Tax multipliers: Pitfalls in measurement and identification

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Main objective: Evaluate the impact of changes in government spending and taxes on output

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- **G multiplier** (increase in $1 of G) : \(-2.5\) to \(3.6\)
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Fiscal multipliers: The big picture

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- But a lot of variation likely due to identification and/or measurement problems
Sources of endogeneity

- Endogeneity source #1: Fiscal variables also respond to output fluctuations

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\[ \Delta Y \rightarrow \Delta G \]
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- Endogeneity source # 2: Policy instrument versus policy outcome

\[ \text{tax revenue} = \text{tax rate} \times \text{tax base} \]

\text{policy outcome} \quad \text{policy instrument} \quad \text{influenced by Y}
Empirical strategies

- SVAR (Blanchard and Perotti, 2002): timing assumption

  G side: it takes G at least one quarter to respond to Y
  T side: idem + use of revenue-output elasticity to differentiate "discretionary" changes in taxes from those driven by changes in output

  "Natural experiment" approach (mostly for the US):
  G side (Barro, 1981): focus on military spending (the least likely to respond to output fluctuations)
  T side (Romer and Romer, 2010): narrative approach of tax changes. Differentiate exogenous (debt-driven and long-run growth) from endogenous (to output fluctuations) tax changes.
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This paper: Disentangling identification from measurement

<table>
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<th>Identification of exogenous fiscal shocks</th>
<th>Measurement of tax policy</th>
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<td>(Finding a tax policy variable under the direct control of the policymaker)</td>
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<td>Tax rate</td>
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• No measurement error. |
| | • Endogeneity problems if tax changes are forward-looking/anticipated.  
• No measurement error. |
| | • Endogeneity problems if tax changes are forward-looking/anticipated.  
• Possible measurement error, especially due to changes in non-policy factors. |

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What do we do?

- Identification issue (revisited): SVAR vs. Fiscal consolidation (IMF)

Measurement of tax policy (less explored): tax rate vs. cyclically-adjusted revenue

Novel VAT quarterly data for 14 industrial countries (1980-2009)

Individual income tax for the US (Romer and Romer, 2010; Barro and Redlick, 2011)

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Tax multipliers

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Punchline # 1 (on measurement): Cyclically-adjusted revenue is a poor proxy for changes in tax rate
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Punchline # 2 (on identification): “Natural experiment” does better job in identifying truly exogenous fiscal shocks
Data

- **Tax rate data**
  - Novel VAT quarterly data for 14 industrial countries (1980-2009)
  - 49 VAT rate changes (36 increases and 13 decreases)
  - Av. marginal individual income for the US (Barro and Redlick, 2011)

- **Cyclically-adjusted revenues**
  - Novel VAT quarterly data

\[
\Delta(\text{cyclically-adjusted revenues}) = \Delta\text{revenues} - \eta \Delta Y
\]

- Individual income for the US (Romer and Romer, 2010)

- “Natural experiment”
  - IMF action-based fiscal consolidation episodes
IMF fiscal consolidation episodes

World Economic Outlook, October 2010
IMF fiscal consolidation episodes

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- Sample: 1980-2009, 15 industrial countries
IMF fiscal consolidation episodes

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Roughly corresponds to RR’s “deficit-driven” category of exogenous fiscal shocks
IMF fiscal consolidation episodes

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- Sample: 1980-2009, 15 industrial countries
- Identified episodes in which “government implemented tax hikes ... or spending cuts ... to reduce the budget deficit and put public finances on a more sustainable footing”
- Roughly corresponds to RR’s “deficit-driven” category of exogenous fiscal shocks
- We use IMF study as our identification mechanism: 21 out of 36 increases exogenous
Tax rate vs cyclically-adjusted: UK

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Tax rate vs cyclically-adjusted: Ireland

- Tax rate
- Cyclically-adjusted revenue

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Tax multipliers

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Correlation between tax rate changes and cyclically-adjusted changes

- Non-zero tax changes: correlation is 0.26 (and insignificant)
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- Fiscal consolidation non-zero tax rate changes: correlation is 0.09 (and insignificant)
Basic specification

\[ \Delta y_{i,t} = \alpha + \sum_{j=0}^{J} \beta_j \Delta t_{i,t-j} + \sum_{i=1}^{l-1} \beta_i d_i + \mu_{i,t}, \]

- \( \Delta y_{i,t} \) = real GDP growth
- \( \Delta t_{i,t-j} \) = fiscal consolidation tax rate change
- \( d_i \) = country dummy

- By construction, changes in tax rates uncorrelated with contemporaneous and future output
Cumulative tax multiplier: Fiscal consolidation tax rate shock
Cumulative tax multiplier: Robustness checks

- We control for government spending (since it likely falls in episodes) by running a three variable SVAR.
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We control for changes in other taxes (corporate and income taxes) by running a four variable SVAR.
Panel A. Cumulative tax multiplier for consumption

Panel B. Cumulative tax multiplier for investment

Panel C. Cumulative tax multiplier for exports

Panel D. Cumulative tax multiplier for imports
Cyclically-adjusted revenue multiplier

Using fiscal consolidation episodes to identify fiscal shocks.

![Graph showing the relationship between tax multipliers and fiscal consolidation episodes. The graph compares using fiscal consolidation tax rates versus cyclically-adjusted revenues over quarters.]
Cyclically-adjusted revenue multiplier

Using all cyclically-adjusted changes

- Using fiscal consolidation tax rates
- Using all cyclically-adjusted revenues

Quarter
Response of tax rate to GDP

Using fiscal consolidation tax rates
Using all cyclically-adjusted revenues
### Summary: Tax multipliers

#### Measurement of tax policy

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<td></td>
<td>Short-run multiplier = -1.02</td>
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<td><strong>Expansionary</strong></td>
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- Tax rate (contractionary)
- Cyclically-adjusted (neutral or expansionary!)
United States: Measurement

Using fiscal consolidation episodes to identify fiscal shocks and US individual income tax data

1. Using cyclically-adjusted revenue

2. Using Romer-Romer revenue change

3. Using Barro-Redlick av. marginal tax rate

Corr(CA, tax rate) = 0.17
Corr(RR, tax rate) = 0.35***
Corr(RR, CA) = 0.59***
Identification problems bias multipliers in different directions

Response of endogenous tax rate changes to output shock

Quarter

Industrial
Developing
Tax multiplier: Industrial versus developing

Tax multiplier (industrial)

Tax multiplier (developing)
Conclusions

- We use novel VAT data for 14 industrial countries and existing US individual income data
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- We revisit the discussion on identification of fiscal shocks: “natural experiment” vs SVAR

Finding: “natural experiment” is a better way of identifying exogenous fiscal policy changes

We analyze the (much less discussed) issue of measurement of tax policy (i.e., measure of policy instrument)

Finding: Tax rates are a better measure of tax policy instrument as opposed to widely-used revenue-based measures, such as cyclically-adjusted revenues.

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  - Tax rate (contractionary), cyclically-adjusted (neutral or expansionary!)