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## Microsimulation in the UK: TAXBEN

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Workshop on microsimulation modelling for fiscal policy analysis  
European Commission Joint Research Centre, Seville  
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# TAXBEN

- Static microsimulation model of the UK tax and benefit system
- First built early 1980s, continuous development since
  - Now increasing investment in upgrades
- Current version written in Delphi (Object Pascal)
- Not open source, and poorly documented (for now)

# Coverage

## Tax and benefit systems since 1975

- Plus, crucially, hypothetical alternatives

### Includes:

- Income tax
- Employee and employer social security contributions
- Council tax (local housing tax)
- VAT
- Most taxes on specific goods (fuel, alcohol, tobacco)
- State pensions and all significant state benefits and tax credits

### But not:

- ‘Capital taxes’: capital gains tax, inheritance tax, stamp duties (property and share transaction taxes)
- ‘Business taxes’: corporation tax, business rates (property tax)
- Public services

# Data

- Runs on several household survey datasets (with population weights)
  - Family Resources Survey (from 1994)
  - Living Costs and Food Survey (from 1978)
  - English Longitudinal Study of Ageing (from 2002)
  - (Labour Force Survey 2007)
- Hoping to add more soon
  - Wealth and Assets Survey
  - Understanding Society
- Also simulated datasets (e.g. simulated lifecycles)
- Not administrative data
  - Doesn't contain crucial information (family circumstances, rent, etc.)
  - Sometimes use it separately

# Static model

- Single period
- No behavioural responses or economic effects embedded in model
- But used extensively as input to behavioural modelling
  - e.g. TAXBEN-generated budget constraints used to estimate labour supply models and simulate labour supply under different tax and benefit systems
  - also consumer demand systems, etc.
- Allows us to use different behavioural models as appropriate
  - Best model to use won't be the same in every case
  - TAXBEN calculator can be called by other programs
- Recent development: FORTAX
  - Slimmed-down tax and benefit model written in Fortran
  - Less functionality than TAXBEN, but faster
  - Useful for dynamic lifecycle models of behaviour (need millions of runs)

# Main UK microsimulation models outside IFS

- Static tax and benefit models
  - IGOTM (HM Treasury) and PSM (Department for Work and Pensions)
  - EUROMOD (based at University of Essex)
  - One or two think tanks
- Dynamic models with a tax/benefit element
  - PENSIM2 (Department for Work and Pensions)
  - SAGE (LSE)
  - LINDA (developed by NIESR, occasionally used by HM Treasury)

# The Institute for Fiscal Studies

- An independent not-for-profit microeconomic research institute
- Aim: ‘to promote the development of effective policy on taxation and government spending by providing high-quality impartial evidence and analysis to inform the public debate’
  - Bridge the gap between academia and policy discussion
- About 50 research staff, of whom about 6 main TAXBEN users
  - Plus network of academic Research Fellows etc.
- Funded by research grants
- Unique and important role in UK policy debate

# How is TAXBEN used?

- Best known for estimating revenue and distributional effects
- Also analysis of work incentives...
  - Interesting in its own right
- ...which feeds into labour supply modelling
  - Estimating/simulating effects of policies on employment, hours of work, earnings
- Input to other behavioural modelling too
  - Benefit take-up, consumer demand, human capital investment, etc.



# When is TAXBEN used?

## Reactive:

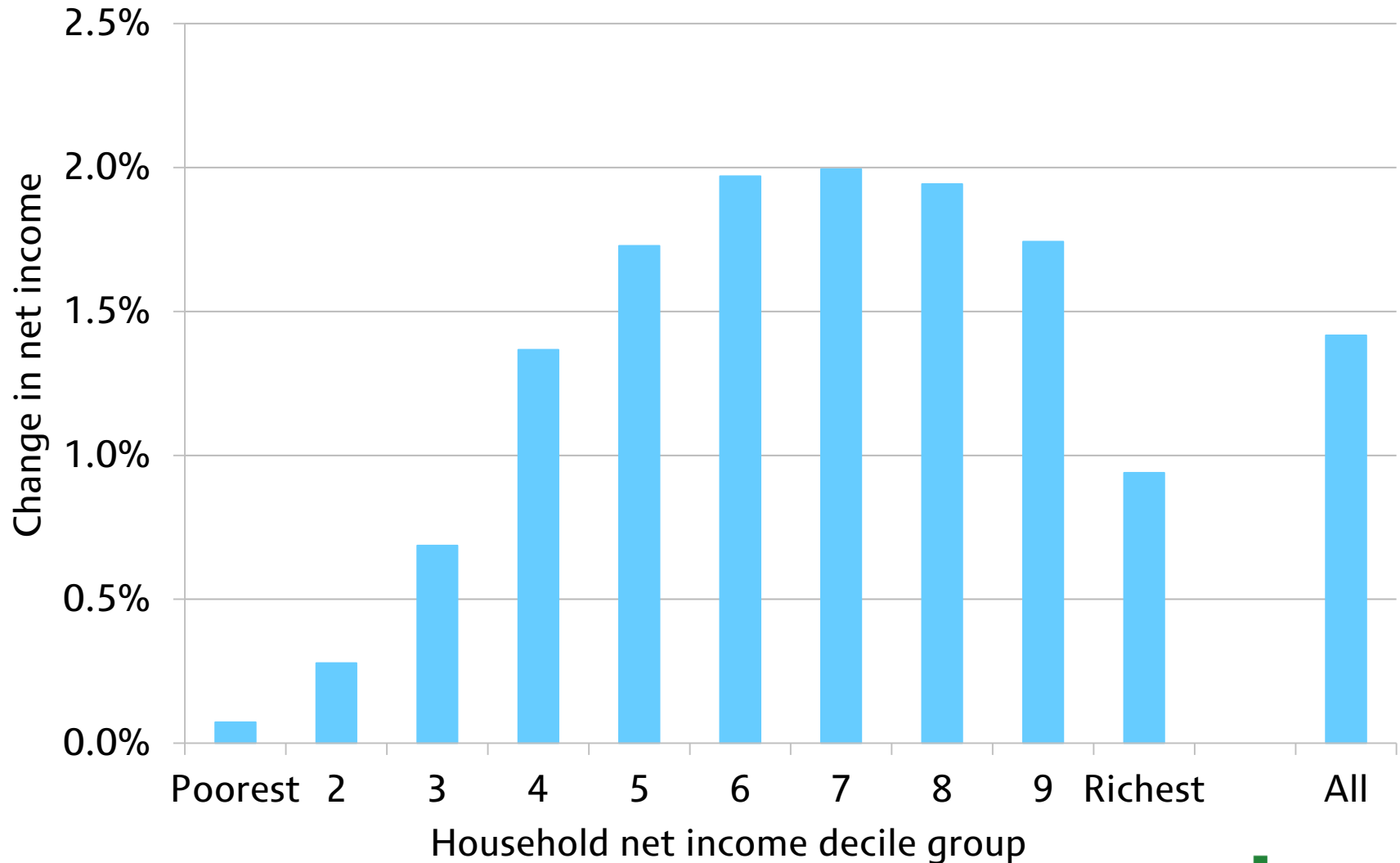
- Day after Budgets etc.
- Election campaigns (government's record, parties' proposals)
- Ad hoc analysis of new announcements/proposals

## Proactive:

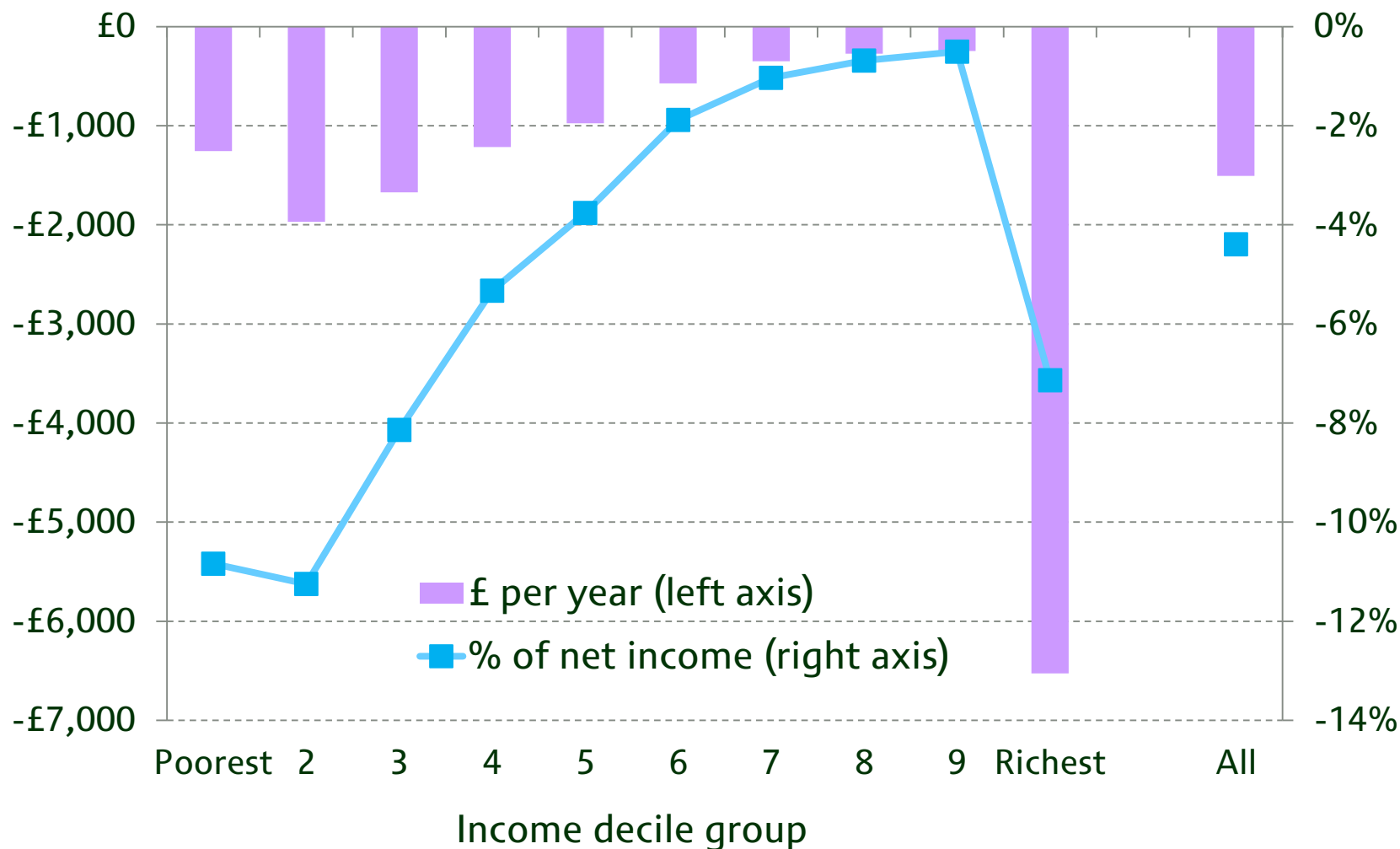
- Annual IFS Green Budget (analysis of options for Budget)
- Academic / policy research projects
  - 'The trade-off between work incentives and redistribution'
  - 'A retrospective evaluation of the EU VAT system'
  - 'The effect of working families' tax credit on lone mothers' labour supply'
  - The Mirrlees Review of taxation

# Increasing the income tax personal allowance

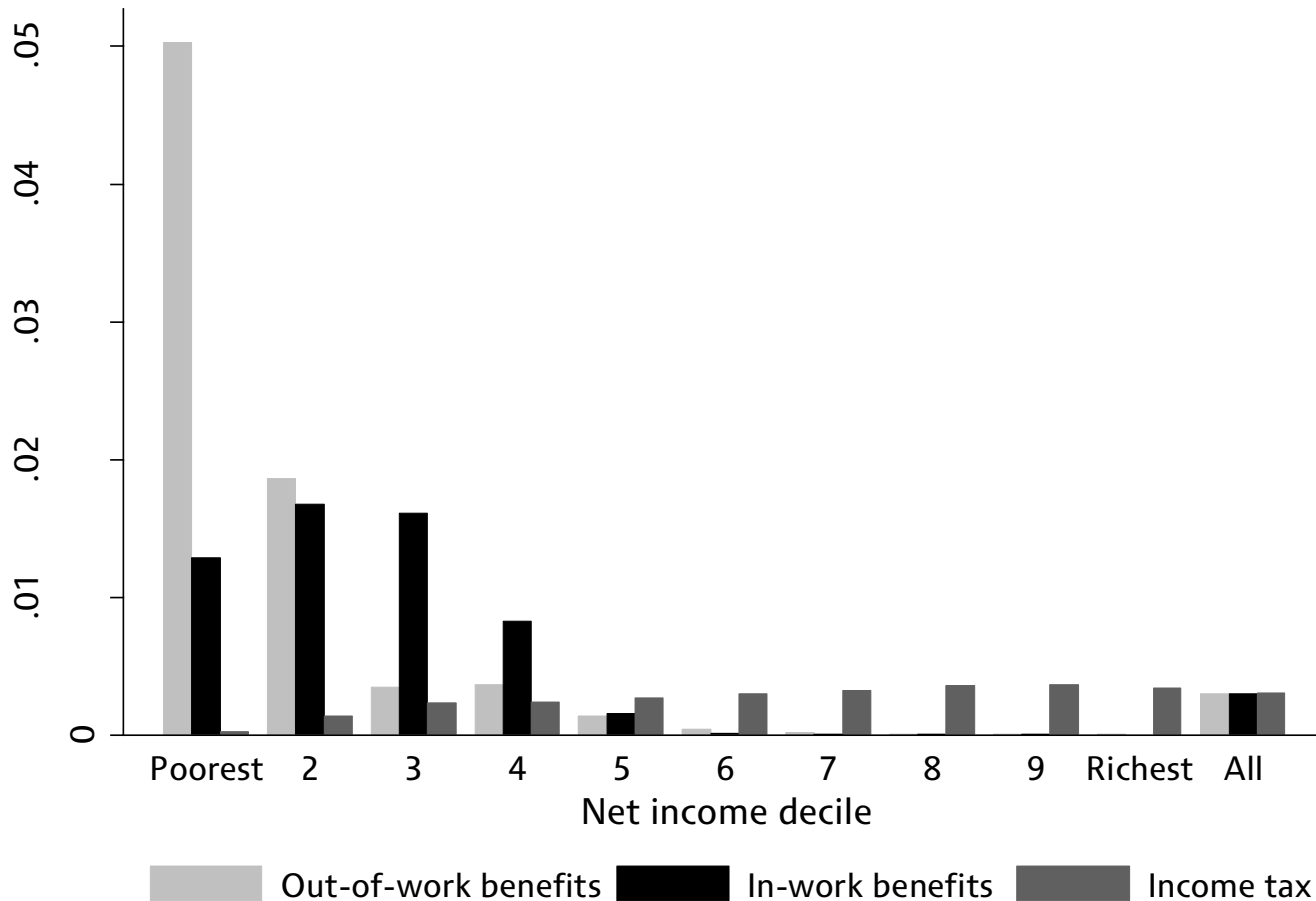
Distributional impact of an increase from £10,000 to £12,500



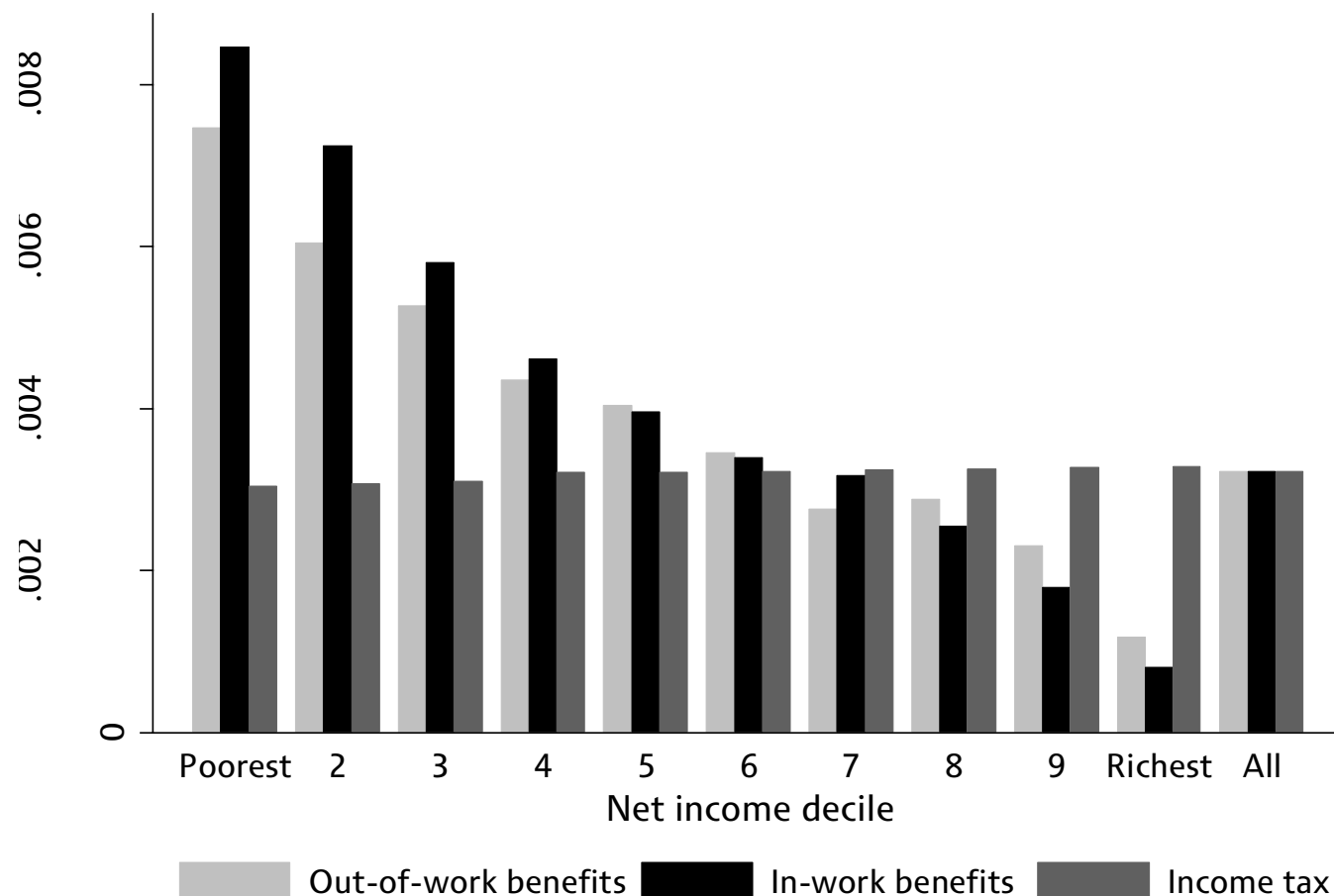
# Impact of tax and benefit reforms between January 2010 and April 2019



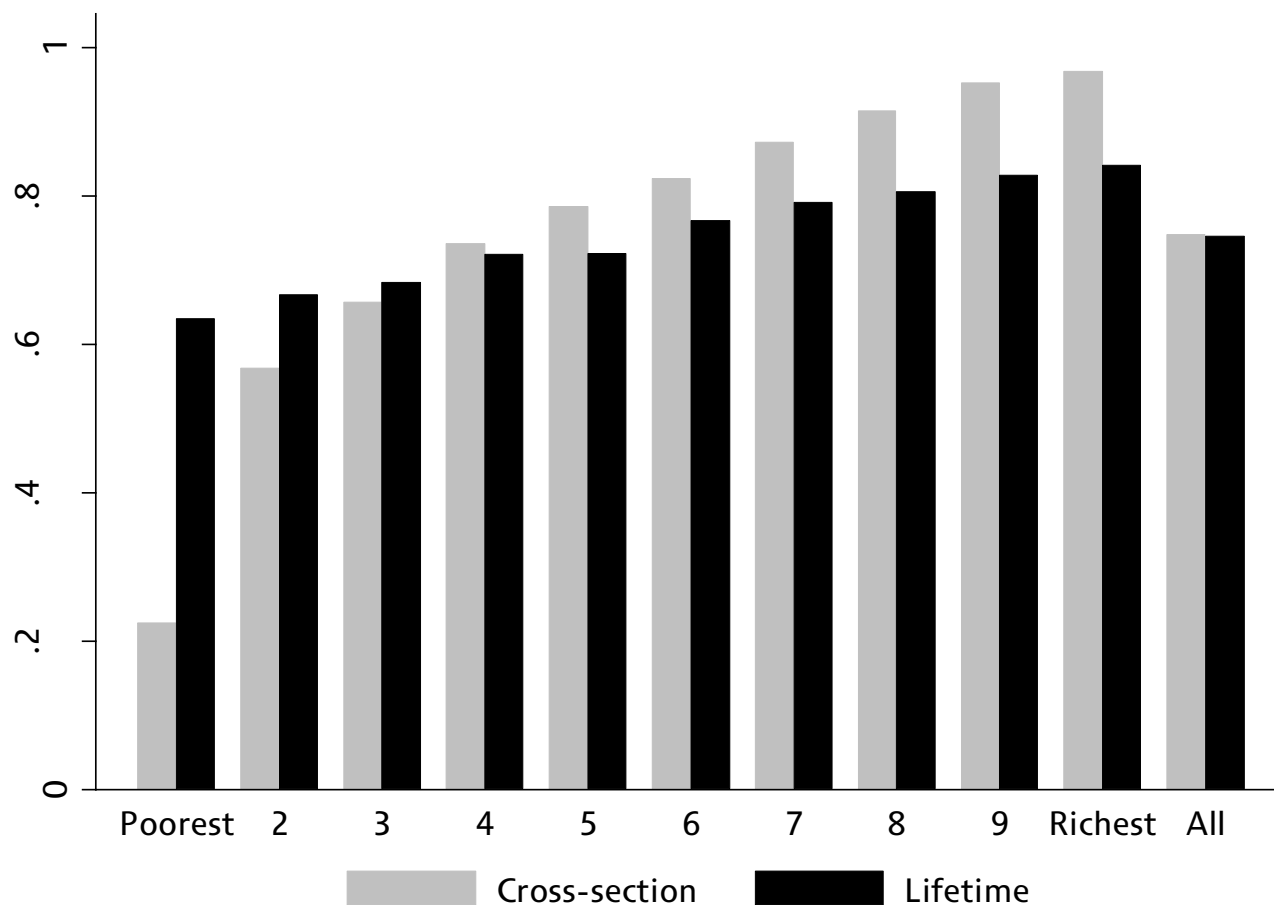
# In cross-section, increase in out-of-work benefits is most progressive



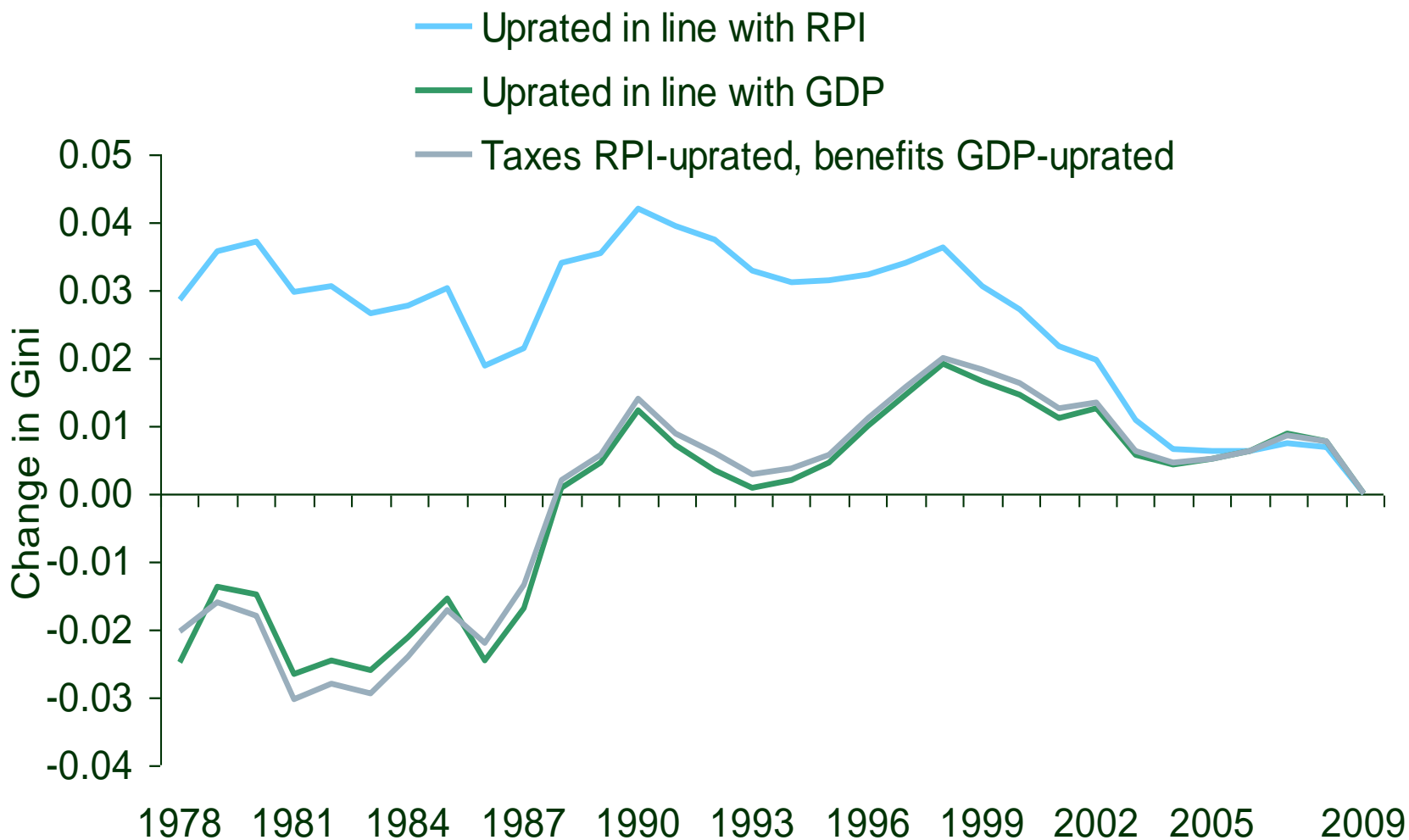
# Over the lifetime, increases in in-work and out-of-work benefits are similarly progressive



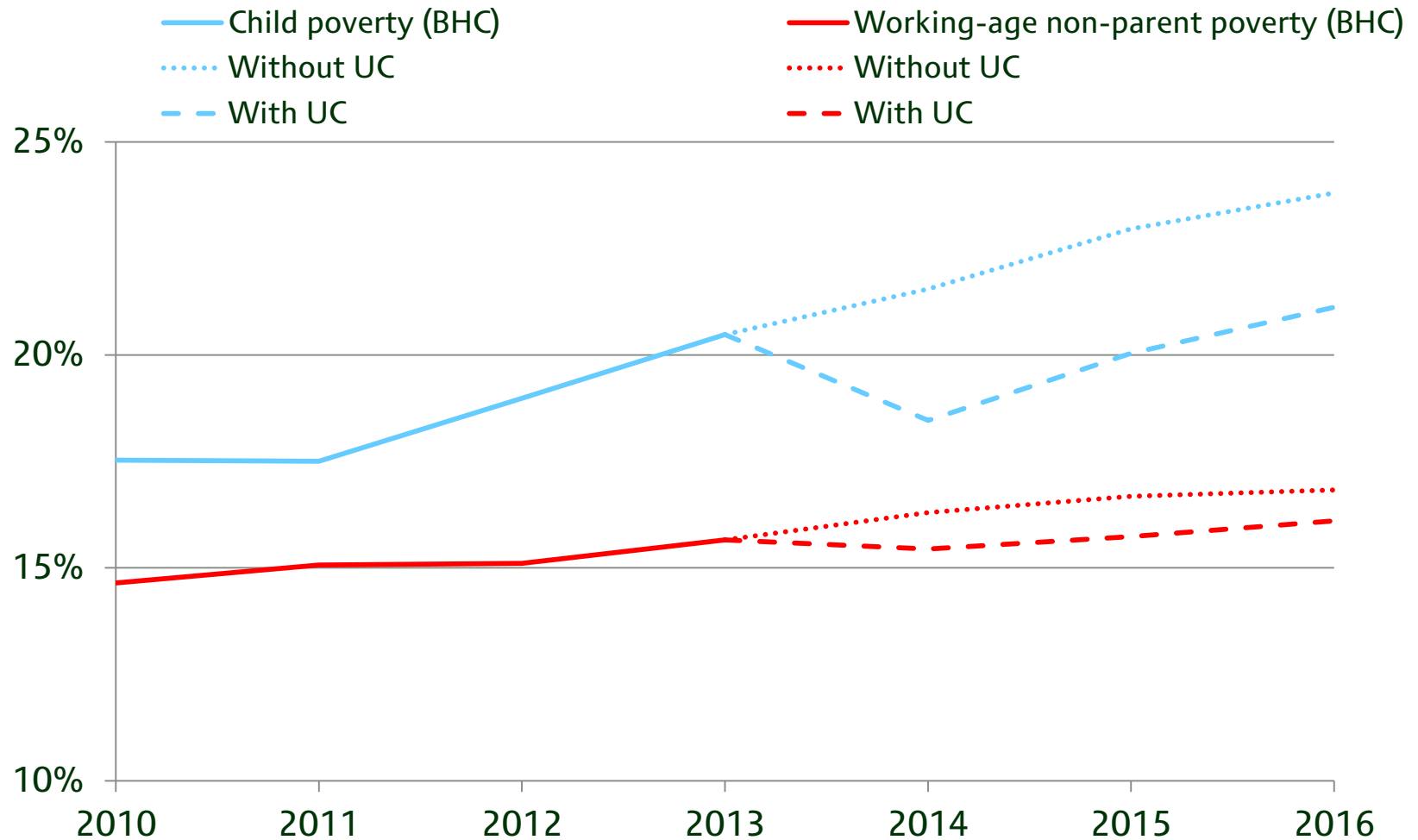
# Explanation: the poorest individuals spend most of working-age life in work



# Effect of tax and benefit reforms on income inequality



# Universal credit and relative poverty rates



Note: take-up assumptions important here

Source: J. Browne, A. Hood and R. Joyce (2013), *Child and working-age poverty in Northern Ireland from 2010 to 2020*



# Effect of universal credit on work incentives

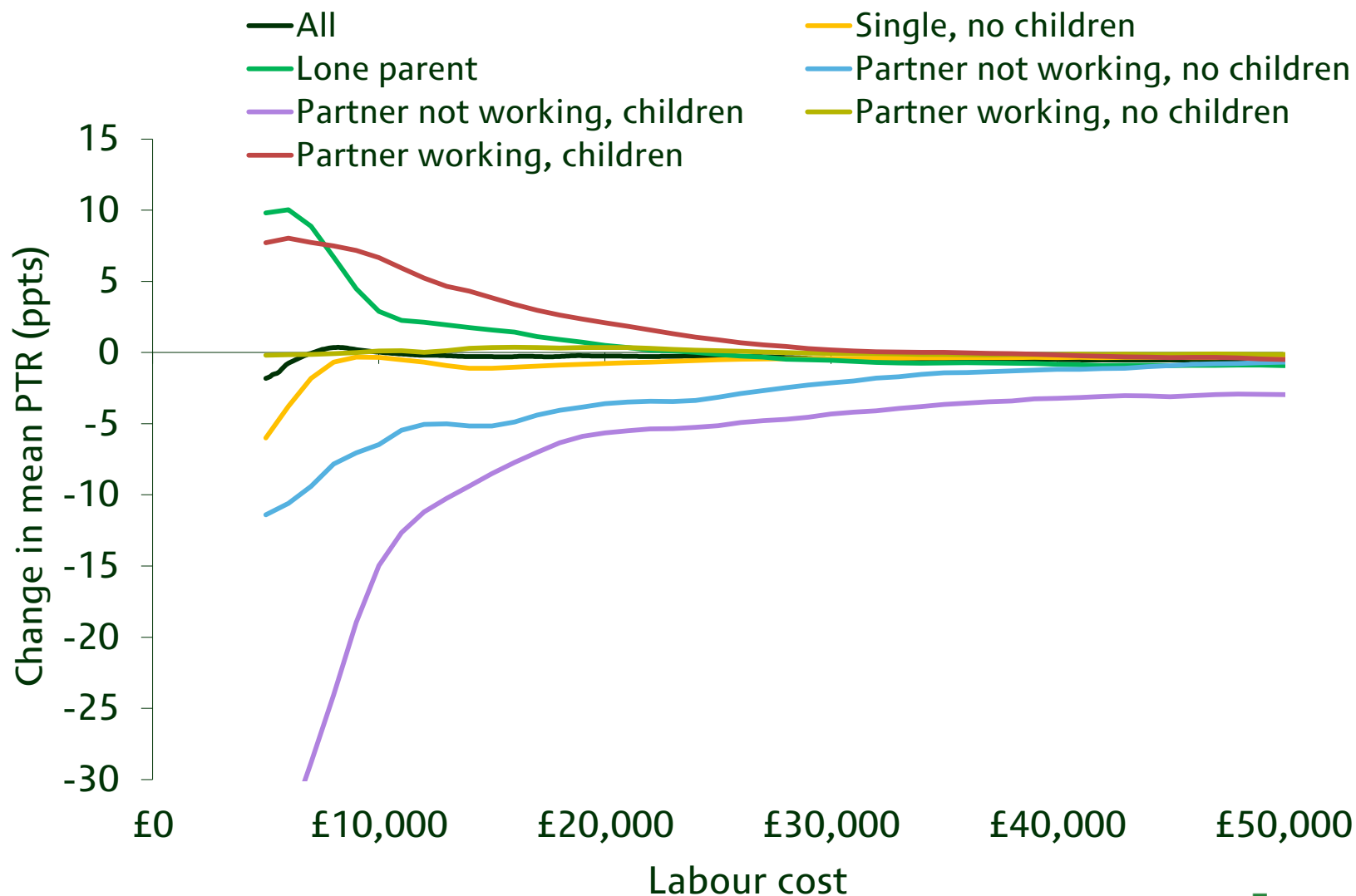
UC gets rid of many of the very weakest work incentives:

- reduces number of people with PTRs >75% by half (1.5m)
- reduces number of people with EMTRs >85% by more than 90% (0.5m)

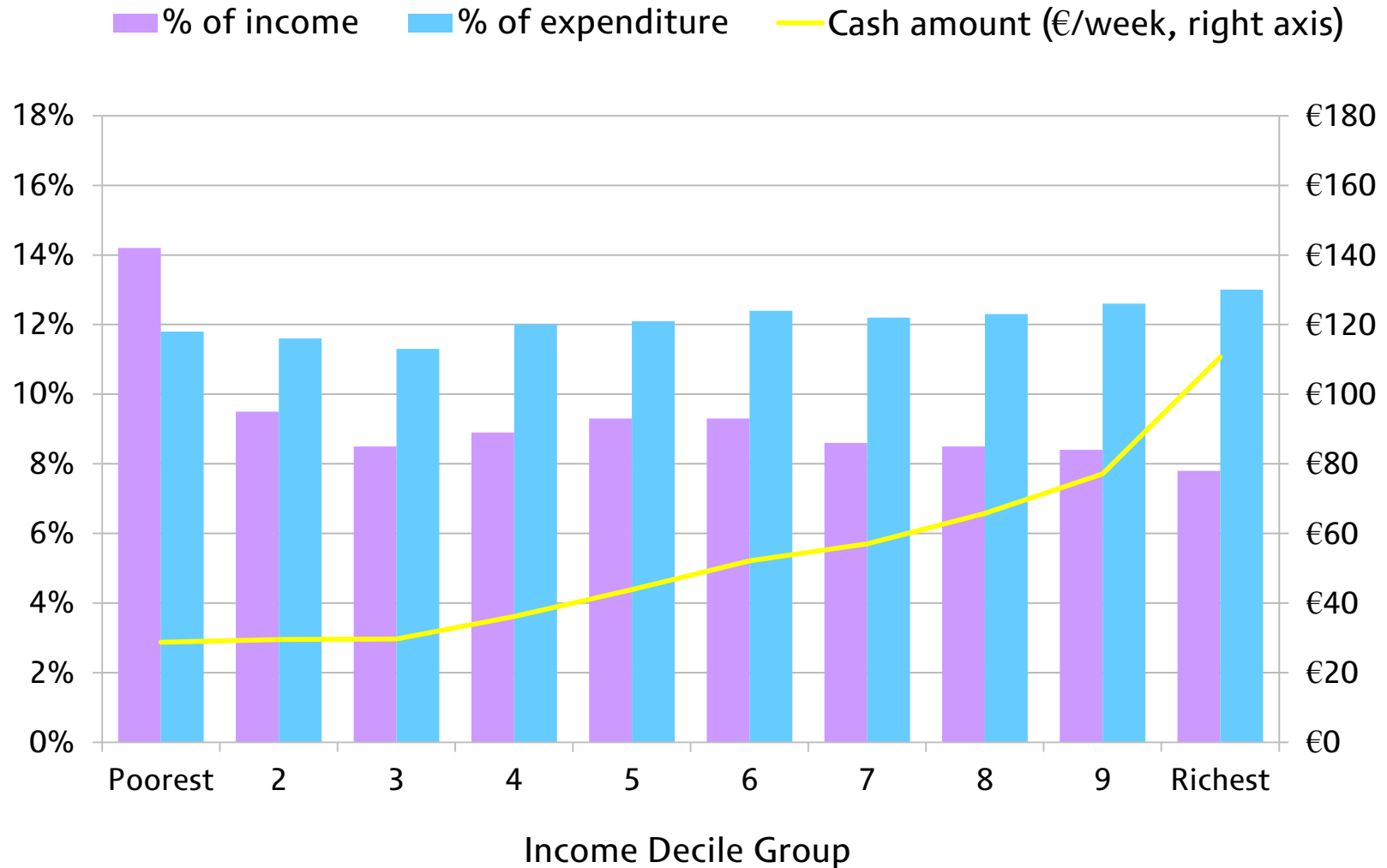
Effect on average work incentives:

	Percentage point change in average:		
	RR	PTR	EMTR
Single, no children	−0.9	−1.5	+0.7
Lone parent	+0.3	+3.6	−5.2
Partner not working, no children	−3.2	−3.4	−0.4
Partner not working, children	−5.7	−10.7	+1.2
Partner working, no children	+0.1	+0.1	−0.3
Partner working, children	+0.9	+2.5	+0.0
All	−0.7	−0.7	−0.1

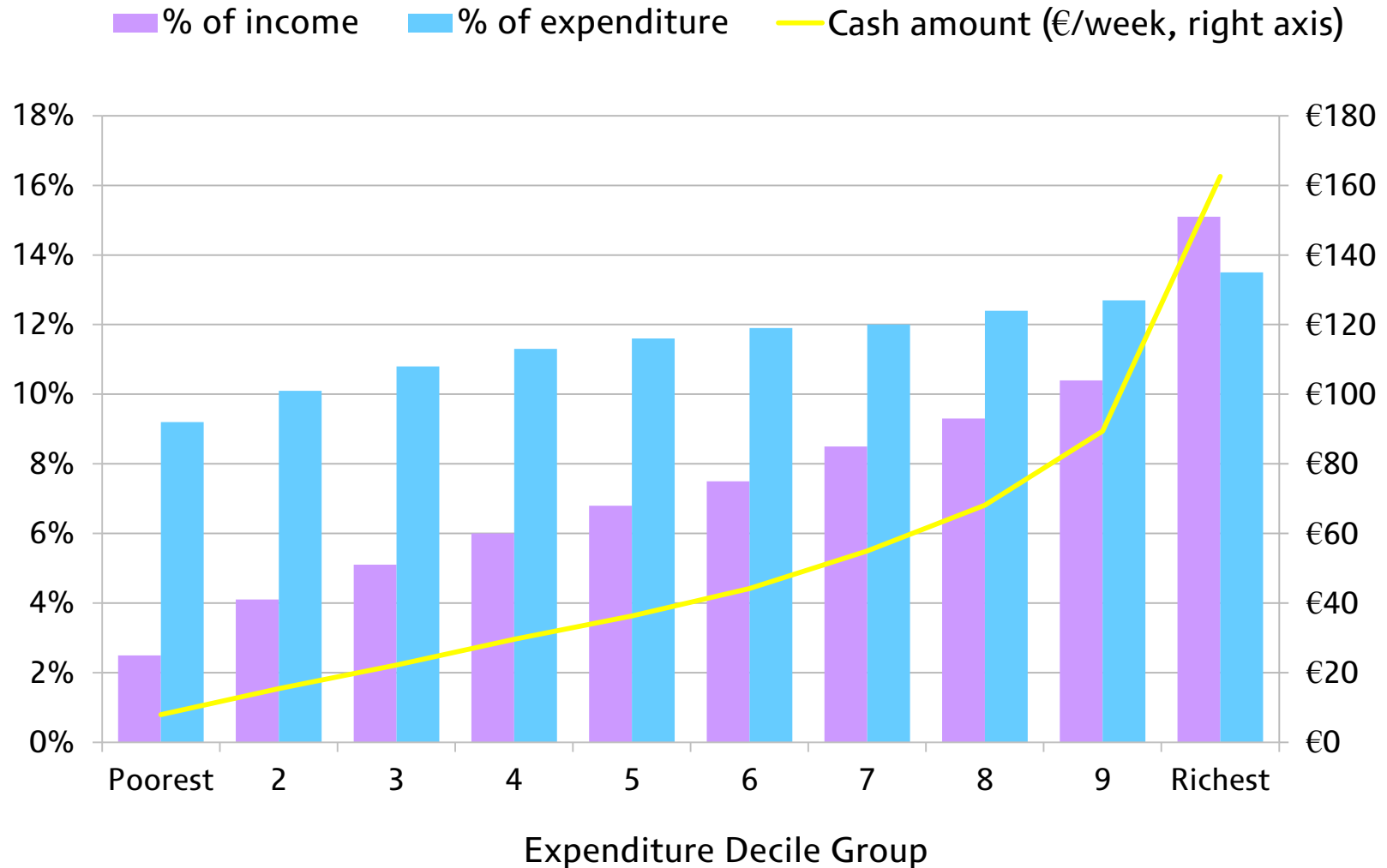
# Effect of UC on average PTR, by earnings



# Distribution of VAT payments in the UK



# Distribution of VAT payments in the UK



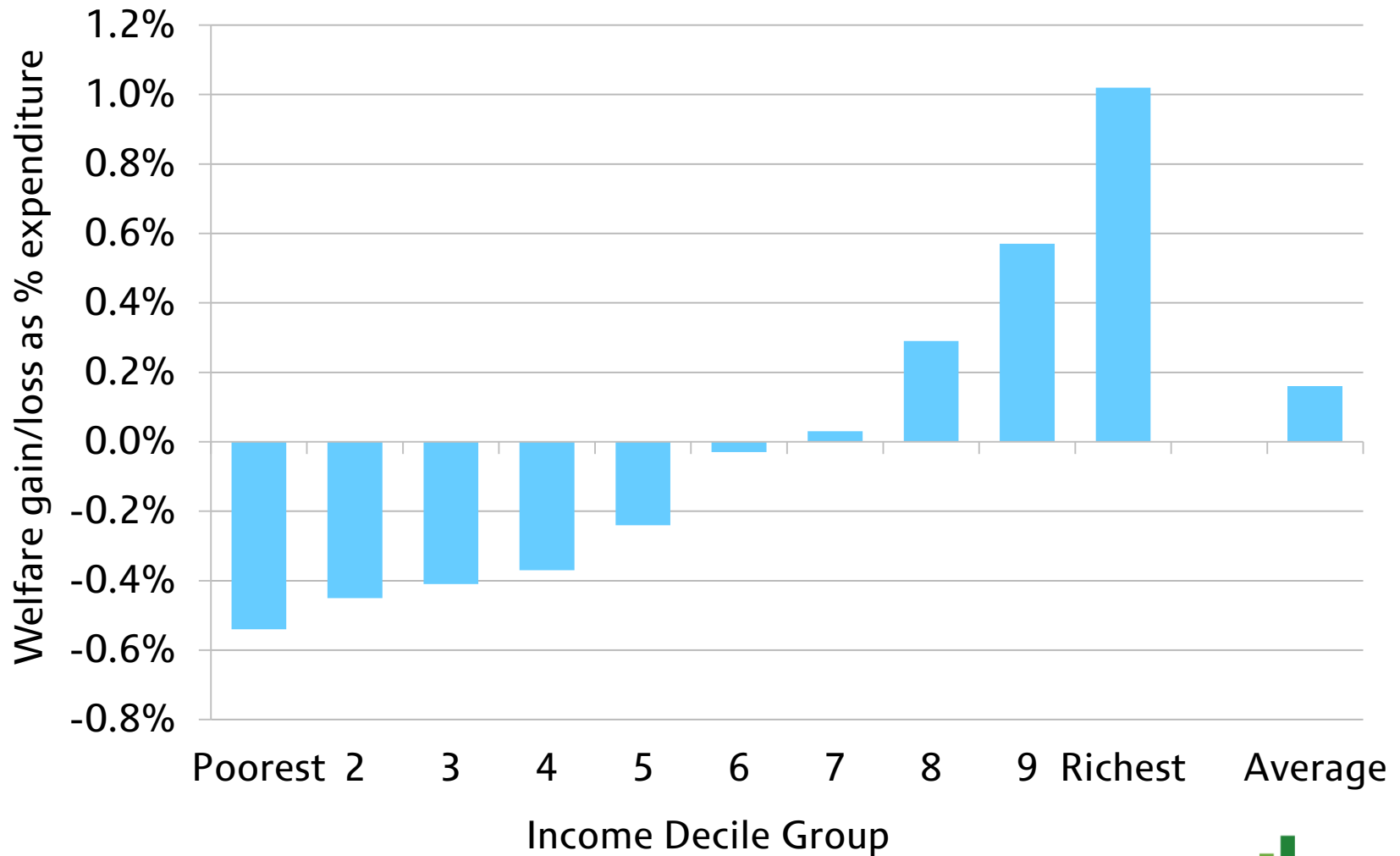
# Revenue-neutral move to a uniform VAT rate

## Effect on spending shares

Good Category	Existing system	Revenue-neutral uniform VAT rate
Zero-rated food	12.1%	13.1%
Standard-rated food, catering and alcohol	12.1%	10.9%
Leisure goods and services (inc. tobacco)	22.3%	22.4%
Domestic energy	5.7%	6.7%
Household goods and services	11.9%	12.7%
Personal goods (inc. clothes) and services	14.5%	14.4%
Private transport	19.2%	18.4%
Other zero-rated goods	2.3%	1.4%

# Revenue-neutral move to a uniform VAT rate

## Effect on welfare



# Distributional impact of changes 2015-2019

Figure 1. Personal tax and benefit measures

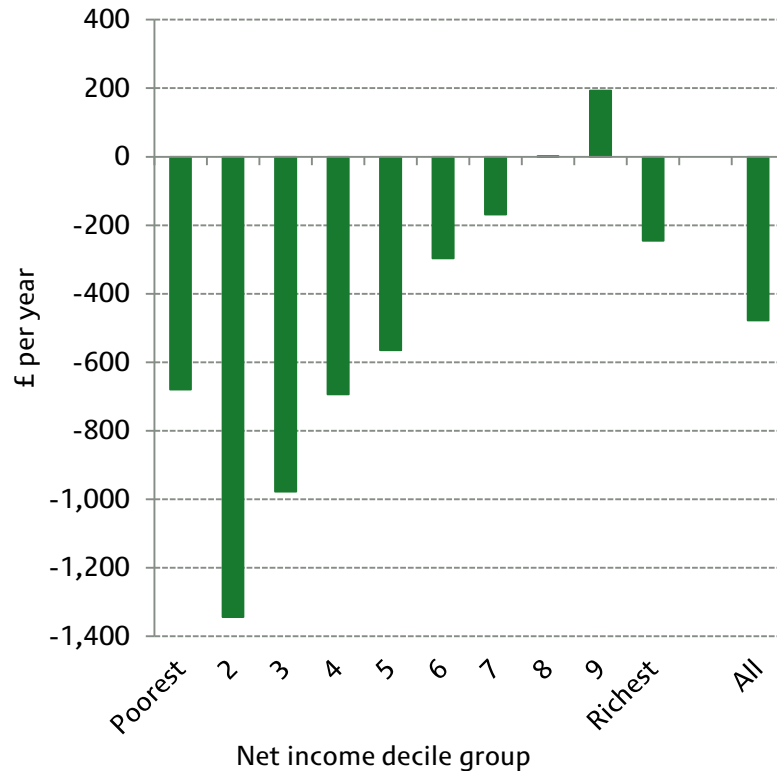
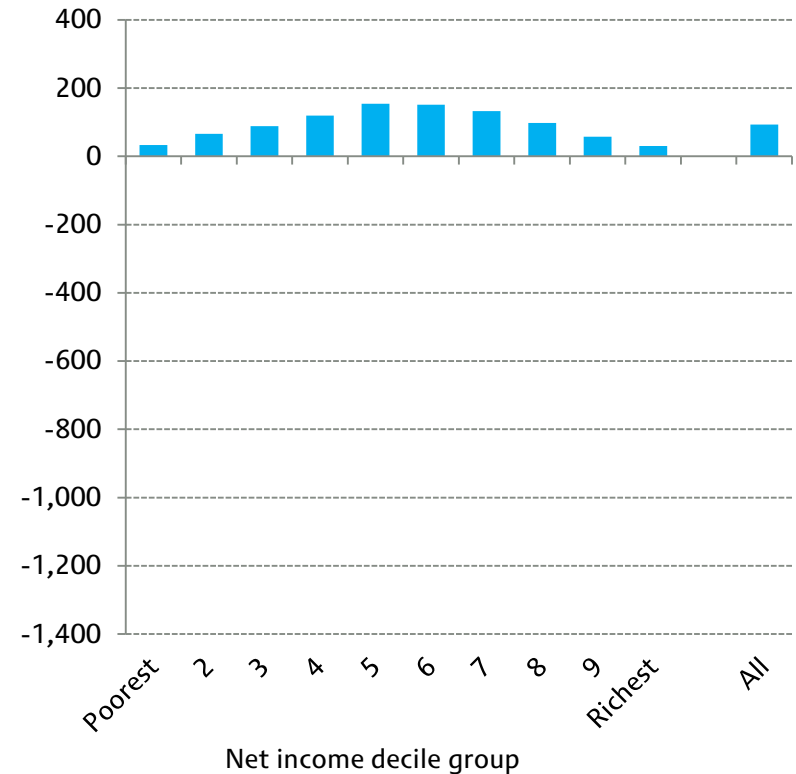


Figure 2. 'National Living Wage'



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