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

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

Preliminary – comments welcome

What we do

- Construct 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)
- Estimate parameters using British panel data (BHPS)
- Study effect of tax credit reforms on education and employment decisions over the lifecycle

Advances over standard approaches

- Features of traditional welfare evaluations (e.g. Brewer et al, 2006):
  1. Estimate impact of particular policy reforms
  2. Use static framework
  3. Focus on short-run labour supply response
  4. Ignore role of family in policy impact
- 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

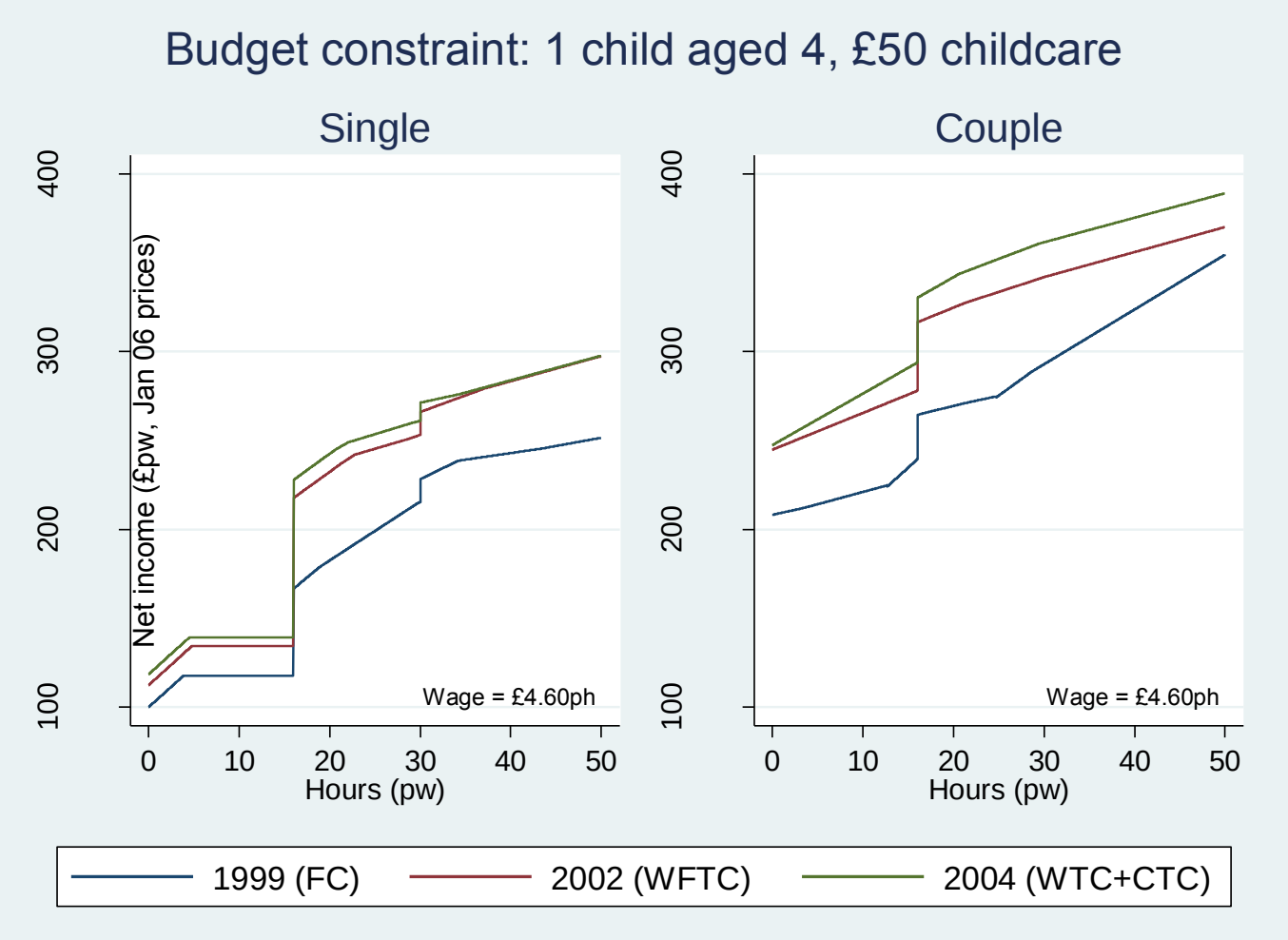
Background: UK tax credit reforms

Award for family with one child aged 0-10 (£ per week, nominal terms)

	April 1999 (FC)	April 2002 (WFTC)	April 2004 (WTC and CTC)
Basic award	£64.95	£88.95	£101.63
30-hour premium	£11.05	£11.65	£12.31
Earnings threshold	£80.65	£94.50	£97.31 and £961.54
Taper rate	70% of net earnings	55% of net earnings	37% and 6.67% of gross earnings
Help with childcare	Disregard up to £60 childcare expenses	Maximum award increased by 70% of childcare expenses up to £135	Maximum award increased by 70% of childcare expenses up to £135

Note: Families with children are eligible if **at least one** adult works 16+ hours. Help with childcare requires **all** adults to work 16+ hours. The increase in generosity between WFTC and WTC/CTC is exaggerated because the reform also incorporated elements of other benefits.

Background: UK tax credit reforms (2)



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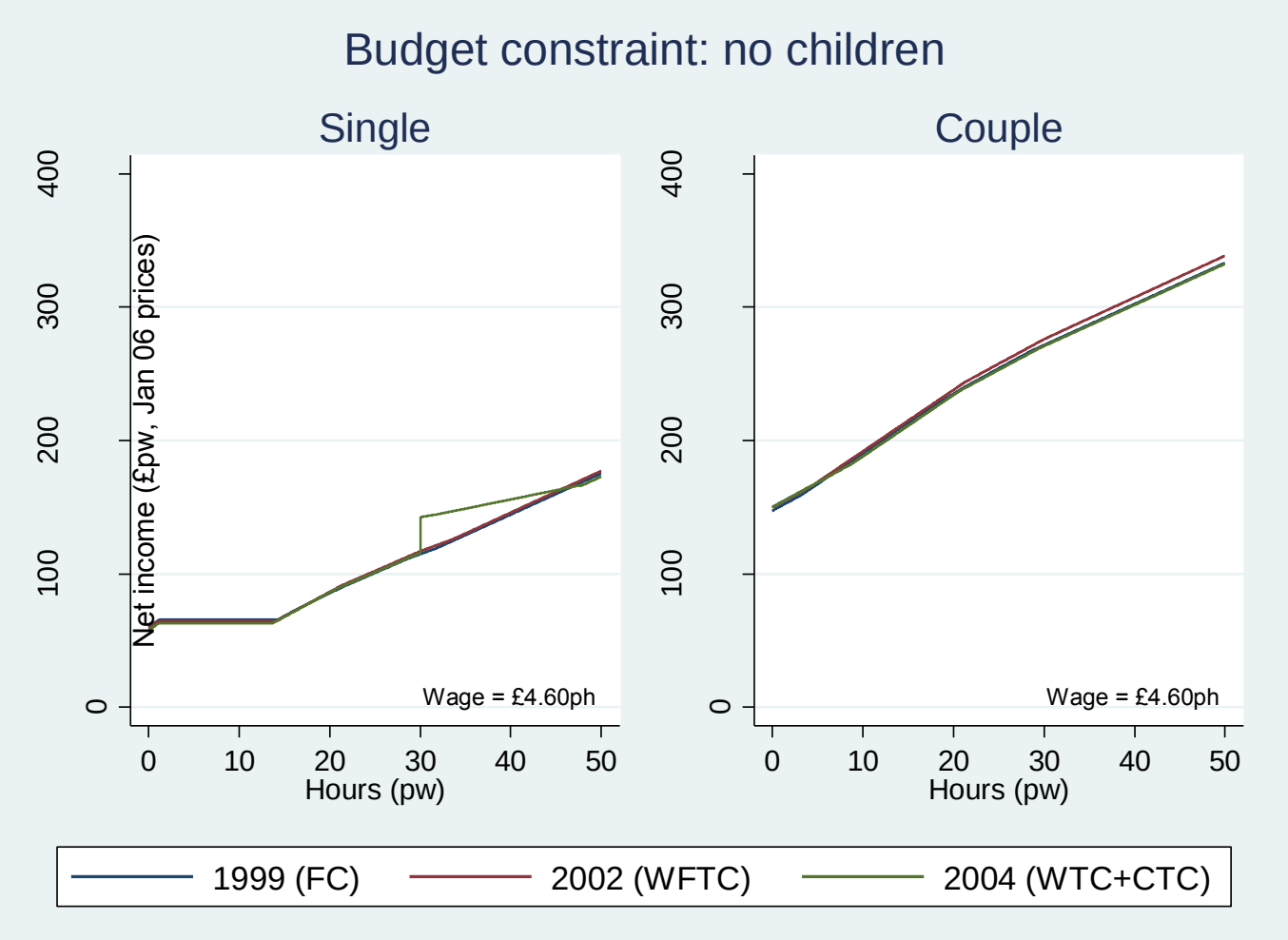
Background: UK tax credit reforms (3)



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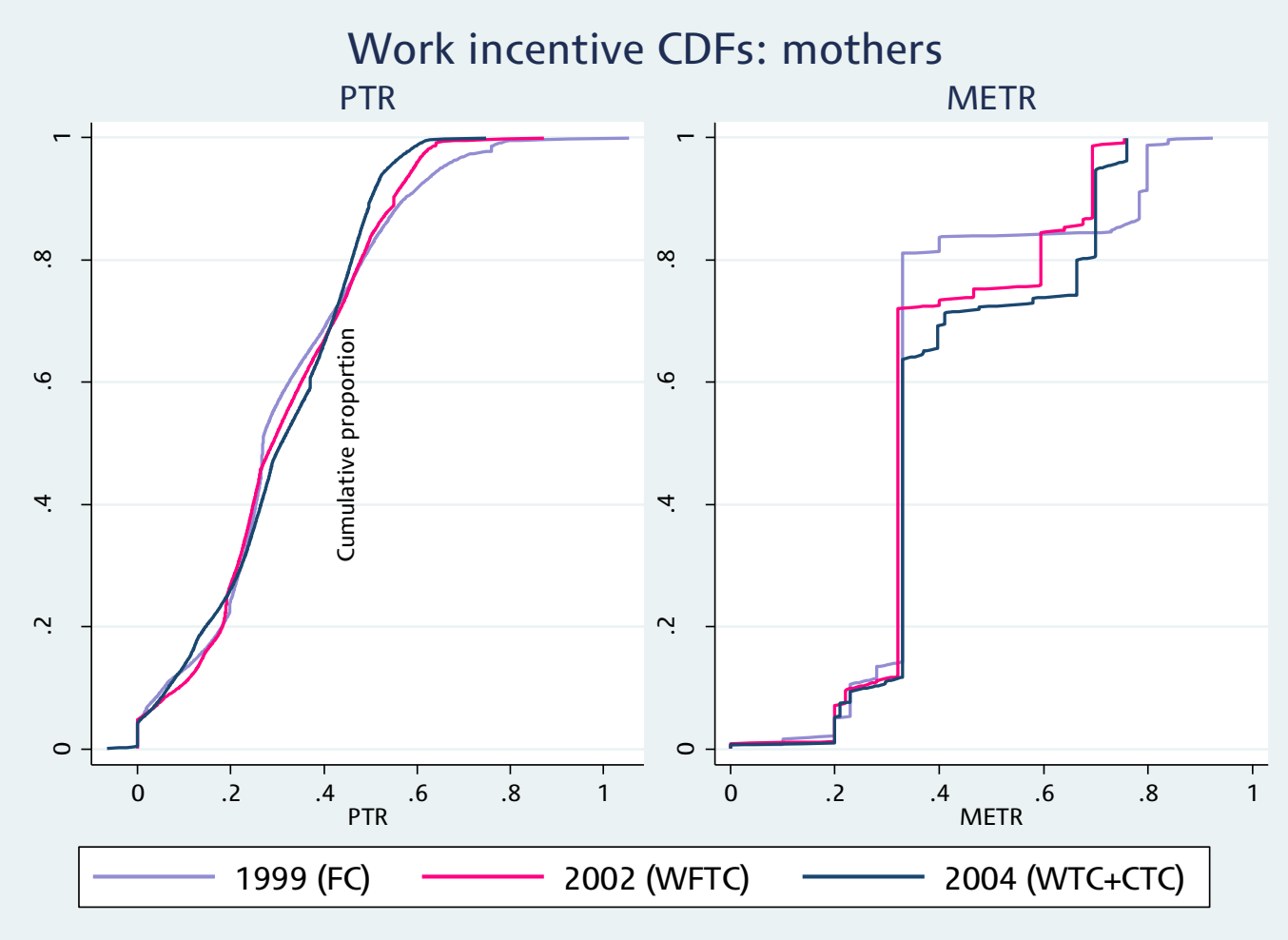
Background: UK tax credit reforms (4)



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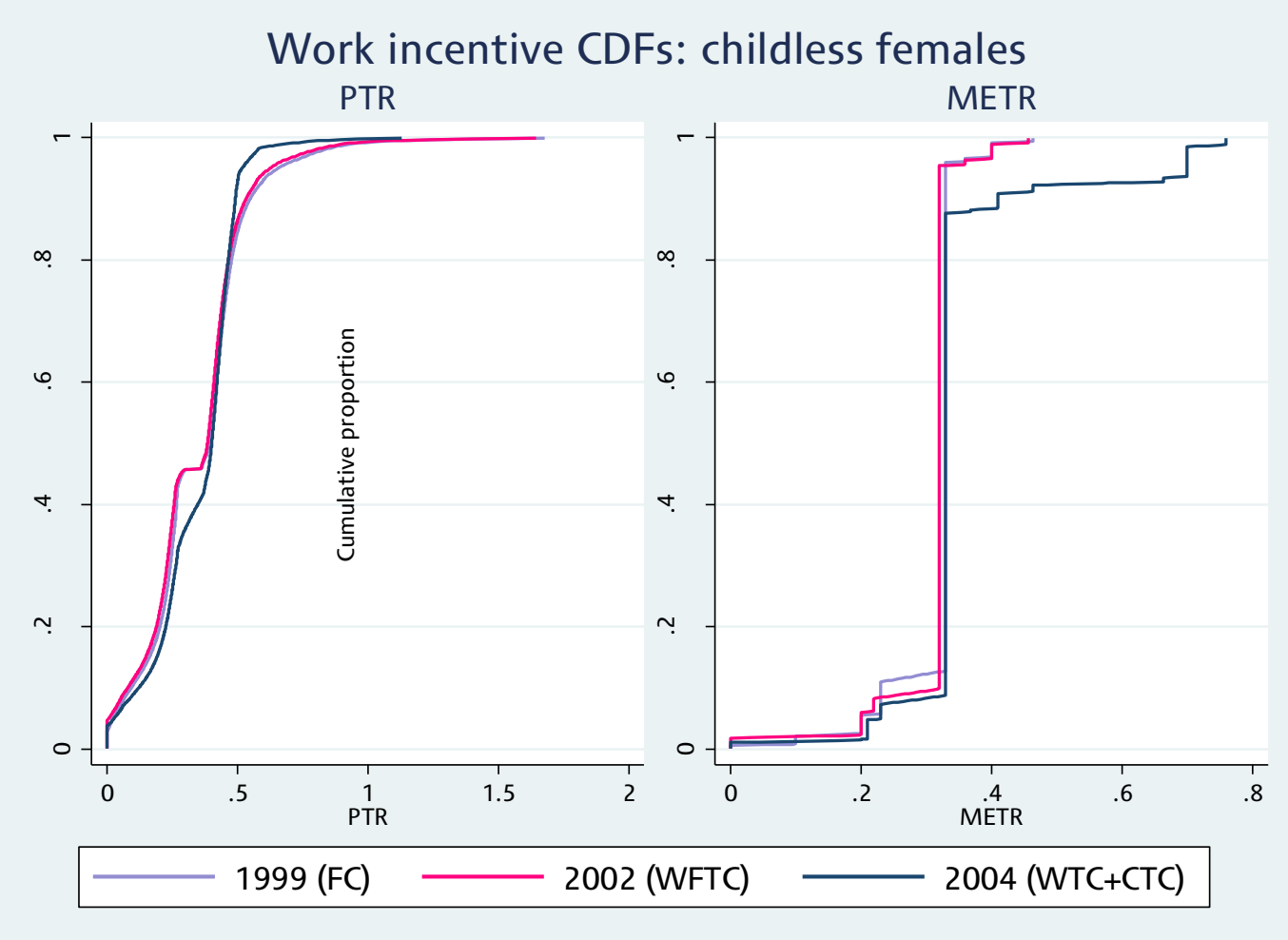
Background: UK tax credit reforms (5)



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Literature: impact of WFTC

- Employment effects
  - + 2-7ppt increase in employment rate for lone parents
  - Smaller, possibly negative impact for second earners in couples
  - Blundell et al, 05; Brewer et al, 06; Francesconi and van der Klaauw, 04; Francesconi et al, 09
- Anticipation employment effects
  - May be substantial (Francesconi and van der Klaauw, 04)
- Couple formation and dissolution
  - Mixed evidence for couple formation and dissolution (Francesconi and van der Klaauw, 04; Gregg et al, 07; Francesconi et al. 09)
- Childbearing
  - Fall in fertility for lone parents (Francesconi and van der Klaauw, 04)
  - Rise in fertility for couples (Brewer et al, 08)

=> Last three may undermine existing employment estimates

Model: overview of female lifecycle

Life in four stages:

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

Model: dynamics of family income

- Female wage
  - Depends on education, experience, persistent productivity shock
  - Experience accumulates while working
- (Exogenous) family formation dynamics
  - Children
    - For simplicity, at most 1 child
    - Arrival probability depends on female age, education and presence of partner
    - Departure with certainty when child reaches age 18
  - Partners
    - Characterised by education, employment status and wage
    - Arrival probability for male with given education depends on female age and education
    - Departure probability depends on female age, presence of child and male education
- Detailed model of tax and benefit system (FORTAX)

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

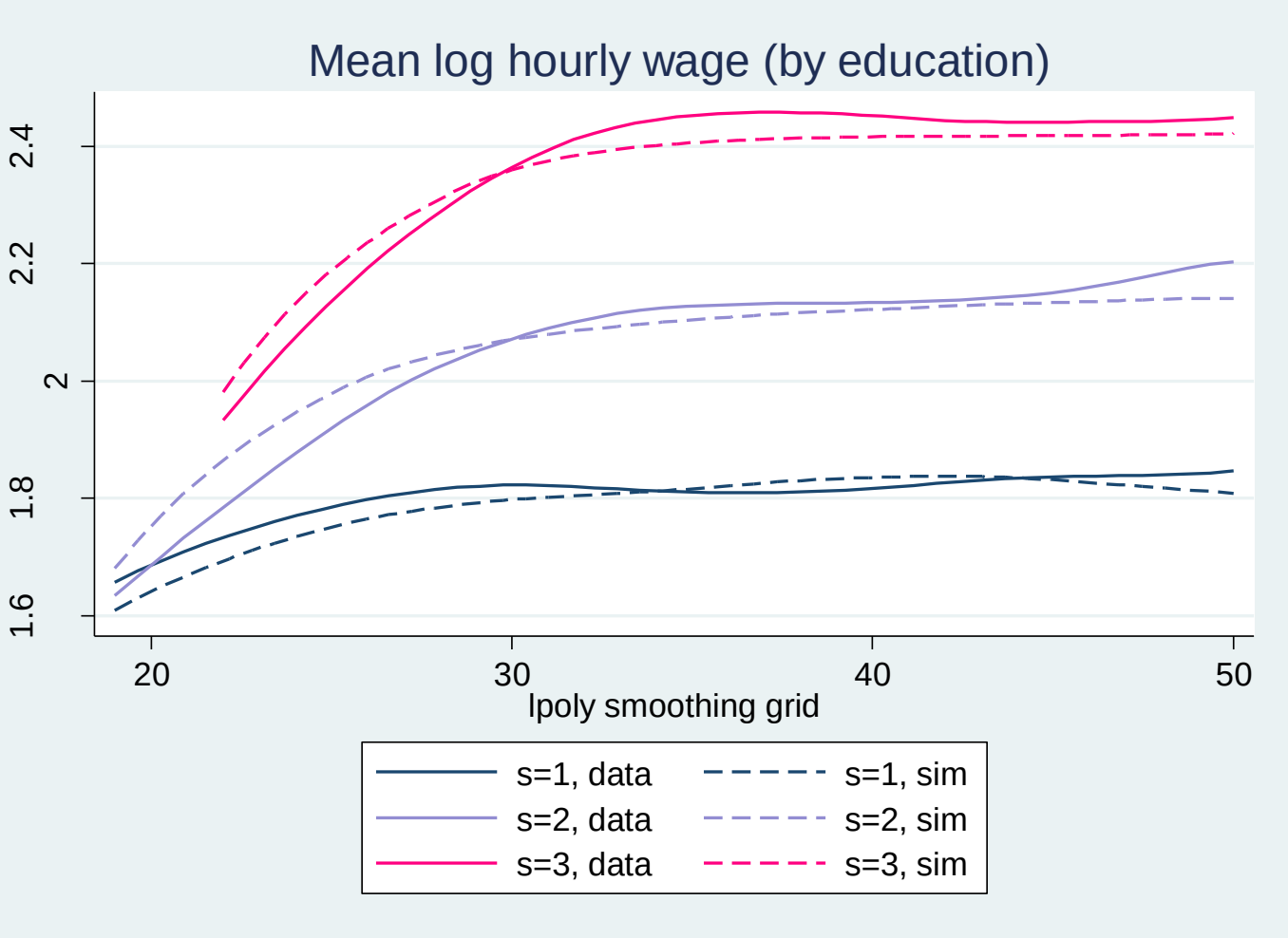
$$V_a(X_{ia}) = \max_{\{c,l\}a,\ldots,A} E\left\{\sum_{b=a}^{A} \beta^{b-a} U(c_{ib}, l_{ib}; X_{ib}) \mid X_{ia}\right\}$$

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



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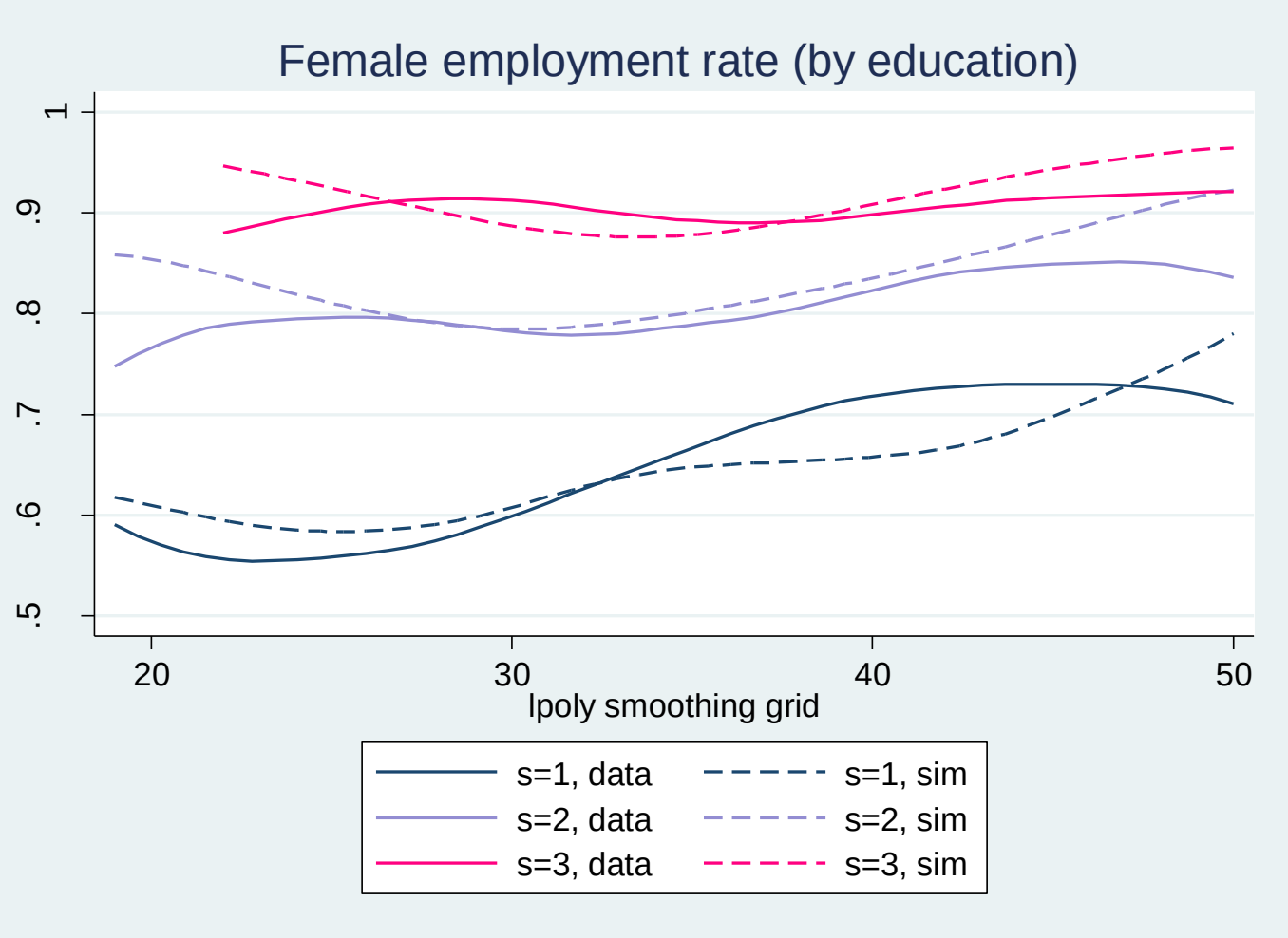
Model fit: female employment rate



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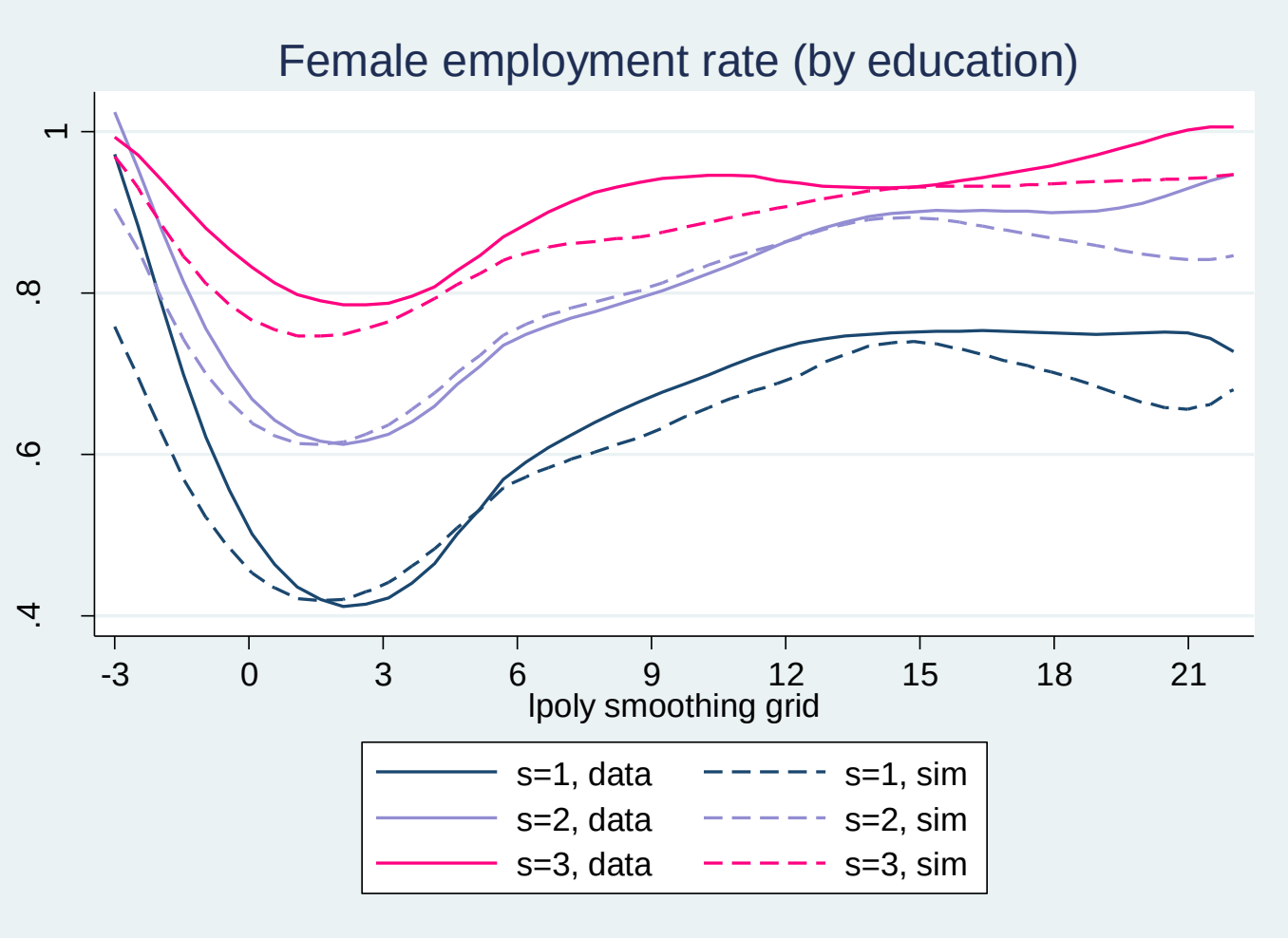
Model fit: female employment rate by age of child



Employment effects of tax credit reforms

	All women				Single women			
	All	No child	Mothers	Child left	All	No child	Mothers	Child left
2002 vs 1999								
All	-0.004	0.006	-0.016	0.002	0.020	0.010	0.051	0.005

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Employment effects of tax credit reforms

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	All	No child	Mothers	Child left	All	No child	Mothers	Child left
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All	-0.004	0.006	-0.016	0.002	0.020	0.010	0.051	0.005
GCSEs	-0.003	0.013	-0.016	0.003	0.034	0.024	0.063	0.009

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GCSEs	-0.003	0.013	-0.016	0.003	0.034	0.024	0.063	0.009
2004 vs 1999								
All	-0.007	0.006	-0.017	-0.008	0.037	0.027	0.057	0.034
GCSEs	-0.004	0.015	-0.011	-0.009	0.066	0.063	0.075	0.059

Education effects

	1999 (baseline)	2002 (increment)	2004 (increment)
GCSEs	0.369	0.005	0.011
A-levels and vocational	0.387	-0.002	-0.004
University	0.244	-0.003	-0.007

Decomposing employment effects: 2002 vs 1999

	All women				Single women			
	All	No child	Mothers	Child left	All	No child	Mothers	Child left
2002 vs 1999								
All	-0.004	0.006	-0.016	0.002	0.020	0.010	0.051	0.005
GCSEs	-0.003	0.013	-0.016	0.003	0.034	0.024	0.063	0.009
2002 vs 1999 cancelling education effect								
All	-0.003	0.006	-0.015	0.002	0.020	0.010	0.052	0.005
GCSEs	-0.004	0.012	-0.018	0.002	0.032	0.022	0.062	0.007

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Decomposing employment effects

	All women				Single women			
	All	No child	Mothers	Child left	All	No child	Mothers	Child left
2002 vs 1999								
All	-0.004	0.006	-0.016	0.002	0.020	0.010	0.051	0.005
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All	-0.003	0.006	-0.015	0.002	0.020	0.010	0.052	0.005
GCSEs	-0.004	0.012	-0.018	0.002	0.032	0.022	0.062	0.007
2002 vs 1999 cancelling all pre-motherhood effects								
All	-0.006	0.000	-0.016	0.002	0.014	0.000	0.050	0.005
GCSEs	-0.008	0.000	-0.019	0.002	0.025	0.000	0.060	0.007

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
- Preliminary results suggest:
  - Substantial employment effects for lone mothers and mothers in couples
  - Small impact on education choices
  - Employment effects not due to changing employment choices
  - Possibly some anticipation effects but little impact on employment during eligibility