings</i>	<i>Density</i>	<i>Extensive</i>	<i>Intensive</i>
0	0.3966		
80	0.1240	0.5029	0.5029
140	0.1453	0.7709	0.3944
220	0.1723	0.7137	0.2344
300	0.1618	0.4920	0.0829
<i>Participation elasticity</i>		1.1295	

# Structural Model Elasticities

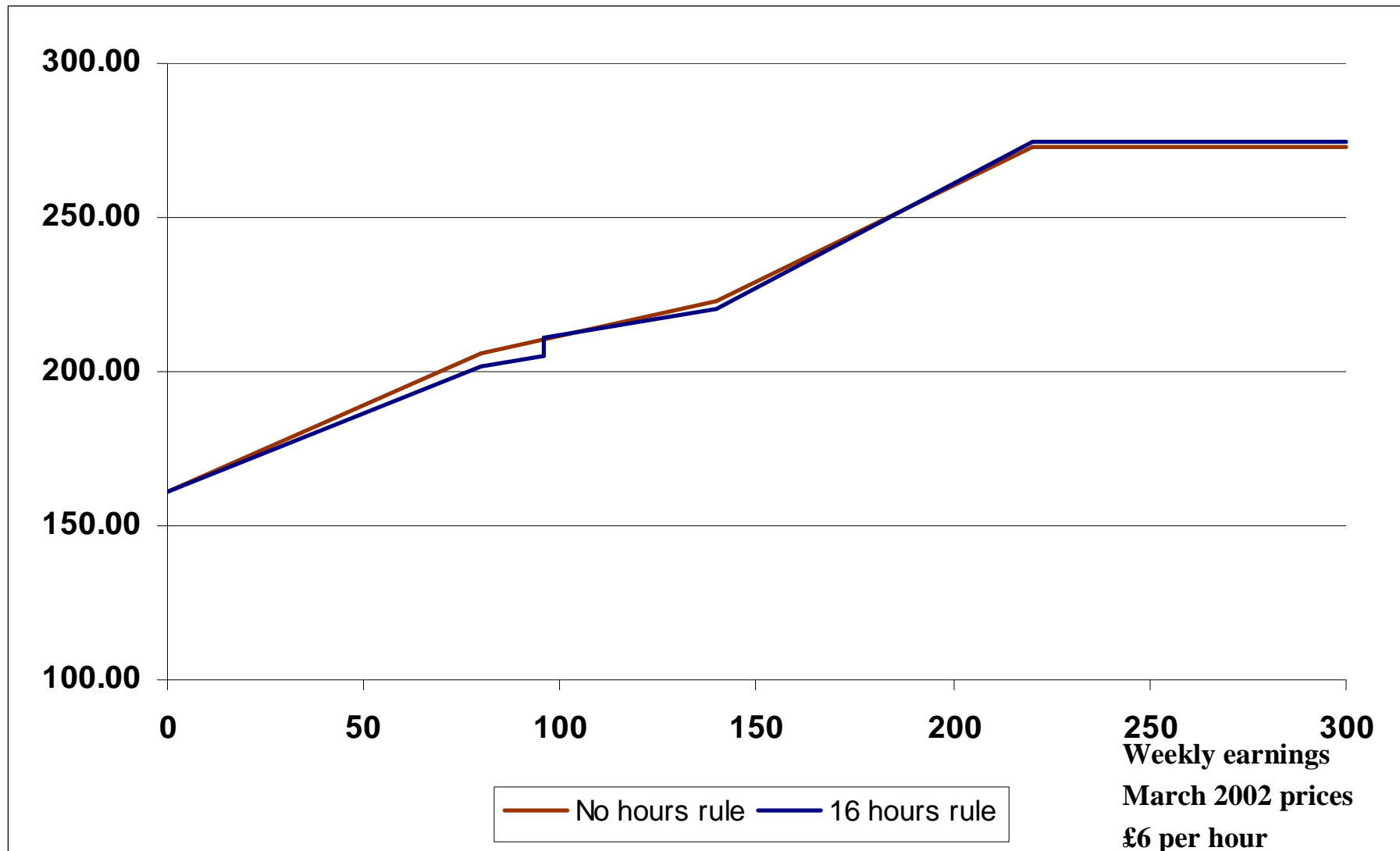
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## (c) Youngest Child Aged 0-4

<i>Earnings</i>	<i>Density</i>	<i>Extensive</i>	<i>Intensive</i>
0	0.5942		
80	0.1694	0.2615	0.2615
140	0.0984	0.6534	0.1570
220	0.0767	0.5865	0.1078
300	0.0613	0.4984	0.0834
<i>Participation elasticity</i>		0.6352	

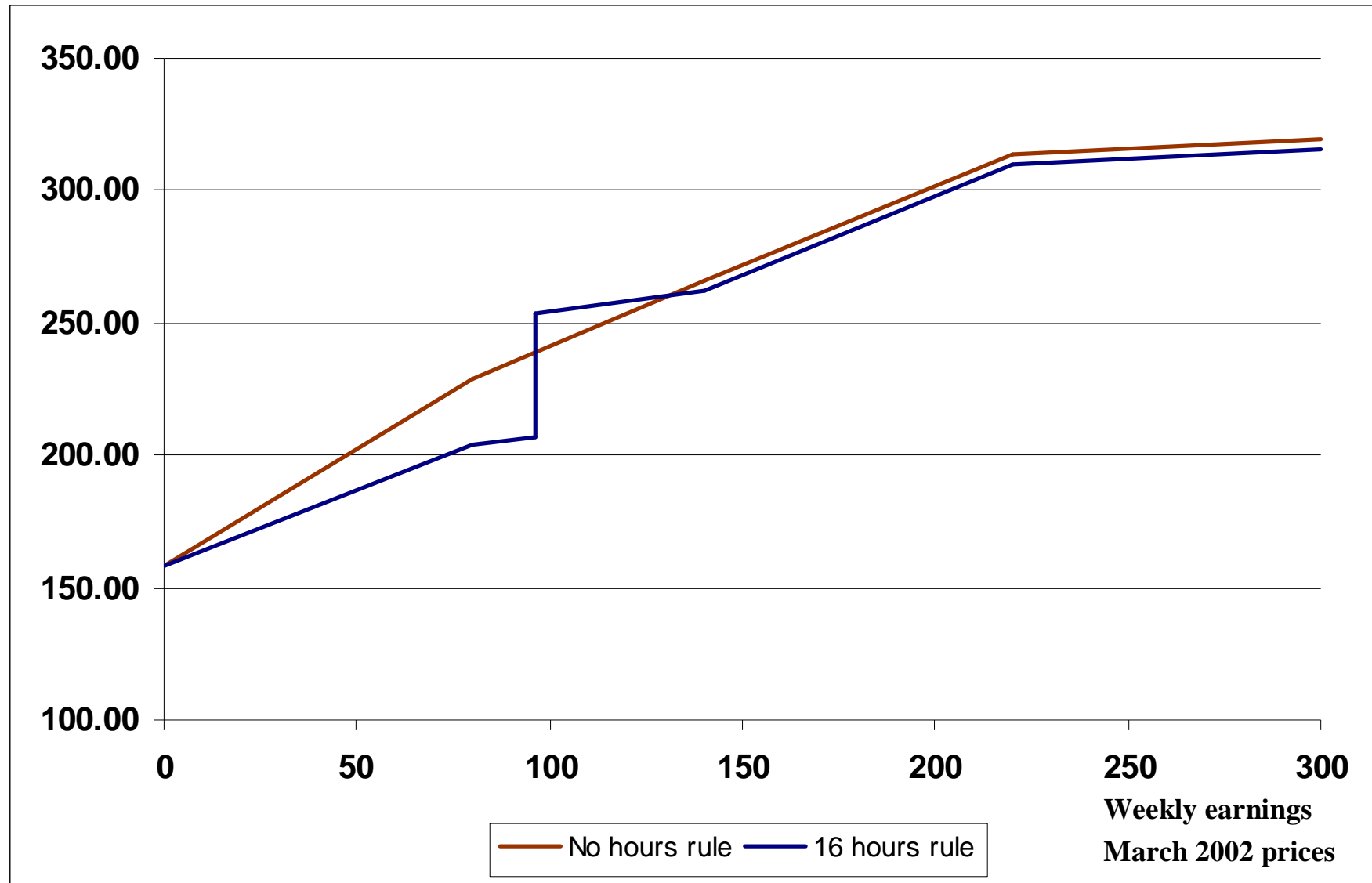
- Implications for the optimal schedule .....

# Implied Optimal Schedule, Youngest Child Aged 0-4



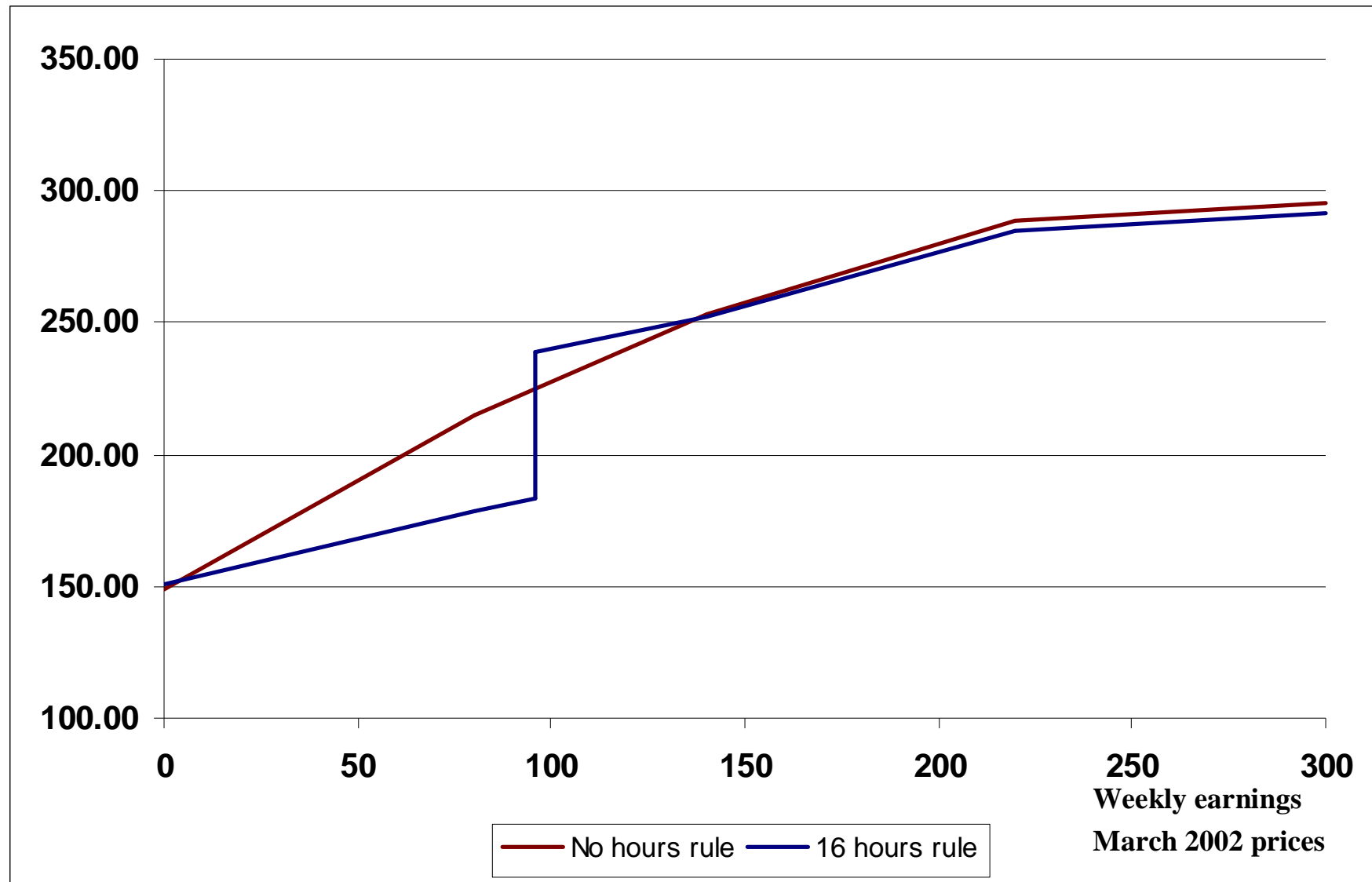
Blundell and Shephard (2008)

# Implied Optimal Schedule, Youngest Child Aged 5-10



Blundell and Shephard (2008)

# Implied Optimal Schedule, Youngest Child Aged 11-18



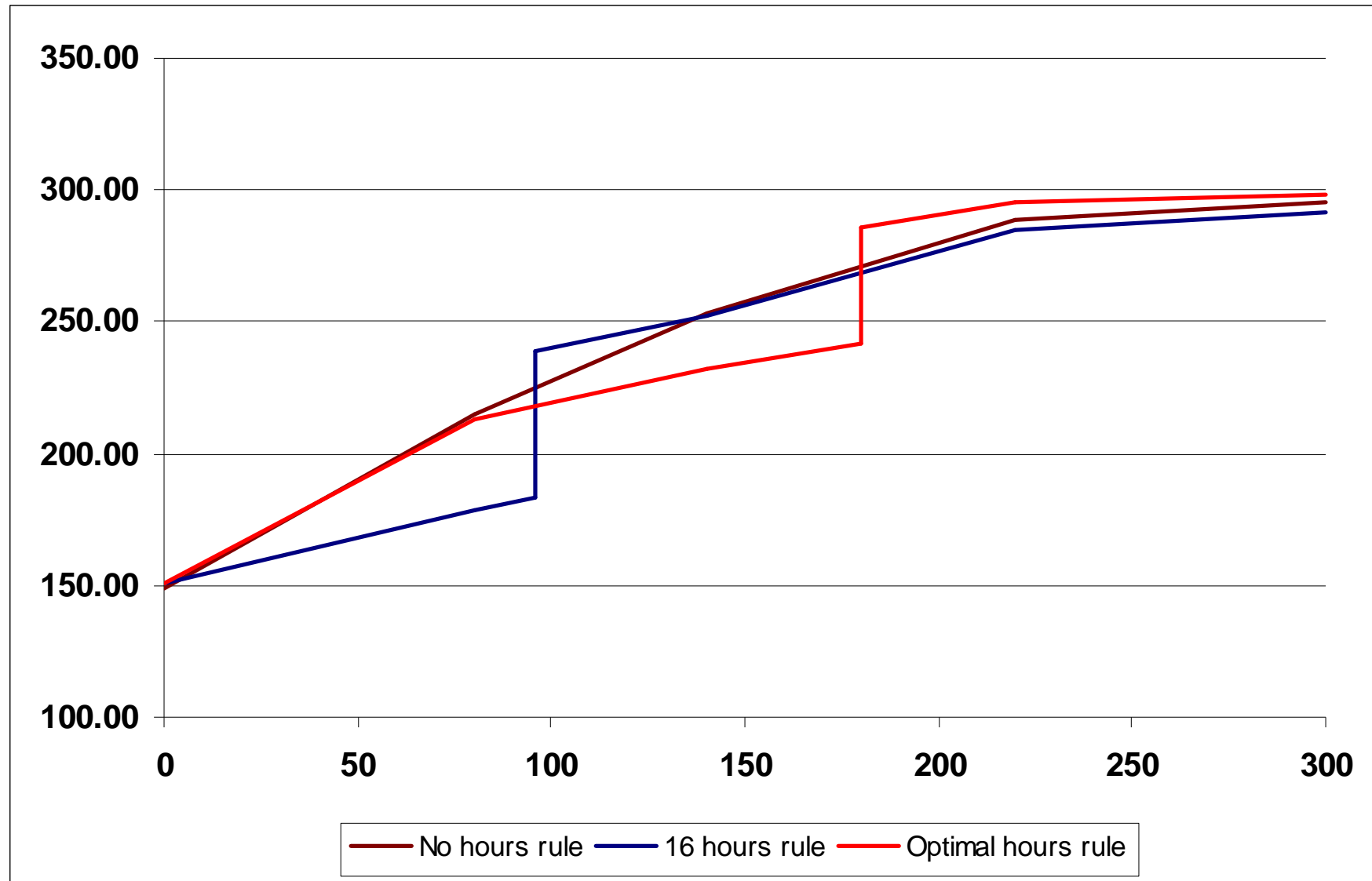
Blundell and Shephard (2008)

## Should there be an hours eligibility condition or ‘bonus’?

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- Is it optimal to have a ‘minimum hour condition’?
- If we can have a 16 hours condition, how should it be designed?
- Is 16 the optimal choice?

# Implied Optimal Schedule, Youngest Child Aged 11-18



Blundell and Shephard (2008)

# Implications

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- Resolved the US-EITC/ UK-WFTC puzzle
- line-up structural model with quasi-experiment treatment effects
- Given the estimated elasticities, some form of earned income tax credit schedule for families with children looks optimal overall
- But....

# Implications

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- Age conditions matter
  - only reduce marginal tax rates on participation for parents with children of school age
- Hours conditions do not always look optimal even if achievable
  - no hours conditions for mothers with youngest child less than 5
  - increases with age of youngest child
  - a type of ‘dynamic’ incentive

## Remaining Issues: Dynamics and Family Interactions

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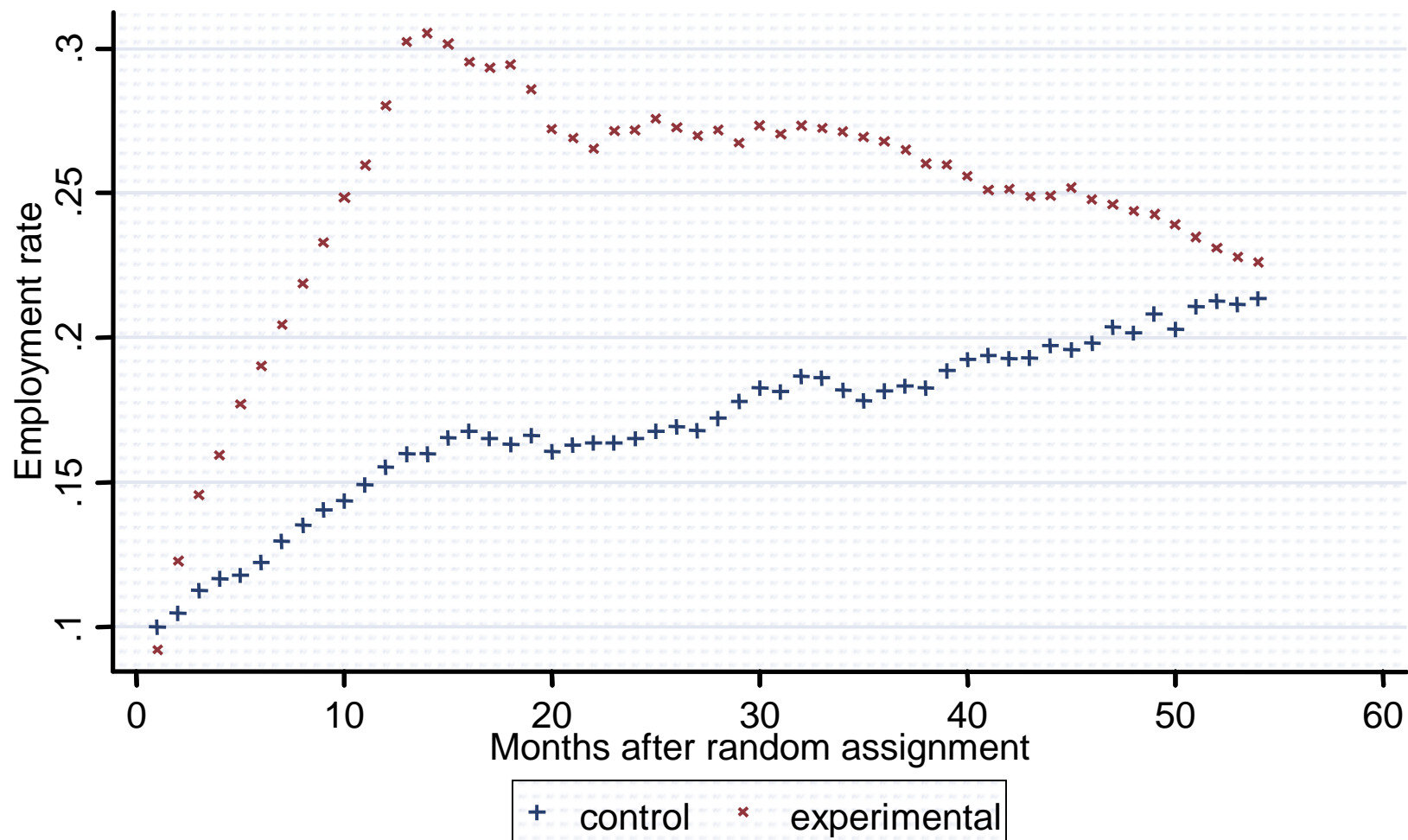
- What of work experience and wages?
  - Gladden and Tamer (2000, 2006)
  - Grogger (2005)
  - Card and Hyslop (2004)
- What is the program impact on gross wages?
- What of couples labour supply decisions?
  - targeting in collective labour supply models
- An impact on fertility and family formation?

## Optimal static design but incentives for self-sufficiency?

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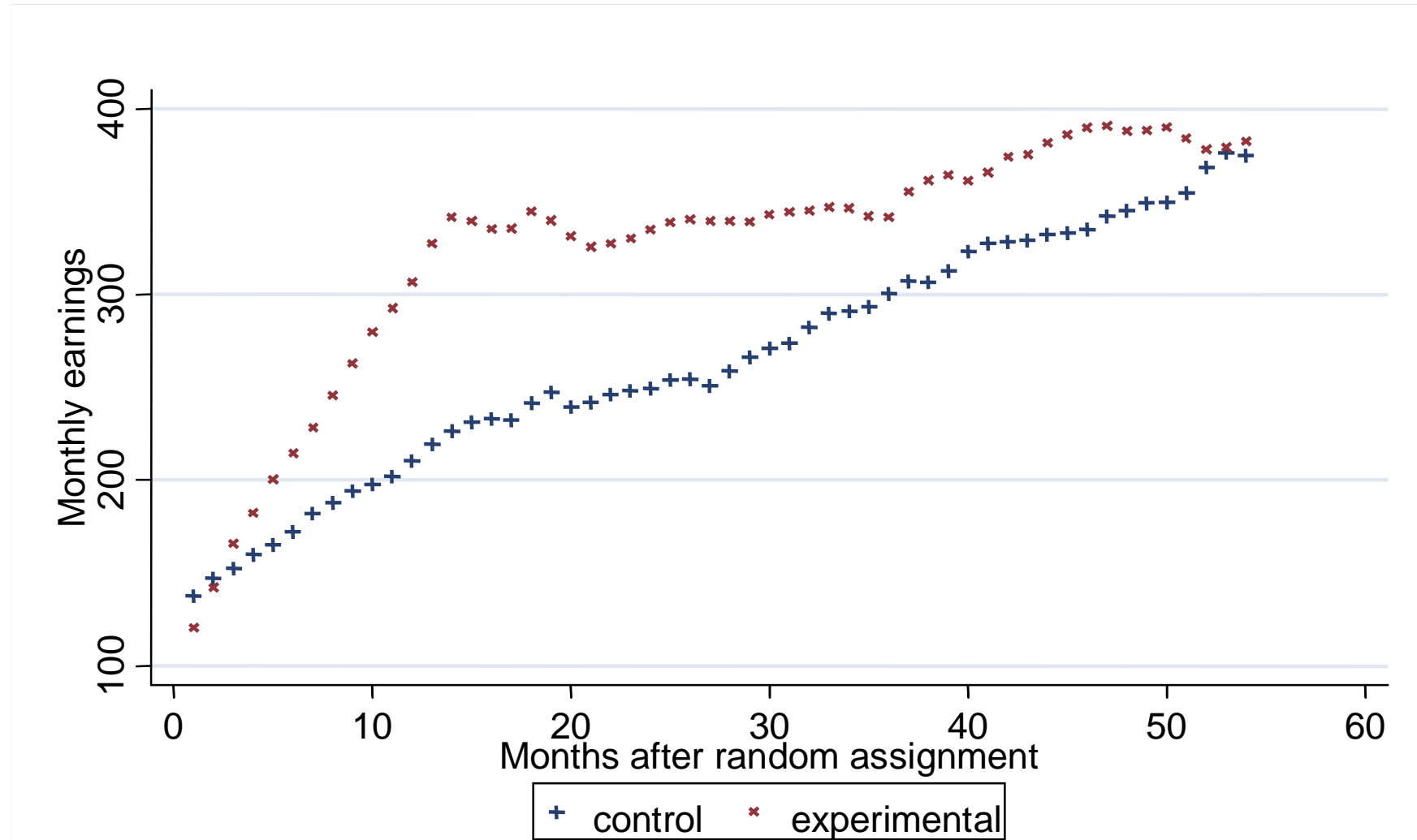
- High marginal tax rates (in the phase-out region) provide disincentive to increase work (or wage rates/productivity).
- An alternative is time-limited conditional programs
- e.g. Canadian Self-Sufficiency Project

# SSP: Full-time employment rates by months after RA



# SSP: Monthly earnings by months after RA

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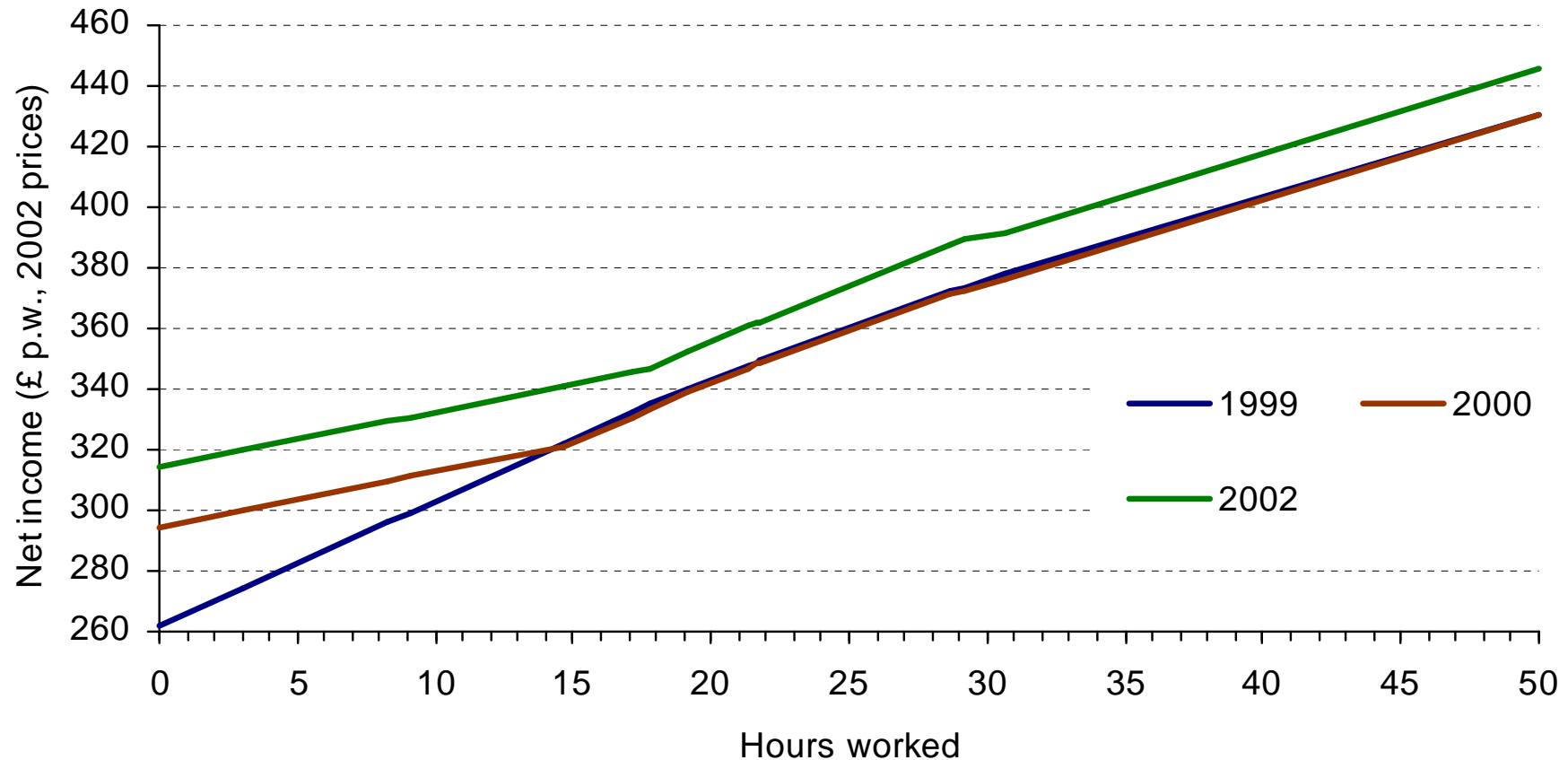


## Dynamic Effects from the Canadian SSP

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- Earnings and employment line up with control group after time limit is exhausted
- Little evidence of employment enhancement or wage progression
  - See Blundell and Moffitt.....
- Other results, Taber etc, UK ERA, show some progression but quite small.

# Reform impacts on budget constraints for mother in couple



*Notes:* Two children under 5. Assumes hourly wage of £4.10, no housing costs or council tax liability and no childcare costs.

The first earner in the couple is assumed to earn £300 per week in 2002 prices.

# Taxation of couples

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- Disincentive for partner in couple
- Optimality of ‘negative jointness’
  - Tax rate on second earner should be *decreasing* in earnings of first earner
  - More need to redistribute among second earners if first earner has low pay
- Is this finding generalisable?
  - Collective model ...

# Results Summary

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## EITC policy with some integrated Income Assistance

- Powerful tool where extensive margin is important
- Redistributive and efficient in a static sense
- Dampens incentives for wage progression
  - condition on the age of the youngest child
  - but wage progression appears small for low wage individuals
- Potential adverse effects in couples
  - secondary worker credit?
  - individualisation of tax credit?

# The Mirrlees Review

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## Tax by Design

*Reforming the Tax System for the 21st Century*

<http://www.ifs.org.uk/mirrleesreview>

# Summary

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- This lecture concerned the optimal schedule of marginal tax rates and the design of earned income tax credits.
- The analysis was based on a structural labour supply model which incorporates unobserved heterogeneity, fixed costs of work and detailed non-convexities of the tax system.
- An analytical framework was developed that allows explicitly for an extensive margin in work choices and also the partial observability of hours of work.
- The empirical motivation was the WFTC reforms.
- Results lend support for the structure of the WFTC reform. But also provide a strong case for a reduction of rates for low earners and suggest these should depend on the age of the child.

## *Some References:*

Beaudry, P., and C. Blackorby (2000), "Taxes and Employment Subsidies in Optimal Redistribution Programs", Discussion Paper 22, UBC, October.

Besley, T. and S. Coate (1992), "Workfare versus Welfare: Incentive Arguments for Work Requirement in Poverty Alleviation Programs", *American Economic Review*, 82(1), 249-261.

Blundell, R. (2006), "Earned income tax policies: Impact and Optimality", The 2005 Adam Smith Lecture to the Society of Labor Economics, *Labour Economics*, 13, 423-443.

Blundell, R.W., Duncan, A. and Meghir, C. (1998), "Estimating Labour Supply Responses using Tax Policy Reforms", *Econometrica*, 66, 827-861.

Blundell, R, Duncan, A, McCrae, J and Meghir, C. (2000), "The Labour Market Impact of the Working Families' Tax Credit", *Fiscal Studies*, 21(1).

Blundell, R. and Hoynes, H. (2004), "In-Work Benefit Reform and the Labour Market", in Richard Blundell, David Card and Richard .B. Freeman (eds) *Seeking a Premier League Economy*. Chicago: University of Chicago Press.

Blundell, R. and MaCurdy (1999), "Labour Supply: A Review of Alternative Approaches", in Ashenfelter and Card (eds), *Handbook of Labour Economics*, Elsevier North-Holland

- Brewer, M. (2003), "The New Tax Credits", *IFS Briefing Note* No. 25, [www.ifs.org.uk](http://www.ifs.org.uk)
- Brewer, M. A. Duncan, A. Shephard, M-J Suárez, (2006), "Did the Working Families Tax Credit Work?", *Labour Economics*, 13(6), 699-720.
- Card, David and Philip K. Robins (1998), "Do Financial Incentives Encourage Welfare Recipients To Work?", *Research in Labor Economics*, 17, pp 1-56.
- Diamond, P. (1980): "Income Taxation with Fixed Hours of Work," *Journal of Public Economics*, 13, 101-110.
- Eissa, Nada and Jeffrey Liebman (1996), "Labor Supply Response to the Earned Income Tax Credit", *Quarterly Journal of Economics*, CXI, 605-637.
- Gregg, P. and S. Harkness (2003), "Welfare Reform and Lone Parents in the UK", CMPO Working Paper Series, 03/072.
- Immervoll, H. Kleven, H. Kreiner, C, and Saez, E. (2004), 'Welfare Reform in European Countries: A Micro-Simulation Analysis' CEPR DP 4324, forthcoming *Economic Journal*.
- Keane, M.P. (1995) 'A New Idea for Welfare Reform', *Quarterly Review*, Federal Reserve Bank of Minneapolis, Spring, pp 2 - 28.
- Keane, M.P. and Moffitt, R. (1998), "A Structural Model of Multiple Welfare Program Participation and Labor Supply", *International Economic Review*, 39(3), 553-589.

Laroque, G. (2005), "Income Maintenance and Labour Force Participation", *Econometrica*, 73(2), 341-376.

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Liebman, J. (2002), 'The Optimal Design of the Earned Income Tax Credit', in Bruce Meyer and Douglas Holtz-Eakin (eds.), *Making Work Pay: The Earned Income Tax Credit and Its Impact on American Families*, New-York: Russell Sage Foundation.

Mirrlees, J.A. (1971), "The Theory of Optimal Income Taxation", *Review of Economic Studies*, 38, 175-208.

Moffitt, R. (1983), "An Economic Model of Welfare Stigma", *American Economic Review*, 73(5), 1023-1035.

Moffitt, R. (2005), "Welfare Work Requirements with Paternalistic Government Preferences, mimeo, Johns Hopkins University, February.

Phelps, E.S. (1994), "Raising the Employment and Pay for the Working Poor", *American Economic Review*, 84 (2), 54-58.

Saez, E. (2002): "Optimal Income Transfer Programs: Intensive versus Extensive Labor Supply Responses," *Quarterly Journal of Economics*, 117, 1039-1073.

Seade, J.K. (1977), "On the Shape of Optimal Income Tax Schedules" *Journal of Public Economics*, 7, 203-236.

## Table A1: Sample Descriptives for Single Women

		<b>1996</b>	<b>1997</b>	<b>1998</b>	<b>1999</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>
<b>No child</b>	<b>Work</b>	<b>0.753</b>	<b>0.762</b>	<b>0.769</b>	<b>0.770</b>	<b>0.774</b>	<b>0.767</b>	<b>0.775</b>
	<b>Age</b>	<b>26.789</b>	<b>26.906</b>	<b>26.799</b>	<b>26.957</b>	<b>27.104</b>	<b>27.317</b>	<b>27.450</b>
	<b>Non-white</b>	<b>0.073</b>	<b>0.077</b>	<b>0.080</b>	<b>0.084</b>	<b>0.091</b>	<b>0.098</b>	<b>0.102</b>
	<b>Left education before 16</b>	<b>0.078</b>	<b>0.072</b>	<b>0.062</b>	<b>0.057</b>	<b>0.052</b>	<b>0.047</b>	<b>0.043</b>
	<b>Left education at 16 or 17</b>	<b>0.394</b>	<b>0.381</b>	<b>0.375</b>	<b>0.375</b>	<b>0.363</b>	<b>0.353</b>	<b>0.356</b>
	<b>London and South-East</b>	<b>0.341</b>	<b>0.350</b>	<b>0.349</b>	<b>0.347</b>	<b>0.354</b>	<b>0.360</b>	<b>0.352</b>
	<b>Rented accommodation</b>	<b>0.343</b>	<b>0.353</b>	<b>0.358</b>	<b>0.340</b>	<b>0.339</b>	<b>0.350</b>	<b>0.346</b>
	<b>Observations</b>	<b>26243</b>	<b>24463</b>	<b>24410</b>	<b>23987</b>	<b>22558</b>	<b>23517</b>	<b>22846</b>
<b>Child</b>	<b>Work</b>	<b>0.417</b>	<b>0.425</b>	<b>0.444</b>	<b>0.464</b>	<b>0.477</b>	<b>0.487</b>	<b>0.496</b>
	<b>Age</b>	<b>32.330</b>	<b>32.580</b>	<b>32.655</b>	<b>32.863</b>	<b>33.181</b>	<b>33.280</b>	<b>33.288</b>
	<b>Non-white</b>	<b>0.100</b>	<b>0.099</b>	<b>0.091</b>	<b>0.098</b>	<b>0.106</b>	<b>0.112</b>	<b>0.111</b>
	<b>Left education before 16</b>	<b>0.209</b>	<b>0.196</b>	<b>0.189</b>	<b>0.169</b>	<b>0.154</b>	<b>0.161</b>	<b>0.155</b>
	<b>Left education at 16 or 17</b>	<b>0.632</b>	<b>0.627</b>	<b>0.633</b>	<b>0.635</b>	<b>0.646</b>	<b>0.641</b>	<b>0.637</b>
	<b>London and South-East</b>	<b>0.285</b>	<b>0.285</b>	<b>0.285</b>	<b>0.293</b>	<b>0.294</b>	<b>0.303</b>	<b>0.301</b>
	<b>Rented accommodation</b>	<b>0.686</b>	<b>0.704</b>	<b>0.708</b>	<b>0.696</b>	<b>0.697</b>	<b>0.694</b>	<b>0.676</b>
	<b>Number of kids</b>	<b>1.783</b>	<b>1.785</b>	<b>1.791</b>	<b>1.784</b>	<b>1.778</b>	<b>1.776</b>	<b>1.794</b>
	<b>Age of youngest child</b>	<b>6.187</b>	<b>6.249</b>	<b>6.272</b>	<b>6.414</b>	<b>6.592</b>	<b>6.612</b>	<b>6.676</b>
	<b>Observations</b>	<b>14613</b>	<b>14172</b>	<b>14550</b>	<b>14343</b>	<b>13572</b>	<b>14097</b>	<b>13996</b>

## Structural Evaluation Model: Parameter Estimates

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Parameter	Estimate	Standard Error	$z$	$P >  z $
$\alpha_{11}$ : Constant	-0.321	0.044	-7.290	0.000
Youngest Child 0-2	0.210	0.074	2.844	0.004
Youngest Child 3-4	0.212	0.065	3.244	0.001
Youngest Child 5-10	-0.059	0.061	-0.969	0.332
$\alpha_{22}$ : Constant	0.308	0.027	11.317	0.000
Youngest Child 0-2	0.024	0.062	0.385	0.700
Youngest Child 3-4	-0.152	-0.031	-2.401	0.016
Youngest Child 5-10	-0.031	0.037	-0.833	0.405
$\alpha_{12}$ : Constant	0.010	0.004	2.693	0.007
Youngest Child 0-2	-0.019	0.005	-3.541	0.000
Youngest Child 3-4	-0.015	0.006	-2.427	0.015
Youngest Child 5-10	0.005	0.005	1.099	0.272

$\beta_1$ :	Constant	0.327	0.023	14.538	0.000
	Age	-0.027	0.047	-0.579	0.563
	Age Squared	0.003	0.006	0.546	0.585
	Education 16	-0.015	0.009	-1.677	0.093
	Youngest Child 0-2	-0.085	0.037	-2.270	0.023
	Youngest Child 3-4	-0.046	0.035	-1.320	0.187
	Youngest Child 5-10	0.012	0.030	0.399	0.690
	Number of Children	0.012	0.007	1.889	0.059
	Non-white	-0.068	0.017	-3.966	0.000
	Random Term (SD)	0.004	0.009	0.400	0.689
$\beta_2$ :	Constant	-0.213	0.015	-13.993	0.000
	Age	0.106	0.012	8.708	0.000
	Age Squared	-0.012	0.002	-7.334	0.000
	Education 16	0.034	0.003	13.188	0.000
	Youngest Child 0-2	0.017	0.027	0.614	0.539
	Youngest Child 3-4	0.062	0.028	2.197	0.028
	Youngest Child 5-10	-0.011	0.020	-0.553	0.581
	Number of Children	-0.012	0.003	-3.565	0.000
	Non-white	0.016	0.009	1.878	0.060
	Random Term (SD)	0.000	0.002	0.000	1.000

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continues...

$\eta$ :	Constant	-0.252	0.061	-4.120	0.000
	October 1999	0.024	0.113	0.213	0.832
	April 2000	-0.210	0.116	-1.809	0.071
	Age	-0.349	0.386	-0.905	0.365
	Age Squared	0.119	0.054	2.214	0.027
	Education 16	0.767	0.085	9.060	0.000
	Non-white	0.399	0.148	2.699	0.007
	Random Term (SD)	0.215	0.103	2.085	0.037
$FC_1$ :	Constant	8.955	6.978	1.283	0.199
	Youngest Child 0-2	42.298	14.532	2.911	0.004
	Youngest Child 3-4	32.760	12.810	2.557	0.011
	Youngest Child 5-10	5.542	8.984	0.617	0.537
	Number of Children	3.015	2.836	1.063	0.288
	Non-white	38.256	13.018	2.939	0.003
	London	48.089	4.593	10.469	0.000
	Random Term (SD)	5.304	3.140	1.689	0.091
$FC_2$ :	Constant	13.963	5.576	2.504	0.012
	Youngest Child 0-2	21.091	14.245	1.481	0.139
	Youngest Child 3-4	-4.638	11.045	-0.420	0.675
	Youngest Child 5-10	13.364	7.747	1.725	0.085
	Number of Children	4.558	3.476	1.311	0.190
	Non-white	-33.931	12.492	-2.716	0.007
	London	-13.858	5.952	-2.328	0.020
Maximised Log Likelihood				-15564.720	
Observations				11594	

*Note:* Standard errors are calculated analytically from the Simulated Maximum

	<b>Apr-99</b>	<b>Oct-99</b>	<b>Jun-00</b>	<b>Jun-02</b>
	<b>(FC)</b>	<b>(WFTC)</b>	<b>(WFTC)</b>	<b>(WFTC)</b>
<b>Basic Credit</b>	<b>49.8</b>	<b>52.3</b>	<b>53.15</b>	<b>62.5</b>
<b>Child Credit</b>				
<i>under 11</i>	<b>15.15</b>	<b>19.85</b>	<b>25.6</b>	<b>26.45</b>
<i>11 to 16</i>	<b>20.9</b>	<b>20.9</b>	<b>25.6</b>	<b>26.45</b>
<i>over 16</i>	<b>25.95</b>	<b>25.95</b>	<b>26.35</b>	<b>27.2</b>
<b>30 hour</b>	<b>11.05</b>	<b>11.05</b>	<b>11.25</b>	<b>11.65</b>
<b>Threshold</b>	<b>80.65</b>	<b>90</b>	<b>91.45</b>	<b>94.5</b>
<b>Taper</b>	<b>70% of earnings after income tax and NI</b>	<b>55% of earnings after income tax and NI</b>	<b>55% of earnings after income tax and NI</b>	<b>55% of earnings after income tax and NI</b>
<b>Childcare</b>	<b>Childcare expenses up to £60 (£100) for 1 (more than 1) child under 12 disregarded when calc income</b>	<b>Award increased by 70% of childcare expenses up to £100 (£150) for 1 (more than 1) child under 15</b>	<b>Award increased by 70% of childcare expenses up to £100 (£150) for 1 (more than 1) child under 15</b>	<b>Award increased by 70% of childcare expenses up to £135 (£200) for 1 (more than 1) child under 15</b>