The Macroeconomic Effects of Fiscal Adjustment Plans: Disaggregating Taxes and Spending

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Research question

1. Does the composition of a fiscal adjustment make a difference? How much of a difference?
   - cuts in current and capital spending
   - cuts in transfers
   - hikes in direct taxes
   - hikes in indirect taxes

2. Are these differences consistent with a theoretical macro model with tax distortions?
   - results from a new-keynesian DSGE model
Fiscal multipliers and the persistence of fiscal shocks

Instantaneous output multipliers to shifts in $G$ and $\tau_n$ in Christiano, Eichenbaum and Rebelo (2011) for varying level of shocks persistence

![Graph showing multipliers and persistence parameter](image-url)
Empirical Results: methodology and data

- Plans, rather than isolated shifts in fiscal variables

- Country-specific styles: extent to which plans are
  - announced in advance
  - consistent over time

- Narrative identification from a *reconstruction* and an *extension* of the Devries et al (2011) IMF dataset ("exogenous” fiscal consolidations in 14 OECD countries over 40 years)
Plans vs the existing literature

\[ e_t : \{ e_t^u, e_{t-i,t}^a, e_{t,t+i}^a \} \]

\[ e_t^u : \{ \tau_t^u, g_t^u \} \quad e_{t-i,t}^a : \{ \tau_{t-i,t}^a, g_{t-i,t}^a \} \quad e_{t,t+i}^a : \{ \tau_{t,t+i}^a, g_{t,t+i}^a \} \]

Romer and Romer (2010)

\[ e_t^{R&R} = \tau_t^u + \tau_{t,t+i}^a \]

Mertens and Ravn (2011)

\[ e_t^{M&R} = \{ \tau_t^u, \tau_{t,t+i}^a \} \]

Jordà and Taylor (2013)

\[ e_t^{J&T} = e_t^u + e_{t-i,t}^a \]

\[ \Rightarrow \text{i.e. } e_t^{J&T} \text{ is predictable} \]
Pooling data from different countries allowing for two sources of heterogeneity

- **within country** heterogeneity with respect to the type of fiscal adjustments
  - plans mostly based on
    - hikes in Direct Taxes
    - hikes in Indirect Taxes
    - cuts in Transfers
    - cuts in Government Spending

- **between country** heterogeneity in the way fiscal policy is conducted over time: *persistence*

  \[ e_{i,t,t+j}^a = \varphi_{i,j} e_{i,t}^u + v_{i,t+j} \]

  \[ \Rightarrow \] Note that when the model contains announcements, the effect of an unanticipated shift in a fiscal variable can only be simulated using estimates of the \( \varphi' \)s
## Styles of fiscal adjustments (persistence of plans)

<table>
<thead>
<tr>
<th></th>
<th>AUS</th>
<th>AUT</th>
<th>BEL</th>
<th>CAN</th>
<th>DEU</th>
<th>DNK</th>
<th>ESP</th>
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<tbody>
<tr>
<td>$\varphi_1$</td>
<td>0.48</td>
<td>0.36</td>
<td>0.14</td>
<td>1.34</td>
<td>-0.10</td>
<td>0.48</td>
<td>0.27</td>
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<tr>
<td></td>
<td>(0.19)</td>
<td>(0.08)</td>
<td>(0.14)</td>
<td>(0.17)</td>
<td>(0.12)</td>
<td>(0.13)</td>
<td>(0.06)</td>
</tr>
<tr>
<td>$\varphi_2$</td>
<td>-0.23</td>
<td>0</td>
<td>0.11</td>
<td>0.51</td>
<td>-0.03</td>
<td>-0.02</td>
<td>0.06</td>
</tr>
<tr>
<td></td>
<td>(0.14)</td>
<td>(0.04)</td>
<td>(0.03)</td>
<td>(0.11)</td>
<td>(0.07)</td>
<td>(0.08)</td>
<td>(0.02)</td>
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<tr>
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<th>FRA</th>
<th>GBR</th>
<th>IRL</th>
<th>ITA</th>
<th>JPN</th>
<th>PRT</th>
<th>USA</th>
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<tbody>
<tr>
<td>$\varphi_1$</td>
<td>0.46</td>
<td>0.35</td>
<td>0.21</td>
<td>-0.26</td>
<td>0.25</td>
<td>0.89</td>
<td>0.47</td>
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<tr>
<td></td>
<td>(0.09)</td>
<td>(0.22)</td>
<td>(0.04)</td>
<td>(0.07)</td>
<td>(0.03)</td>
<td>(0.29)</td>
<td>(0.35)</td>
</tr>
<tr>
<td>$\varphi_2$</td>
<td>0.14</td>
<td>0.07</td>
<td>0</td>
<td>-0.02</td>
<td>0</td>
<td>0.12</td>
<td>0.34</td>
</tr>
<tr>
<td></td>
<td>(0.05)</td>
<td>(0.18)</td>
<td>(0.00)</td>
<td>(0.04)</td>
<td>(0.00)</td>
<td>(0.10)</td>
<td>(0.28)</td>
</tr>
</tbody>
</table>
Constructing plans and extending the data

- We go back to the original Devries\&al sources and
  - separate out unanticipated, anticipated and implemented (but previously announced) shifts in taxes and spending
  - organize the data into plans
  - extend the data and construct plans that cover the period 2010-2014
  - disaggregate expenditure in government consumption and investments and transfers, and revenues in direct and indirect taxes
  - while doing this we double check the Devries\&al identification
Disaggregation

Taxes

- **Direct Taxes**: taxes on net income of individuals, on profits of corporations and enterprises, on capital gains and taxes on individual and corporate properties
- **Indirect Taxes**: taxes on transactions, goods and services (e.g. VAT, excise duties, stamp duty, services tax)

Spending

- **Government consumption and investment**: current expenditures for consumption of goods and services, public sector salaries, costs of state provided services (e.g. public education and health) plus all government fixed capital formation expenditures
- **Transfers**: money transferred by the government to households (e.g. pensions and unemployment benefits) and corporations (without expecting an economic gain, e.g. subsidies)
Labelling of plans

We define 4 types of plans. Plans mostly based on

- Direct Taxes
- Indirect Taxes
- Government consumption and investment
- Transfers

We label plans in two steps

- we evaluate whether the plan mainly consists of spending measures (EB) or tax measures (TB)
  - if the plan is EB, we assess whether it consists mostly of consumption and investment or transfers measures
  - If TB whether direct or indirect taxes prevail
### Average plans

#### 4 components - (1981-2014)

<table>
<thead>
<tr>
<th>Number of plans</th>
<th>Plan</th>
<th>Direct</th>
<th>Indirect</th>
<th>Consumption</th>
<th>Transfer</th>
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</thead>
<tbody>
<tr>
<td>Direct Tax Based</td>
<td>38</td>
<td>1.67</td>
<td>0.73</td>
<td>0.22</td>
<td>0.31</td>
</tr>
<tr>
<td>Indirect Tax Based</td>
<td>20</td>
<td>1.52</td>
<td>0.28</td>
<td><strong>0.82</strong></td>
<td>0.15</td>
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<tr>
<td>Consumption Based</td>
<td>58</td>
<td>1.81</td>
<td>0.20</td>
<td>0.20</td>
<td><strong>0.90</strong></td>
</tr>
<tr>
<td>Transfer Based</td>
<td>43</td>
<td>1.20</td>
<td>0.30</td>
<td>0.20</td>
<td>0.40</td>
</tr>
</tbody>
</table>

How IRFs are computed
4-level disaggregation: output growth

Consumption Based (Blue), Transfer Based (Green), Direct Based (Red) and Indirect Based (Yellow) Adjustments

\[ \phi = [0.35, 0.7] \]

\[ \phi = [1.34, 0.51] \]
4-level disaggregation: private consumption growth

Consumption Based (Blue), Transfer Based (Green), Direct Based (Red) and Indirect Based (Yellow) Adjustments

\( \phi = [0.35, 0.7] \)

\( \phi = [1.34, 0.51] \)
4-level disaggregation: fixed capital formation

Consumption Based (Blue), Transfer Based (Green), Direct Based (Red) and Indirect Based (Yellow) Adjustments

\( \phi = [0.35, 0.7] \)

\( \phi = [1.34, 0.51] \)
4-level disaggregation: ESI business confidence

Consumption Based (Blue), Transfer Based (Green), Direct Based (Red) and Indirect Based (Yellow) Adjustments

phi=[0.35, 0.7]  
phi=[1.34, 0.51]

Negative phi
Fiscal plans in a NK framework (extending Chistiano, Eichenbaum and Rebelo, 2011)

- **Representative household:**
  - Infinitely lived with $U_t(C_t, G_t, N_t) = \frac{(C_t + a_g G_t)^{1-\sigma}}{1-\sigma} + \frac{N^{1+\psi}}{1+\psi}$
  - Invests in two types of assets: capital $K_t$ and risk free government bonds $B_t$
  - Subject to adjustment costs on investments
  - Receives lump sum transfer $T_t$ and pays payroll tax $\tau^d_t$ and private consumption tax $\tau^c_t$

- **Production side:** monopolistic competition among intermediary firms with Calvo price rigidity, flexible wages and constant returns to scale

- **Government**
  - 4 instruments: $\tau^d$, $\tau^c$, $T$ (lump sum transfers), $G$
    
    \[ G_t + T_t + (1 + i_t) \frac{B_t}{P_t} = \tau^d_t w_t N_t + \tau^c_t C_t + \frac{B_{t+1}}{P_t} \]

- **Monetary policy:** Taylor rule
Introducing plans

\[
G_t = (1 - \rho_G)G_{st} + \rho_G G_{t-1} + e_{t,G}^u + \sum_{s=1}^{3} e_{t-s,t}^a\]

\[
T_t = (1 - \rho_T)T_{st} + \rho_T T_{t-1} + e_{t,T}^u + \sum_{s=1}^{3} e_{t-s,t}^a\]

\[
\tau_t^d = (1 - \rho_{\tau^d})\tau_{st}^d + \rho_{\tau^d} \tau_{t-1}^d + e_{t,\tau^d}^u + \sum_{s=1}^{3} e_{t-s,t}^a\]

\[
\tau_t^c = (1 - \rho_{\tau^c})\tau_{st}^c + \rho_{\tau^c} \tau_{t-1}^c + e_{t,\tau^c}^u + \sum_{s=1}^{3} e_{t-s,t}^a\]

Note that each movement in \( e_{t,f}^u \), \( f \in \{ G, T, \tau^d, \tau^c \} \), is accompanied by

- **announcements**: \( e_{t,t+s}^a = \phi_s e_{t,f}^u \), \( s \in \{1, 2, 3\} \)
- **contemporaneous changes in fiscal variables other than \( f \)**
  - e.g. the composition of the average CB plan is 50% \( G \), 17%, \( T \) and 12% each \( \tau_t^d \) and \( \tau_t^c \) (see slide 11)
Calibration as in CER. Plans: \( \phi_1=0.35, \phi_2=0.7, \phi_3=0 \)
Conclusions

- Empirical results
  - Tax-based plans (both based on Direct and Indirect Taxes) are the most recessionary
  - Plans based on cuts in Spending are the least recessionary
  - Transfers-based plans are not very different from Spending-based plans

- This heterogeneity is consistent with the predictions of a simple NK model with tax distortions and standard calibration
Computing impulse responses

- Heterogeneity in styles implies that an initial correction of 1% of GDP will generate plans of different size across countries.

- We normalize plans, computing impulse responses to a plan of the size of 1% of GDP, while traditional impulse responses are computed with respect to a shock of 1% of GDP.

\[ e_{i,t}^u + e_{i,t,t+1}^a + e_{i,t,t+2}^a = 1 \]

\[ e_{i,t,t+j}^a = \varphi_{i,j} e_{i,t}^u \text{ for } j = 1, 2 \]

\[ e_{i,t}^u = \frac{1}{1 + \varphi_{i,1}^\wedge + \varphi_{i,2}^\wedge} \]

as an example for Italy, where \( \varphi_{1}^\wedge = -0.24 \) and \( \varphi_{2}^\wedge = 0 \) we simulate \( e_t^u = 1.32 \), \( e_{t,t+1}^a = -0.32 \), \( e_{t,t+2}^a = 0 \).
Negative phi

Consumption Based (Blue), Transfer Based (Green), Direct Based (Red) and Indirect Based (Yellow) Adjustments