

The effect of occupational changes on the Marginal Cost of Public Funds: a decomposition analysis

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SUMMARY

Research aims:

- In the 2000s in the UK, the share of low and high-skilled occupations has continued growing relative to the share of middle-skilled occupations.
- We study how these changes to the occupational structure have affected the revenue-generating properties of the tax-benefit system.
 - We estimate the Marginal Cost of Public Funds (MCPF) defined as the welfare cost from raising one additional £ of government revenue in terms of reduced labour supply.

Main findings:

- Between 2001 and 2011 in the UK, we find an increase in MCPF of 4 to 13 percentage points.
- Using decomposition methods, between 5.6% and 8.1% of this change is explained by changes in the occupational shares.
- The tax-benefit system has become less efficient over time in raising revenues and substantial part of this change is due to the polarised occupational structure.

MOTIVATION

Occupational shares in 2001 and 2011 (in %)

	2001	2011
<i>Males</i>		
low-skilled occupations	14.940	17.520
middle-skilled occupations	39.374	34.900
high-skilled occupations	45.686	47.580
<i>Females</i>		
low-skilled occupations	34.295	34.150
middle-skilled occupations	28.617	21.771
high-skilled occupations	37.087	44.079
<i>All</i>		
low-skilled occupations	24.244	25.618
middle-skilled occupations	34.698	29.302
high-skilled occupations	41.058	45.079

Note: Occupations are ranked by their median 2001 wage based on the Family Resources Survey. **Low-skilled:** elementary, sales, customer service, caring leisure, other service occupations; **middle-skilled:** admin, secretarial, skilled trades, process, plant, machine operatives occupations; **high-skilled:** associate prof., technical, managers directors, senior officials, professional occupations.

Changes to the allocation of workers across the income distribution could have implications on the government budget:

- increase in low-income tax payers and potential benefit claimants; increase in high-income tax payers
- stronger extensive labour supply elasticities at the bottom than at the top of the income distribution (Eissa and Liebman, 1996; Meyer and Rosenbaum, 2001)

We study the effect of occupational changes in the UK in the 2000's on the Marginal Cost of Public Funds (Kleven&Kreiner, 2006)

- the welfare cost from raising one additional £ of government revenue in terms of reduced labour supply
- function of work incentives and labour supply elasticities (both at intensive and extensive margin)

DECOMPOSING MCPF

A. Model parametrically changes in the Marginal Cost of Public Funds (MCPF) due to changes in the:

- returns to occupational characteristics (wages) (OLS regression)
- occupational shares (low, medium, high-skilled) (mlogit regression)
- education level (secondary, college, undergrad, postgrad) (mlogit regression)

B. Derive counterfactual scenarios:

- Estimate regression models in t_1 and t_2
- Take estimated coefficients from t_1 and apply on data from t_2
- Predict residuals: account for changes in the variance of residuals (OLS); or ensure unobserved choice determinants consistent with observed behavior (mlogit)

C. Use the tax-benefit model EUROMOD

to calculate actual and counterfactual benefit entitlements, tax liabilities and household net incomes. Also, to calculate marginal effective (m_i)

and participation (τ_i) tax rates.

Use hypothetical hours-of-work (ε_i) and participation (η_i) labour supply elasticities across earnings deciles from Kleven&Kreiner (2006):

Decile	1	2	3	4	5	6	7	8	9	10
S5	ε : 0	0	0	0	0	0	0	0	0	0
	η : 0.4	0.4	0.3	0.3	0.2	0.2	0.1	0.1	0	0
S6	ε : 0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	η : 0.4	0.4	0.3	0.3	0.2	0.2	0.1	0.1	0	0
S7	ε : 0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	η : 0.8	0.6	0.4	0.2	0	0	0	0	0	0
S8	ε : 0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	η : 0.4	0.3	0.2	0.1	0	0	0	0	0	0
S9	ε : 0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	η : 0.6	0.6	0.4	0.4	0.3	0.3	0.2	0.2	0	0

The Marginal Cost of Public Funds is:

$$MCPF = \frac{1}{\sum_{i=k}^I \left[1 - \frac{m_i}{1-m_i} \varepsilon_i - \frac{\tau_i}{1-m_i} \eta_i \right] s_i}$$

s_i = wage share of subgroup i of total wages

Data: Family Resources Survey (FRS): cross-sectional, very detailed information on income and individual/household characteristics, nationally representative. We use two waves of data: for 2001/02 and 2011/12.

RESULTS

- The increase in the number of university graduates between 2001 and 2011 has led to substantial shifts from i) middle to high-skilled occupations among males and ii) low to high-skilled occupations for females.
- In contrast, there has been within-occupational changes towards low-skilled jobs.

	Occupational shares by skill level								
	Males			Females			All		
	low	middle	high	low	middle	high	low	middle	high
A. Level in percent:									
Observed 2001	14.9	39.4	45.7	34.3	28.6	37.1	24.2	34.7	41.1
Observed 2011	17.5	34.9	47.6	34.1	21.8	44.1	25.6	29.3	45.1
B. Change in percentage points due to changes in:									
education	0.7	-3.7	2.9	-3.9	0.6	3.3	-1.1	-1.7	2.9
occupational shifts	2.8	0.4	-3.1	3	-4	1	2.6	-1.4	-1.3
unexplained factors	-0.9	-1.2	2.1	0.7	-3.4	2.7	-0.1	-2.3	2.4

Decomposing the Marginal Cost of Public Funds for different labour supply scenarios (S5-S9)

	S5	S6	S7	S8	S9
A. Level:					
Observed 2001	1.08	1.16	1.11	1.09	1.21
2001 data, 2011 tax-ben policies	1.13	1.25	1.18	1.14	1.34
Observed 2011	1.17	1.33	1.26	1.18	1.47
B. Change in percent due to changes in:					
Education	-7.99	-8.99	-5.79	-6.89	-9.62
Occupational shares	6.76	7.37	5.61	6.2	8.11
Wages	26.1	19.31	19.19	15.31	20.41
Unexplained factors	75.12	82.3	80.99	85.39	81.09

Decomposing the government's budget (tax revenues – benefit spending)

	In million £
A. Level:	
Observed 2001	39,381
2001 data, 2011 tax-ben policies	50,210
Observed 2011	29,532
B. Change in percent due to changes in:	
Education	-22.66
Occupational shares	7.10
Wages	29.63
Unexplained factors	85.94

- We find an increase in MCPF (4-13pp) when comparing i) counterfactual value (2001 data with 2011 tax-benefit policies) and ii) 2011 value. Thus, over time **the UK tax-benefit system has become less efficient** in raising revenues due to changes in the population characteristics and distribution of gross income.
- Between 5.6-8.1% of the MCPF change is due to occupational shares changes.**
- The 'occupation' effect is almost entirely offset by 'education', i.e. the increase in the number of university graduates.
- We find that the government budget has fallen dramatically due to changes in the population characteristics and distribution of gross market incomes (comparing i) 2001 data with 2011 tax-benefit policies and ii) 2011 value).
- Changes in the occupational shares explains about 7% of this drop.
- In the context of continuous occupational changes, our results raise concerns about the weakened ability of the tax-benefit to raise efficiently revenues but also potentially to redistribute incomes.**