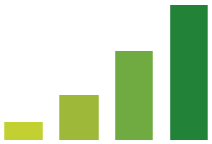

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The long-term effects of in-work benefits in a lifecycle model for policy evaluation

Richard Blundell, Monica Costa Dias, Costas Meghir and Jonathan Shaw

What we do

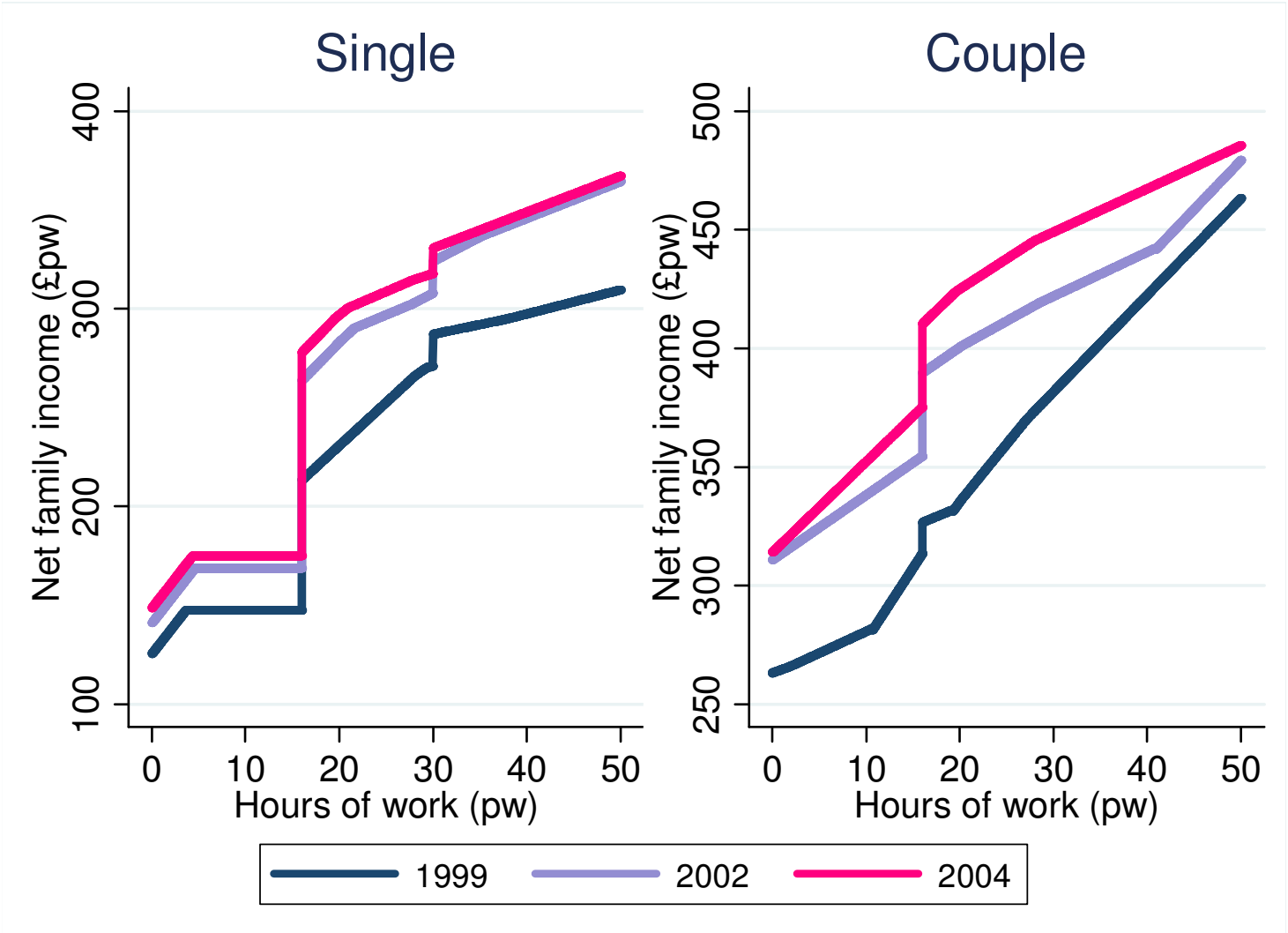
- Study effect of tax credit reforms on education and employment decisions over the lifecycle
- Using a lifecycle model of female labour supply, human capital and savings
  - Eckstein and Wolpin (1989) and (1999), Keane and Wolpin (1997), Adda et al (2008), Todd and Wolpin (2006), Eckstein and Lifshitz (2011)
- With parameters estimated using British panel data (BHPS)

Standard approaches

- Features of traditional welfare evaluations (e.g. Brewer et al, 2006):
  1. Estimate impact of reform packages
  2. Use static framework
  3. Focus on short-run labour supply response
- Counter-examples: Ham and Lalonde (1996), Todd and Wolpin (2006), Haan and Prowse (2010), etc
- This paper: first attempt to study UK tax and benefit system in dynamic context
  - Focus is on female response to UK tax credit reforms
  - Dynamic effects via education, experience, productivity and family composition
  - Also investigate impact on education

Background to reforms: budget constraints

Families with child aged 4, £50 childcare



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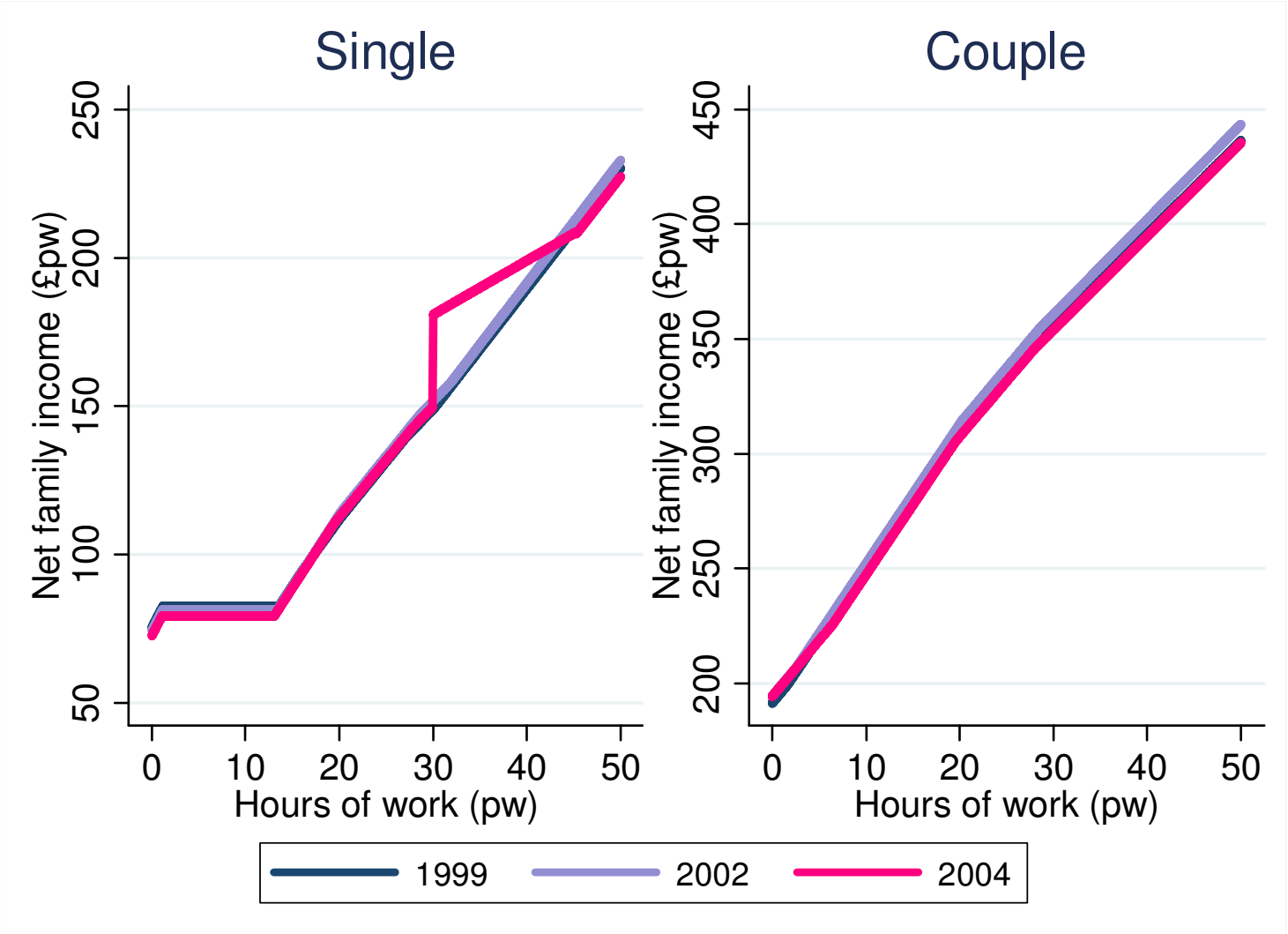
Background to reforms: budget constraints

Families without children



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Literature: employment impact of WFTC/EITC

- WFTC
  - + 2-7ppt increase in employment rate for lone parents
  - Smaller, possibly negative impact for second earners in couples
  - Blundell et al (2005), Brewer et al (2006), Francesconi and van der Klaauw (2004), Francesconi et al (2009)
- EITC
  - Positive and substantial impact on employment rate for lone parents (e.g. Eissa and Liebman (1996), Meyer and Rosenbaum (2001))
  - Modest negative impact for second earners (e.g. Eissa and Hoynes (1998))

Literature: impact of WFTC/EITC on other outcomes

- Couple formation and dissolution
  - WFTC: mixed evidence (Francesconi and van der Klaauw (2004), Gregg et al (2007), Francesconi et al. (2009))
  - EITC: small and ambiguous (Eissa and Hoynes (1999), Ellwood (2000))
- Childbearing
  - WFTC: Fall in fertility for lone parents, rise for couples (Francesconi and van der Klaauw, (2004), Brewer et al (2008))
  - EITC: little effect (Baughman and Dickert-Conlin (2009))
- Anticipation and labour market attachment effects?

Model: overview of female lifecycle

Life in three stages:

1. Education (up to 18/21)
   - Secondary, A-levels or university (determines type of human capital)
2. Working life (18/21-59)
   - Labour supply {0hrs, 20hrs, 40hrs} and consumption
   - Partnering and childbearing
3. Retirement (60-69)
   - Consumption only

Model: dynamics of female earnings

- Log wage equation

s=schooling
i=individual
a=age

$$w_{sia} = \ln W_s + \alpha_s \ln(e_{ia} + 1) + v_{sia} \qquad v_{sia} = \rho_s v_{sia-1} + u_{sia}$$

Log wage | Market wage rate | Experience | Productivity

- Experience accumulation

$$e_{ia+1} = e_{ia}(1 - \delta_s) + \delta_{sPT} 1[l_{ia} = 20] + \delta_{sFT} 1[l_{ia} = 40]$$

Depreciation rate | PT accumulation rate | FT accumulation rate

Model: dynamics of family income

- (Exogenous) family formation dynamics
  - Children
    - Model youngest child
    - Characterised by age
    - Arrival probability depends on family characteristics
    - Departure with certainty when child reaches age 18
  - Partners
    - Characterised by education, employment status and wage
    - Arrival and departure probabilities depend on family characteristics

Model: dynamics of family income

- Male wage equation and selection into employment

$$w^m_{s^m ia} = \ln W^m_{s^m} + \alpha^m_{s^m} \ln(a-18) + v^m_{s^m ia}$$

Log wage — Market wage rate — Age — Productivity

$$v^m_{s^m ia} = \rho^m v^m_{s^m ia-1} + u^m_{s^m ia}$$

$$u^m_{s^m ia} \sim N(0, \sigma^2_{us^m})$$ Ongoing couples

$$v^m_{s^m ia} \sim N(0, \sigma^2_{vs^m})$$ New couples

- Detailed model of UK tax and benefit system (FORTAX)
  - Taxes: income tax, NI, council tax
  - Benefits: child benefit, maternity grant, tax credits, income support, housing benefit, council tax benefit, free school meals

Model: decision-making environment

- Risk averse individuals faced with uncertainty
  - Own productivity (health)
  - Family dynamics: partnering/separation, child bearing
  - Partner employment and income
- No insurance market
  - Only implicit insurance through human capital, savings and public policy
- Credit constraints during working life
  - So public policy may facilitate transfers across lifecycle
- Decisions taken to maximise expected lifetime utility

$$V_a(X_{ia}) = \max_{\{c,l\}a,\ldots,A} E\left\{\sum_{b=a}^{A} \beta^{b-a} U(c_{ib}, l_{ib}; X_{ib}) \mid X_{ia}\right\}$$

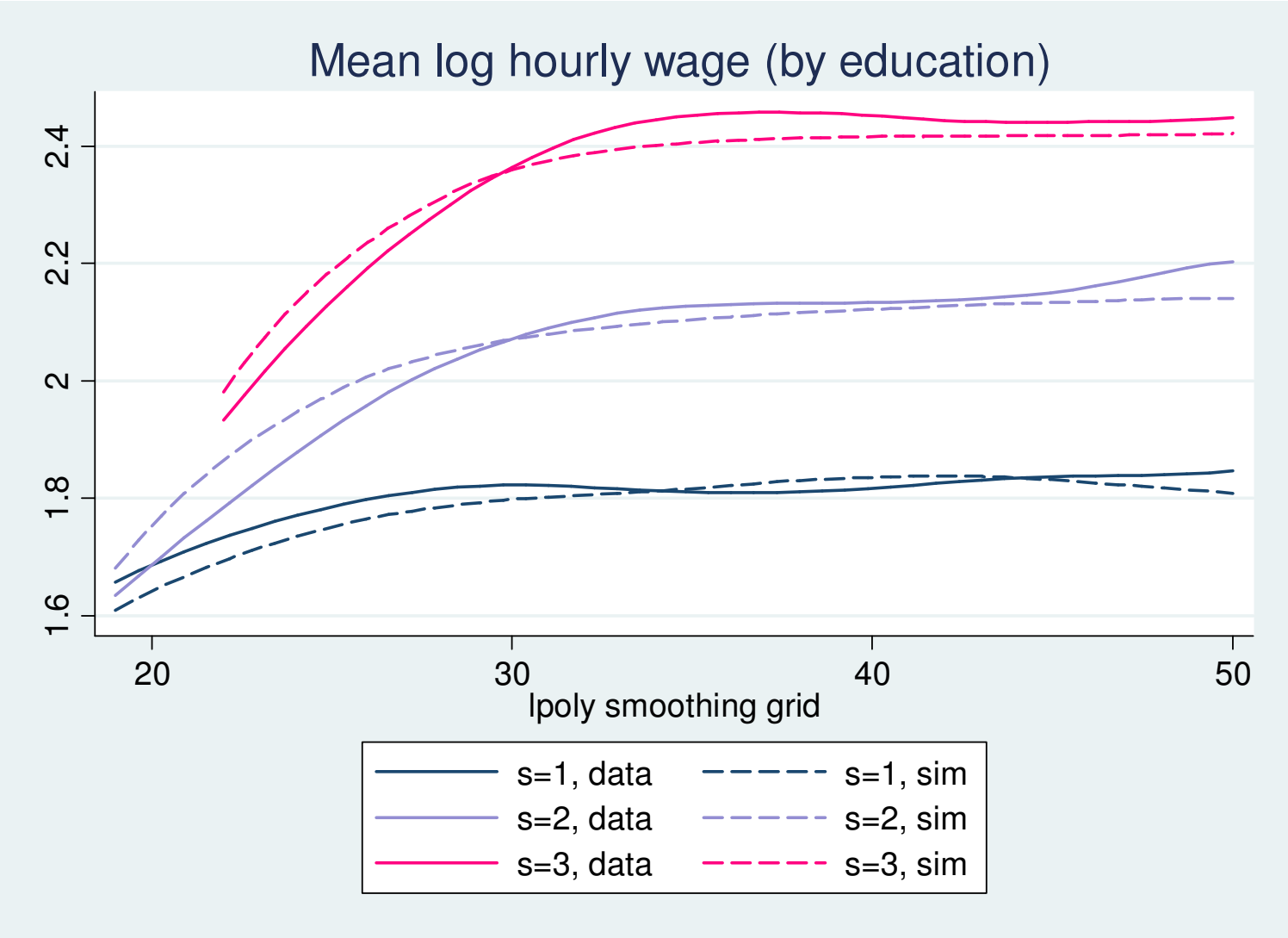
Value — State variables — Utility function — Consumption — Labour supply

Model: data and estimation

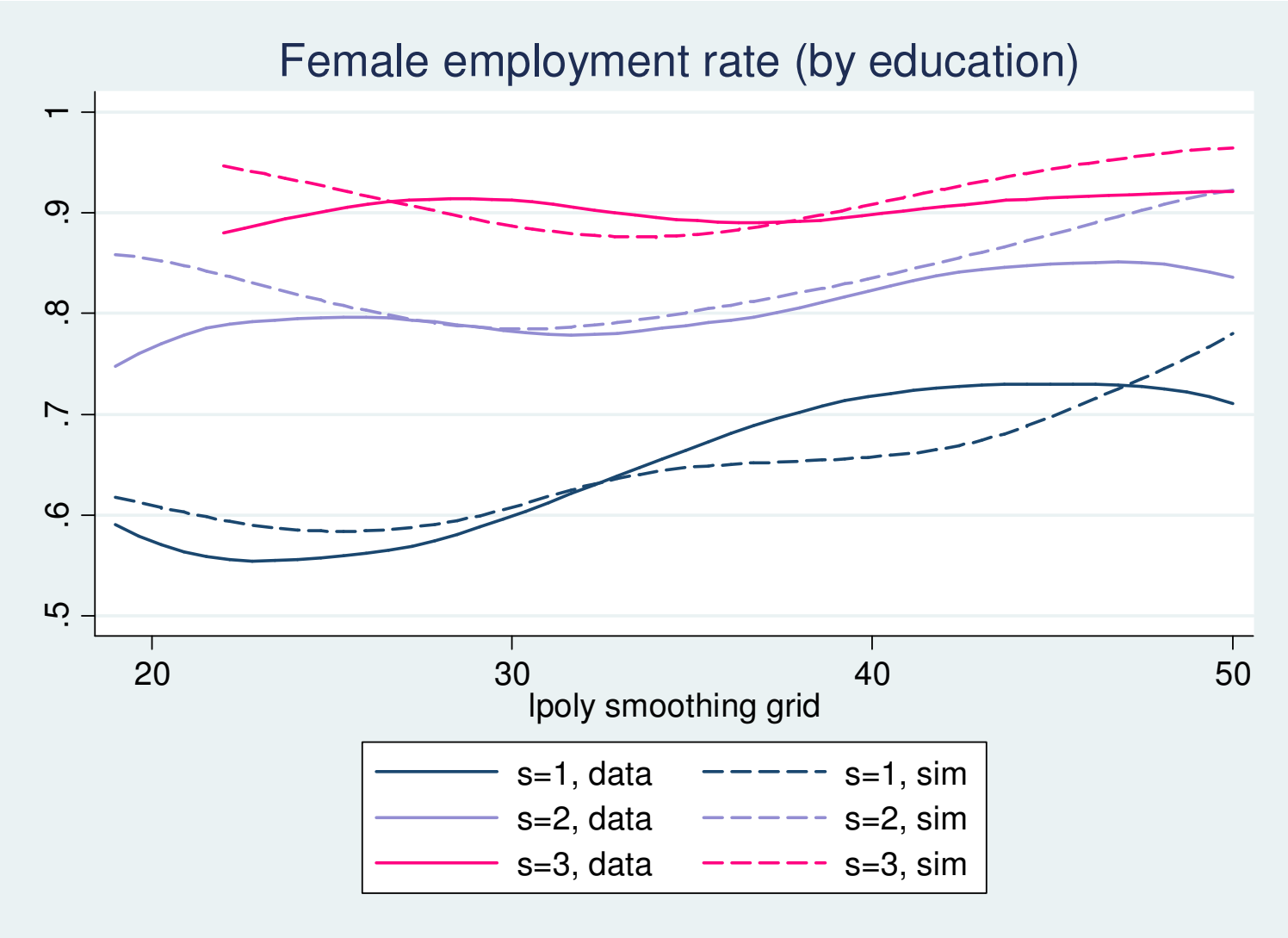
- Model estimated using BHPS data:
  - Unbalanced panel of 5,300 females over 16 waves, 1991–2006

- Multi-step estimation procedure
  1. Fix interest rate, discount rate, intertemporal preference parameter
  2. Estimate some parameters outside structural model
     - Male selection model
     - Family dynamics and childcare costs (reduced form)
  3. Estimate remaining parameters by method of simulated moments (MSM)
     - Parameters include: cost of education, female wage equation, experience accumulation, taste for employment, distribution of unobserved heterogeneity
- Results below based on data simulated by the model

Model fit: female log hourly wage



Model fit: female employment rate



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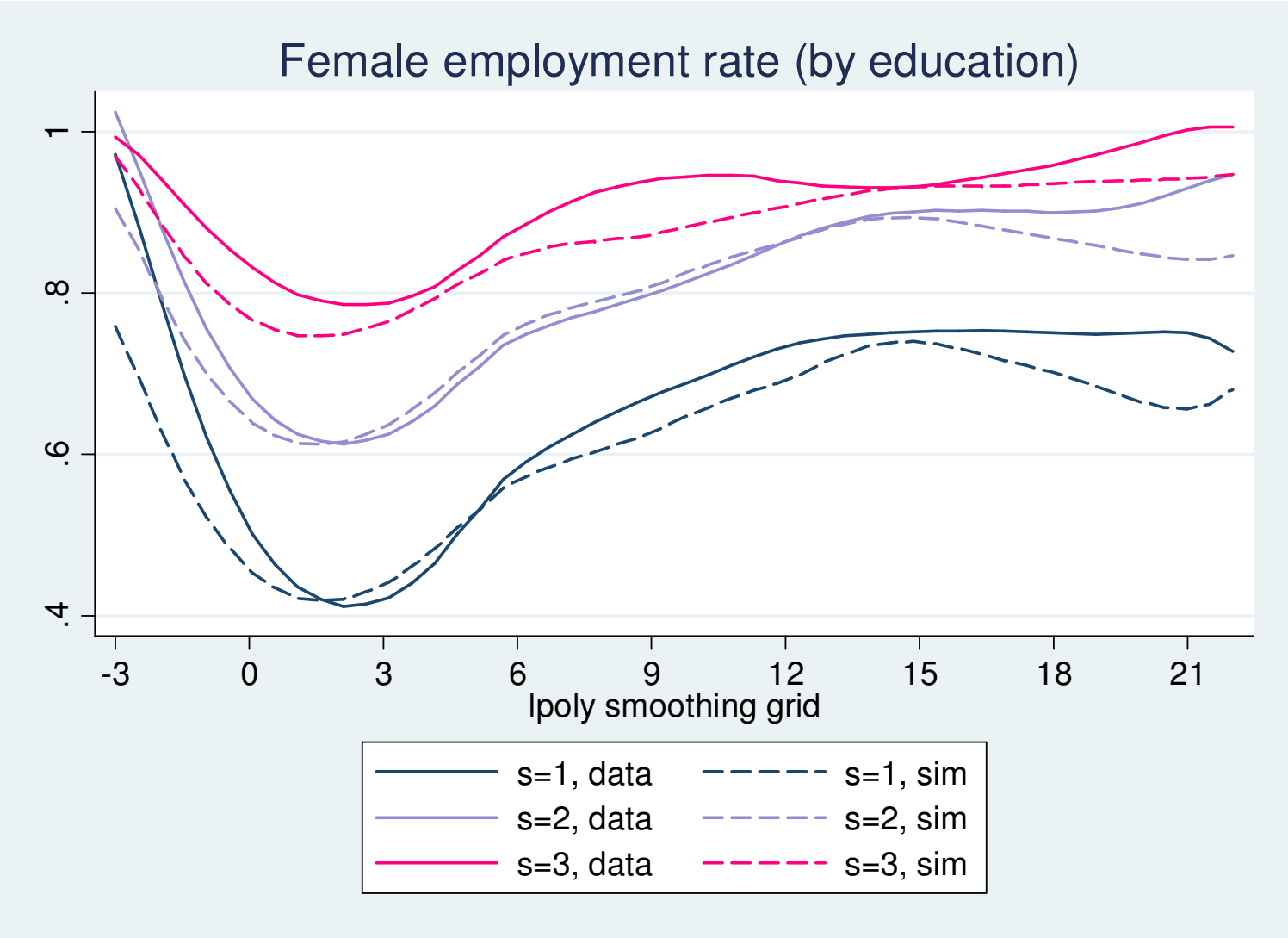
Model fit: female employment rate by age of child



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Lifecycle employment effects of reforms

	Total	Single childless	Single mother	Couple childless	Couple mother	Tax adjust
Non-revenue neutral effect (ppt/100):						
1999+WFTC	0.015	0.000	0.103	-0.001	-0.042	–
2002						
2004						

Lifecycle employment effects of reforms

	Total	Single childless	Single mother	Couple childless	Couple mother	Tax adjust
Non-revenue neutral effect (ppt/100):						
1999+WFTC	0.015	0.000	0.103	-0.001	-0.042	–
2002	0.005	0.007	0.050	0.000	-0.038	–
2004						

Lifecycle employment effects of reforms

	Total	Single childless	Single mother	Couple childless	Couple mother	Tax adjust
Non-revenue neutral effect (ppt/100):						
1999+WFTC	0.015	0.000	0.103	-0.001	-0.042	–
2002	0.005	0.007	0.050	0.000	-0.038	–
2004	0.006	0.025	0.032	-0.003	-0.031	–

Lifecycle employment effects of reforms

	Total	Single childless	Single mother	Couple childless	Couple mother	Tax adjust
Non-revenue neutral effect (ppt/100):						
1999+WFTC	0.015	0.000	0.103	-0.001	-0.042	–
2002	0.005	0.007	0.050	0.000	-0.038	–
2004	0.006	0.025	0.032	-0.003	-0.031	–
Revenue neutral effect (ppt/100):						
1999+WFTC	0.014	-0.002	0.103	0.000	-0.043	+0.014
2002	0.002	0.002	0.046	0.001	-0.039	+0.039
2004	0.005	0.021	0.029	-0.003	-0.027	+0.029

Note: "Tax adjust" = change in basic rate of income tax

Education effect of reforms

	Basic	Intermediate	Higher
1999 baseline	0.318	0.472	0.209
Revenue neutral effect (ppt/100):			
1999+WFTC	0.014	-0.003	-0.011
2002	0.023	-0.005	-0.017
2004	0.034	-0.009	-0.025

Employment effects of reforms, allowing for education response

	Total	Single childless	Single mother	Couple childless	Couple mother	Tax adjust
Revenue neutral effect, no education response (ppt/100):						
1999+WFTC	0.014	-0.002	0.103	0.000	-0.043	+0.014
2002	0.002	0.002	0.046	0.001	-0.039	+0.039
2004	0.005	0.021	0.029	-0.003	-0.027	+0.029

Note: “Tax adjustment” = change in basic rate of income tax

Lifecycle employment effects of reforms allowing for education response

	Total	Single childless	Single mother	Couple childless	Couple mother	Tax adjust
Revenue neutral effect, no education response (ppt/100):						
1999+WFTC	0.014	-0.002	0.103	0.000	-0.043	+0.014
2002	0.002	0.002	0.046	0.001	-0.039	+0.039
2004	0.005	0.021	0.029	-0.003	-0.027	+0.029
Revenue neutral effect, with education response (ppt/100):						
1999+WFTC	0.005	-0.006	0.080	-0.002	-0.051	+0.021
2002	-0.010	-0.006	0.014	-0.001	-0.048	+0.050
2004	-0.012	0.012	-0.017	-0.006	-0.037	+0.045

Note: “Tax adjustment” = change in basic rate of income tax

Conclusion

- Develop a female lifecycle model to study UK tax and benefit system in dynamic context
  - Dynamics via education choices, experience accumulation, productivity and family composition
- Estimated on UK data
- Used to understand effect of UK tax credit reforms
- Results suggest:
  - Lifecycle employment effects (holding education fixed):
    - Large for lone mothers and mothers in couples
    - Marginally positive overall
  - But education choices sensitive to reforms
  - Lifecycle employment effects (allowing education response):
    - Effects fall substantially
    - Overall effect now negative