The redistributive effects of fiscal policy

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Outline PFR 2017

I. Current developments and prospects

II. Recent developments in fiscal surveillance

III. Impact of fiscal policy on income distribution, including automatic stabilisers

- distributional effects of fiscal policy
- automatic stabilisers across income groups

IV. Government investment in the EU: the role of institutional factors

- key drivers of public investment
- monography - five case studies
Impact of fiscal policy on income distribution

Part III
Part III:
Impact of fiscal policy on income distribution

Outline

1. Motivation
2. Effectiveness of fiscal policy in reducing inequality
3. Functioning of automatic stabilisers across income groups
4. Conclusions
1. Motivation

- "Excessive" inequality matters for growth

  - "Mainstream" economic theory: trade-off between equity and efficiency \((Okun, 1975)\)

  - However, "excessive" inequality can have negative effects on growth
    - Lower demand \((Galor and Zeira, 1993)\)
    - Contribute to under-investment in human capital, lower social mobility and productivity \((Stiglitz, 2012)\)
    - Lead to misallocation of resources and rent-seeking \((Alesina and Rodrik, 1994; Alesina and Perotti, 1996)\)

- Social issues are also a priority for the EU (e.g. European Pillar of Social Rights), although tackling inequality is mainly a national prerogative in the EU
1. Motivation

Distinction between direct and total effects of fiscal policy on inequality

- **Fiscal policy**
  - Fiscal stance
  - Tax and benefit system
    - Direct taxes and SIC (e.g. personal income tax)
    - Social transfers in cash (e.g. Un.ben.)
  - Other key fiscal elements
    - Social transfers in-kind (e.g. educ.)
    - Indirect taxation (e.g. VAT)
  - Behavioural (supply) effect
    - Potential GDP
  - Demand effect
    - Actual GDP
  - Net transfers (social transfers net of direct taxes/SIC)
    - Govt. redistribution
  - Market income (before taxes and transfers)
  - Disposable income (after taxes and transfers)
    - Market income plus net transfers
1. Motivation

Sizeable direct effects of the tax and benefit system on inequality reduction

Largely depend on size and progressivity of sub-components

- **Cash transfers**
  - Pensions: low progressivity, redistribution across time rather than across income groups
  - Family and housing allowances: more progressive, but smaller
  - Some countries: smaller transfers but more means-tested, same redistributive power

- **Taxes**
  - Direct taxes generally progressive; some countries *de jure* very progressive, *de facto* with large tax loop holes

Cash transfers have greater direct distributive effects than direct taxes: 
\[ \frac{3}{4} \] of income inequality reduction from transfers
1. Motivation

But total effects of the tax-benefit system on inequality are less clear cut

Higher taxes can trigger disincentives
- *Competitiveness losses, unemployment* $\rightarrow$ *inequality*
  - Tax wedge: depending on LM functioning, high income earners can bargain $\rightarrow$ inequality
  - Tax loop holes as electoral response $\rightarrow$ inequality
  - Tax evasion/fraud $\rightarrow$ inequality

Dis-incentive effects from cash benefits
- *depend on institutional factors.* Example: social benefits in the framework of ALMP

Overall, possible to design a tax-benefit system that reduce inequality in the long run (*if dis-incentives factored-in*)
1. Motivation

The distributive effects of social transfers in kind

**Key social transfers in kind:** Education, health, other transfers in kind (social protection) (childcare, housing)

**Sizeable budgetary impact:** 13% of GDP in 2016 (6.5% in CY, 19.1% in SE)

**Can contribute to reduce (future market) income inequality, e.g.:**
- Education (early childhood and schooling)
- Well-designed ALMP, professional & vocational training
- Health and long-term care

**But:**
- Effects take longer than cash benefits
- Effects also not negligible on "current" inequality + other immediate effects e.g. activation policies via childcare

→ need to be well-designed and financed in a growth-friendly manner
The distributive effects of indirect taxes

Indirect taxes (consumption taxes: VAT, excise duties)
- Key component of public revenues (second after income taxes)
- Generally regressive (relative to income)
- But high income earners pay more (absolute and relative of spending), as they consume more highly taxed goods [annex]

Possible indirect effects (competitiveness, labour supply)
2. Effectiveness of fiscal policy in reducing inequality: What do the data say?

Outline

a. Direct effects of tax benefit system
   → Micro data on the tax and benefit system using EU-SILC, 2004-2014

b. Total effects of fiscal policy
   → Macro data on COFOG from OECD, 1980-2014, panel regressions
2A. Direct effects of tax benefit system on inequality

Key indicators and data sources

Indicators of inequality

• Gini index of market/gross (excl. tax and benefits) and disposable/net (incl. tax and benefits) income inequality

• Income ratios: S90/S50, S50/S10

Indicators of redistribution

• Difference between Gini market and disposable income

• Gini elasticities: impact of a marginal increase of an income source on the reduction of Gini, keeping all other income sources unchanged

Data sources

• Household data (2004-2014): EU statistics on income and living conditions (EU-SILC) database; data for the UK stem from the Family Resource Survey

2A. Direct effects of tax benefit system on inequality

Gini index – a key inequality measure used here

**Reminder: Key idea of Gini**

- **Gini = A / (A + B)**
- It ranges from 0% (perfect equality) to 100% (max. inequality)

**Illustration: Sensitivity of Gini to changes in household income**

<table>
<thead>
<tr>
<th>Status-quo (SQ)</th>
<th>France</th>
<th>Italy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gini Change vs. SQ</td>
<td>29.2</td>
<td>31.7</td>
</tr>
</tbody>
</table>

Scenarios: 100 EUR more for each household with ...

- **S1: Low-income (deciles 1 and 2)**
  - Gini: 28.5, Change vs. SQ: -0.7
  - Gini: 30.8, Change vs. SQ: -0.9

- **S2: Medium-income (deciles 5 and 6)**
  - Gini: 29.0, Change vs. SQ: -0.2
  - Gini: 31.4, Change vs. SQ: -0.3

- **S3: High income (deciles 9 and 10)**
  - Gini: 29.6, Change vs. SQ: 0.4
  - Gini: 32.0, Change vs. SQ: 0.3

**Source:** European Commission (2017): PFR, p. 84 based on own EUROMOD simulations.
2A. Direct effects of tax benefit system on inequality

Inequality in the EU increased strongly in 1990s, but has remained broadly stable since 2000

Source: Authors' calculations using data from Solt (2016): Standardised World Income Inequality Database (SWIID).
2A. Direct effects of tax benefit system on inequality

Market inequality in EU close to US level, but disposable inequality still relatively low

Source: Authors' calculations using data from Solt (2016): Standardised World Income Inequality Database (SWIID).
2A. Direct effects of tax benefit system on inequality

Sizeable diversity between levels of inequality across EU Member States

Inequality and redistribution in the EU (average 2004-2014)

Relationship Gini market income and redistribution

Source: Authors' calculations using data from EU SILC.
2A. Direct effects of tax benefit system on inequality

Low- and middle-income households benefit in particular from redistribution

Net transfers by income decile (average 2004-14)

DE

PL

FR

UK

Social transfers
Direct taxes
Net transfers (% decile income)
Net-transfers (% average income)
Social transfers have a larger impact in reducing inequality than direct taxes

**Note:** This graph shows the contributions to government redistribution, distinguishing between direct taxes and social transfers (including pensions).

**Source:** Author’s calculations based on EU-SILC.
Effectiveness in inequality-reduction depends on fiscal policy instrument.

Gini elasticities in % (average 2004–2014)

- Direct taxes
- Old-age benefits (pensions)
- Education and family /children allowances
- Survivor, sickness and disability benefits
- Unemployment benefits
- Social exclusion/housing allowances
2A. Direct effects of tax benefit system on inequality

Market inequality increased after the crisis, but disposable inequality remained broadly stable

A. Gini market income
B. Gini disposable income
C. Govt. redistribution
2B. Total effects of fiscal policy on inequality

**Total effects of fiscal policy on income inequality: a regression analysis**

**Starting point**
- EUROMOD helpful to analyse direct effects of fiscal policies on inequality
- But it does not control for indirect effects (e.g. macro feedback effects)

**Key objective of the panel regression**
- Aims at identifying causal links between fiscal policy (COFOG) and inequality, while controlling for indirect effects

**What's new?**
- New extended OECD data series allow for more precise measures of fiscal policies by functions of government (COFOG series, a bit broader than the sub-components analysed with EUROMOD)
2B. Total effects of fiscal policy on inequality

Relationship between inequality and COFOG fiscal policy items (EU, 1980-2014)
2B. Total effects of fiscal policy on inequality

Estimation approach

- **Key dynamic panel specification**

  \[ Gini \text{ } DI_{i,t} = \beta_1 Gini \text{ } DI_{i,t-1} + \beta_2 Gini \text{ } MI_{i,t} + \beta_3 COFOG_{it-1} + \beta_4 X_{it-1} + \varepsilon_{it} \]

  - Up to 28 EU countries \((i)\) and eight 5-year-periods between 1980 and 2014 \((t)\)
  - \(DI/MI\) refers to disposable/market income; \(X\) is a vector consisting of key non-fiscal control variables derived from the literature

  - Short-/long-term elasticities:
    \(\frac{\partial Gini \text{ } DI}{\partial COFOG}\bigg|^{ST} = \beta_{COFOG}; \quad \frac{\partial Gini \text{ } DI}{\partial COFOG}\bigg|^{LT} = \frac{\beta_{COFOG}}{(1-\beta_1)}\)


- **Estimation approach**
  - Fixed effects likely to be biased due to endogeneity
  - Two-stage system GMM estimator to control for endogeneity
  - One-step first difference GMM used in robustness tests
2B. Total effects of fiscal policy on inequality

Key finding: total effects of fiscal policy seem to be smaller than direct effects

- Some fiscal expenditure variables have had an inequality-mitigating total effect
  - Education, health expenditures
  - Some benefits (family allowances, sickness and disability)

- But, indirect effects can weaken the impact of fiscal policy on inequality
  - Behavioural responses of firms, workers consumers (labour supply)
  - Macroeconomic feedback effects (e.g. high public debt can weigh on growth)

- Some caveats remain (e.g. findings only hold for EU on average; inequality a multi-dimensional phenomenon -> omitted variables, collinearities; 5-year averages reduces nbr of observations; impact may only occur with a lagged effect)
3. Functioning of automatic stabilisers

Key focus on functioning of automatic stabilisers

Two ways to conduct counter-cyclical policies

- **Automatic stabilisers**: Rely on the *existing* legal provisions of the tax and benefits system
  - When the economy grows, tax revenues increase and social benefit payments decrease (→ help prevent the economy from overheating)
  - When the economy slows, tax revenues decrease and social benefit payments increase (→ help stimulate the economy)

- **Discretionary fiscal policy measures**

Focus here on automatic stabilisers

- **Direct effects on income and consumption** (EUROMOD simulations)
- **Total effects on income, consumption and GDP** (QUEST simulations)
Direct effects of automatic stabilisers – a microeconomic perspective using EUROMOD

• **Size of automatic stabilisation of income**

\[
\tau_{h}^{\text{micro}} = \frac{\Delta Y_{h}^{M} - \Delta Y_{h}^{D}}{\Delta Y_{h}^{M}} = 1 - \frac{\Delta Y_{h}^{D}}{\Delta Y_{h}^{M}}
\]

where \(Y_{D}/Y_{M}\) stands for disposable/market income;

It varies between 0% (shock is not absorbed at all by tax and benefit system) to 100% (shock is fully absorbed)

• **Size of automatic stabilisation of consumption/demand**

\[
\theta_{h}^{\text{micro}} = 1 - \frac{\Delta C_{h}}{\Delta Y_{h}^{M}} = 1 - \frac{\alpha_{h} \ast \Delta Y_{h}^{D}}{\Delta Y_{h}^{M}}
\]

\(\alpha\) stands for MPC (taken from Japelli and Pistaferri, 2014);

It varies between 100% (consumption does not react to shock, \(\alpha = 0\)) to \(\tau^{\text{micro}}\)% (consumption reacts fully to shock, \(\alpha = 1\))
3A. Direct effects of automatic stabilisers

Size of income stabilisation fairly high in the EU, but sizeable differences across countries

Memo: The income stabilisation coefficient measures the share of disposable income which is absorbed following a shock to market income due to the tax and benefit system.

Source: EUROMOD simulations based on EU SILC data for 2014.
3A. Direct effects of automatic stabilisers

Stabilisation mostly results from benefits (taxes) for low- (high-) income households

Average

Lowest income quintile (Q1)

Middle income Quintile (Q3)

Highest income quintile (Q5)
3A. Direct effects of automatic stabilisers

Stabilisation mostly results from benefits for low-income households

Lowest income quintile (Q1)

- Taxes
- SSC
- Benefits
3A. Direct effects of automatic stabilisers

Weak correlation between income stabilisation and redistribution

\[ y = 15.6 + 98.2x \]

\[ R^2 = 0.23 \]
3A. Direct effects of automatic stabilisers

Size of demand stabilisation fairly high in the EU, differences across countries smaller

Memo: The consumption stabilisation coefficient measures the share of consumption which is absorbed following a shock to market income due to the tax and benefit system and the marginal propensity to consume (MPC).

Source: EUROMOD simulations based on EU SILC data for 2014. MPC indicators are taken from Jappelli and Pistaferri (2014) based on estimates for Italy.
Total effects of automatic stabilisers – a macroeconomic perspective using QUEST

Key objective

- EUROMOD helpful tool to analyse the direct automatic stabilisation effects, but it does not control for indirect effects.

→ complement the analysis by assessing total effect using QUEST simulations for Italy

Analysis of automatic stabilisers in QUEST

- Total automatic stabilisation effects in QUEST are derived based on two scenarios:
  (i) situation where AS are operating as normal,
  (ii) counter-factual benchmark scenario where AS do not operate

→ Assumption: expenditures and taxes are kept fixed at their baseline level. (robustness: kept constant as a share of GDP)

- Simulations combine the effects of a temporary shock to TFP and exports (mix of supply and demand)
3B. Total effects of automatic stabilisers

Total effects of automatic stabilisers – a macroeconomic perspective using QUEST

<table>
<thead>
<tr>
<th>Stabilisation coefficients</th>
<th>Direct effects (EUROMOD)</th>
<th>Total effects (QUEST)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disposable income</td>
<td>33.3</td>
<td>29.1</td>
</tr>
<tr>
<td>Consumption</td>
<td>69.1</td>
<td>54.8</td>
</tr>
<tr>
<td>Real GDP</td>
<td>NA</td>
<td>5.8</td>
</tr>
</tbody>
</table>
4. Conclusions (I)

**Impact of fiscal policy on income distribution**

- Income inequality in the EU on average is today clearly higher than in 1980, but its increase mainly results from an upward shift in the 1990s

- The tax and benefit system had a *direct* effect in reducing income inequality in the EU by almost one-third

- However, *total* effects of fiscal policy on inequality reduction are supposed to be smaller (in particular due to the behavioural responses and macroeconomic effects)
Functioning of automatic stabilisers

• The degree of direct automatic stabilisation is fairly high in the EU in 2014 according to EUROMOD simulations
  → 33% of income variation is absorbed due to the tax benefit system
  → 70% of consumption variation is absorbed due to the tax benefit system and the dissaving behaviour

• The size of total automatic stabilisation is smaller than its direct effect as shown for Italy using new QUEST simulations (in particular due to the behavioural responses and macroeconomic effects)
Background slides
Part III
General drivers of inequality: OECD view

**Globalisation**
- Trade openness: largely reported insignificant
- Financial openness: insignificant or (sometimes) dis-equalising
- Inward FDI: inconclusive
- Outsourcing: inconclusive
- Technological change: dis-equalising (especially at the upper part of the distribution)

**Macro-economic structure**
- Evidence on inequality/development relationship inconclusive, including for enlarged country sample
- Industry sector dualism: generally not confirmed but there may be issues of knowledge sector dualism and bias
- Unemployment: dis-equalising

**Labour institutions and regulations**
- Unionization (coverage, density) and wage coordination: largely equalising, rarely insignificant
- EPL: equalising
- Minimum wages: (modestly) equalising
- UB replacement rate: equalising, rarely insignificant
- Tax wedge: inconclusive
  Employment effects tend to off-set inequality effects, except for EPL

**Demographic and societal structure**
- Education: largely reported equalising
- Assortative mating: dis-equalising
- Female employment: equalising
- Single headed households: dis-equalising
- Age composition: inconclusive
- Migration: inconclusive

**Political processes**
- Inequality: the structure of it matters (via the position of the pivotal voter)
- Voter turnout: significant, equalising especially if low income voters are mobilized
- Partisanship: equalising for Left cabinet seats
- Indirect effects (via institution formation and redistribution): sizeable but direction is inconclusive

**Redistribution**
- Tax/transfer systems: equalising, with great country variation
- Reduction in redistributive effectiveness: dis-equalising (since 1990s)
- Cash transfers generally have larger equalising impact than income taxes (except decomposition calculations)
- 2\textsuperscript{nd} order effects (disincentives) offset but do not outweigh 1\textsuperscript{st}-order redistributive effects

Source: Förster and Toth (2015), in: Handbook of Income Distribution (eds. Atkinson/Bourguignon), chapter 19 (p.1804), Fig. “a qualitative summary of results for OECD countries reported in recent studies”. EPL, employment protection legislation; FDI, foreign direct investment; UB, unemployment benefit.
Market inequality increased after the crisis, but disposable inequality remained broadly stable.
**Decomposition of Gini elasticities**  
*(EU28, average 2004-14)*

\[
\frac{\partial G/\partial e}{G} = \frac{S_k G_k R_k}{G} - S_k.
\]

<table>
<thead>
<tr>
<th>Source</th>
<th>Gini elasticity</th>
<th>Contributions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct taxes</td>
<td>-0.14</td>
<td>S 0.46</td>
</tr>
<tr>
<td></td>
<td></td>
<td>G 0.55</td>
</tr>
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<td></td>
<td></td>
<td>R -0.81</td>
</tr>
<tr>
<td>Pensions</td>
<td>-0.12</td>
<td>S 0.34</td>
</tr>
<tr>
<td></td>
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<td>G 0.79</td>
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<td></td>
<td></td>
<td>R 0.14</td>
</tr>
<tr>
<td>Education, family, children</td>
<td>-0.05</td>
<td>S 0.07</td>
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<td></td>
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<td>G 0.74</td>
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<td></td>
<td></td>
<td>R -0.12</td>
</tr>
<tr>
<td>Survivor, sickness and disability</td>
<td>-0.04</td>
<td>S 0.08</td>
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<tr>
<td></td>
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<td>G 0.89</td>
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<tr>
<td></td>
<td></td>
<td>R -0.01</td>
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<tr>
<td>Unemployment benefits</td>
<td>-0.02</td>
<td>S 0.04</td>
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<td></td>
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<td>G 0.94</td>
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<td></td>
<td></td>
<td>R -0.04</td>
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<tr>
<td>Social exclusion, housing</td>
<td>-0.02</td>
<td>S 0.01</td>
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<td></td>
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<td>G 0.95</td>
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<td></td>
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<td>R -0.45</td>
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</tbody>
</table>

- share of the income source with respect to total income \(S_k\) (e.g. pensions)
- how equally or unequally distributed the income source is \(G_k\), (e.g. if the income is equally distributed \(G_k = 0\), it cannot influence inequality);
- the correlation of the income source with the distribution of total income \(R_k\), (e.g. if the income source is large and unequally distributed \(S_k\) and \(G_k\), it may either increase inequality \(R_k\) is positive and large) or decrease it \(R_k\) is negative or close to 0)
### Key findings I: key control variables

<table>
<thead>
<tr>
<th></th>
<th>(1) FE</th>
<th>(2) First-Diff</th>
<th>(3) GMM</th>
<th>(4) Sys-GMM</th>
<th>(5) GMM</th>
<th>(6) Sys-GMM</th>
<th>(7) GMM</th>
<th>(8) Sys-GMM</th>
<th>(9) GMM</th>
<th>(10) Sys-GMM</th>
<th>(11) GMM</th>
<th>(12) Sys-GMM</th>
<th>(13) GMM</th>
</tr>
</thead>
<tbody>
<tr>
<td>In gini (t-1)</td>
<td>0.294***</td>
<td>0.362**</td>
<td>0.258**</td>
<td>0.325**</td>
<td>0.597***</td>
<td>0.631***</td>
<td>0.693***</td>
<td>0.673***</td>
<td>0.603***</td>
<td>0.711***</td>
<td>0.588***</td>
<td>0.666***</td>
<td>0.310*</td>
</tr>
<tr>
<td>In gini market income (t)</td>
<td>0.477***</td>
<td>0.038</td>
<td>0.187</td>
<td>0.120</td>
<td>0.292</td>
<td>0.376**</td>
<td>0.355*</td>
<td>0.479**</td>
<td>-0.045</td>
<td>0.337</td>
<td>0.494**</td>
<td>0.360***</td>
<td>0.775**</td>
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<td></td>
<td>(4.505)</td>
<td>(0.126)</td>
<td>(0.721)</td>
<td>(0.477)</td>
<td>(0.753)</td>
<td>(2.334)</td>
<td>(1.700)</td>
<td>(2.096)</td>
<td>(-0.170)</td>
<td>(0.998)</td>
<td>(2.340)</td>
<td>(2.030)</td>
<td>(6.966)</td>
</tr>
<tr>
<td>In real GDP pc (t-1)</td>
<td>-0.077</td>
<td>-0.044**</td>
<td>-0.040</td>
<td>-0.040</td>
<td>-0.040</td>
<td>-0.033***</td>
<td>-0.034***</td>
<td>-0.038***</td>
<td>-0.056***</td>
<td>-0.038**</td>
<td>-0.036</td>
<td>-0.035***</td>
<td>-0.070***</td>
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<td></td>
<td>(-1.045)</td>
<td>(-1.884)</td>
<td>(-1.801)</td>
<td>(-0.659)</td>
<td>(-2.080)</td>
<td>(-3.232)</td>
<td>(-2.625)</td>
<td>(-3.506)</td>
<td>(-2.791)</td>
<td>(-2.480)</td>
<td>(-0.975)</td>
<td>(-2.825)</td>
<td>(-4.293)</td>
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<tr>
<td>In real GDP pc squared (t-1)</td>
<td>-0.025</td>
<td>(-0.087)</td>
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<tr>
<td>real GDP growth (t)</td>
<td>-0.003</td>
<td>(-0.824)</td>
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<tr>
<td>In govt. headline balance (t-1)</td>
<td>-0.349*</td>
<td>-0.371**</td>
<td>-0.500</td>
<td>-0.094</td>
<td>-0.108</td>
<td>-0.234</td>
<td>-0.389**</td>
<td>-0.323</td>
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<td>(-1.897)</td>
<td>(-2.118)</td>
<td>(-1.261)</td>
<td>(-0.249)</td>
<td>(-0.161)</td>
<td>(-1.410)</td>
<td>(-2.315)</td>
<td>(-1.430)</td>
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<tr>
<td>In unemp. rate (t-1)</td>
<td>-0.016</td>
<td>-0.022</td>
<td>-0.030*</td>
<td>-0.011</td>
<td>-0.019</td>
<td>-0.011</td>
<td>-0.003</td>
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<tr>
<td></td>
<td>(-0.675)</td>
<td>(-0.971)</td>
<td>(-1.822)</td>
<td>(-0.339)</td>
<td>(-0.698)</td>
<td>(-0.513)</td>
<td>(-0.129)</td>
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<tr>
<td>In openness (t-1)</td>
<td>-0.013</td>
<td>(-0.795)</td>
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**Note:** The sample includes up to 28 EU countries covering the period 1980-2014 using 5-year average. All estimations include time dummies. Estimation approaches: (1) Fixed effects using heteroskedasticity-robust Huber-White standard errors; (2) Two-step system GMM (SYS-GMM) estimator following Blundell and Bond (1998), controlling for endogeneity of the lagged dependent variable and the real GDP per capita. Due to the small sample size the set of internal instrumental variables is restricted by "collapsing" the matrix of instruments and restricting its lags up t-4. The standard errors are corrected following Windmeijer (2005). AR(1,2) and Hansen tests confirm the validity of the system GMM specifications. ***, ** and * denote respectively statistical significance at 1, 5 and 10%.
### Key findings II: Cofog variables

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<td>0.701***</td>
<td>0.591***</td>
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<td>-0.457**</td>
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<td>0.026</td>
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<td>-0.245**</td>
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<td>(0.992)</td>
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<td>In old-age &amp; survivor pensions exp. (t-1)</td>
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<td>(1.890)</td>
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<td>In property income paid exp. (t-1)</td>
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### # observations

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### Max # of obs per country

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### Min # of obs per country

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### Avg # of obs per country

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### Short-term effect cofog (size)

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### Short-term effect cofog (p-value)

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### Long-term effect cofog (size)

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### Long-term effect cofog (p-value)

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### AR(1) (p-value)

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### AR(2) (p-value)

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### Hansen (p-value)

| Hansen (p-value) | 0.96 | 0.41 | 0.98 | 0.91 | 0.51 | 0.94 | 0.75 | 0.91 | 0.96 | 0.55 | 0.98 |
|------------------|------|------|------|------|------|------|------|------|------|------|------|------|

### # instruments

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**Note:** For more details on the estimation procedure see previous slide.
Key findings III: Cofog robustness checks

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**Cofog variables (are included one-by-one controlling for the variables listed above)**

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<td>-0.053</td>
<td>-0.116*</td>
<td>-0.115***</td>
<td>-0.115***</td>
<td>-0.064*</td>
<td>-0.131**</td>
<td>-0.099**</td>
<td>-0.089**</td>
</tr>
<tr>
<td></td>
<td>(-1.282)</td>
<td>(-0.970)</td>
<td>(-2.544)</td>
<td>(-2.631)</td>
<td>(-2.886)</td>
<td>(-1.957)</td>
<td>(-2.397)</td>
<td>(-2.377)</td>
<td>(-1.985)</td>
</tr>
<tr>
<td>In health exp.</td>
<td>-0.067*</td>
<td>-0.054*</td>
<td>-0.021</td>
<td>-0.004</td>
<td>-0.029</td>
<td>-0.101**</td>
<td>-0.078*</td>
<td>-0.077*</td>
<td>-0.116**</td>
</tr>
<tr>
<td></td>
<td>(-1.696)</td>
<td>(-1.728)</td>
<td>(-0.577)</td>
<td>(-0.100)</td>
<td>(-0.793)</td>
<td>(-2.527)</td>
<td>(-1.700)</td>
<td>(-1.700)</td>
<td>(-2.501)</td>
</tr>
<tr>
<td>In other wages/interm cons. exp.</td>
<td>-0.082</td>
<td>-0.063</td>
<td>-0.103</td>
<td>-0.078</td>
<td>-0.072</td>
<td>-0.057</td>
<td>0.15</td>
<td>-0.028</td>
<td>-0.082</td>
</tr>
<tr>
<td></td>
<td>(-0.570)</td>
<td>(-0.708)</td>
<td>(-1.024)</td>
<td>(-0.992)</td>
<td>(-0.744)</td>
<td>(-0.950)</td>
<td>(-1.468)</td>
<td>(-0.279)</td>
<td>(-0.985)</td>
</tr>
<tr>
<td>ln old-age &amp; survivor pensions exp.</td>
<td>0.069</td>
<td>0.014</td>
<td>0.085</td>
<td>0.067</td>
<td>0.052</td>
<td>0.066</td>
<td>0.018</td>
<td>0.056</td>
<td>-0.008</td>
</tr>
<tr>
<td></td>
<td>(1.021)</td>
<td>(0.484)</td>
<td>(1.165)</td>
<td>(1.561)</td>
<td>(1.054)</td>
<td>(1.181)</td>
<td>(0.558)</td>
<td>(0.884)</td>
<td>(-0.302)</td>
</tr>
<tr>
<td>ln sickness and disability exp.</td>
<td>-0.044**</td>
<td>-0.036***</td>
<td>-0.028*</td>
<td>-0.036**</td>
<td>-0.031**</td>
<td>-0.043**</td>
<td>-0.051**</td>
<td>-0.054**</td>
<td>-0.061*</td>
</tr>
<tr>
<td></td>
<td>(-2.519)</td>
<td>(-2.581)</td>
<td>(-1.938)</td>
<td>(-2.368)</td>
<td>(-2.269)</td>
<td>(-2.539)</td>
<td>(-2.830)</td>
<td>(-3.082)</td>
<td>(-1.886)</td>
</tr>
<tr>
<td>In unemployment benefits exp.</td>
<td>-0.003</td>
<td>-0.015</td>
<td>-0.025</td>
<td>-0.011</td>
<td>-0.011</td>
<td>-0.012</td>
<td>-0.024</td>
<td>-0.030</td>
<td>-0.022</td>
</tr>
<tr>
<td></td>
<td>(-0.189)</td>
<td>(-1.216)</td>
<td>(-1.431)</td>
<td>(-0.867)</td>
<td>(-1.101)</td>
<td>(-1.379)</td>
<td>(-1.505)</td>
<td>(-1.604)</td>
<td>(-1.235)</td>
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<tr>
<td>ln family and children exp.</td>
<td>-0.021</td>
<td>-0.034*</td>
<td>-0.041**</td>
<td>-0.044*</td>
<td>-0.049**</td>
<td>-0.048**</td>
<td>-0.076**</td>
<td>-0.050</td>
<td>-0.052***</td>
</tr>
<tr>
<td></td>
<td>(-0.685)</td>
<td>(-1.813)</td>
<td>(-2.130)</td>
<td>(-1.890)</td>
<td>(-2.414)</td>
<td>(-2.224)</td>
<td>(-2.462)</td>
<td>(-1.263)</td>
<td>(-2.934)</td>
</tr>
<tr>
<td>ln subsidies exp.</td>
<td>-0.013</td>
<td>-0.013</td>
<td>-0.029</td>
<td>-0.009</td>
<td>-0.027</td>
<td>-0.024</td>
<td>-0.023</td>
<td>-0.023</td>
<td>-0.029</td>
</tr>
<tr>
<td></td>
<td>(-0.525)</td>
<td>(-0.526)</td>
<td>(-0.766)</td>
<td>(-0.286)</td>
<td>(-0.926)</td>
<td>(-1.462)</td>
<td>(-0.738)</td>
<td>(-0.884)</td>
<td>(-1.630)</td>
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<tr>
<td>ln investment exp.</td>
<td>-0.014</td>
<td>-0.008</td>
<td>-0.026</td>
<td>-0.026</td>
<td>-0.021</td>
<td>-0.009</td>
<td>-0.020</td>
<td>0.001</td>
<td>0.017</td>
</tr>
<tr>
<td></td>
<td>(-0.332)</td>
<td>(-0.181)</td>
<td>(-0.797)</td>
<td>(-0.743)</td>
<td>(-0.574)</td>
<td>(-0.316)</td>
<td>(-0.452)</td>
<td>(0.018)</td>
<td>(1.156)</td>
</tr>
<tr>
<td>ln other primary exp.</td>
<td>-0.056</td>
<td>-0.072*</td>
<td>-0.034</td>
<td>-0.033</td>
<td>-0.045</td>
<td>-0.052</td>
<td>-0.047</td>
<td>-0.029</td>
<td>-0.013</td>
</tr>
<tr>
<td></td>
<td>(-1.858)</td>
<td>(-1.811)</td>
<td>(-0.935)</td>
<td>(-0.911)</td>
<td>(-1.074)</td>
<td>(-1.583)</td>
<td>(-1.075)</td>
<td>(-0.825)</td>
<td>(-0.432)</td>
</tr>
<tr>
<td>ln property income paid exp.</td>
<td>0.016</td>
<td>0.022</td>
<td>0.014</td>
<td>0.015</td>
<td>0.010</td>
<td>0.014</td>
<td>-0.017</td>
<td>-0.006</td>
<td>0.005</td>
</tr>
<tr>
<td></td>
<td>(0.901)</td>
<td>(0.855)</td>
<td>(0.575)</td>
<td>(0.643)</td>
<td>(0.408)</td>
<td>(0.750)</td>
<td>(-0.748)</td>
<td>(-0.204)</td>
<td>(1.610)</td>
</tr>
</tbody>
</table>

Note: For more details on the estimation procedure see previous slide.