The effects of fiscal policy on output and debt sustainability: A DSGE analysis

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Motivation

• Use of discretionary fiscal policy in most OECD countries
• Question on the **effectiveness** of the fiscal package
• Question of the **composition** of the fiscal package
Roadmap

• Main features of the model
• Simulation results
• Conclusions
Main features

Draws extensively on existing DSGE models (Ratto et al, 2009; Smets and Wouters, 2003)

- Closed economy
- Monopolistic product markets
- Heterogeneity in the household sector
- Adjustment costs and rigidities
Monetary policy

Taylor rule

\[ i_t = \rho i_{t-1} + (1-\rho)[r + \theta_1(\pi_t - \pi^*) + \theta_2 \log(GAP_t)] \]

- Interest rate persistence
- Neutral interest rate
- Inflation target
- Output gap
Key feature of the model

\[ ig_t - i_t = \theta E_t d_{t+1} \]

Interest rates on government debt  Policy rate  Expected deficit

Calibrated using Laubach (2009)
Fiscal policy

Spending

\[ G_t = ub_t + G_t^{cd} + I_t^o + TR_t \]

with \( ub_t = \varepsilon \log (GAP_t) \)

Unemploy. benefit \quad Gov. consumption \quad Public investment \quad Transfers

Revenue

Tax revenues

\[ R_t^a = t_w^t W_t L_t + t^o_t P_t C_t + t^k_t t^k_t P_t K_{t-1} + t^k_t i g_t B_{t-1} \]

Stabilisation rule

\[ T_t^b = \tau_1 \left( \frac{B_t}{Y_t} \right) - b^s + \tau_2 d_t \]

\[ \text{debt} \quad \text{deficit} \]
Fiscal policy shocks

• Different policy shocks
  o Spending: government consumption, investment, transfers
  o Revenue: wage tax, consumption tax, capital tax

• All shocks amount to 1% of baseline GDP

• Temporary (last around 2 years)

• Monetary policy is assumed to be accommodative
Spending shocks

SIMULATION RESULTS

Y (per cent)

B/Y (percentage point)
Revenue shocks

Y (per cent)  B/Y (percentage point)

0  0
0.05  0.2
0.1  0.4
0.15  0.6
0.2  0.8
0.25  1.0
0.3  1.2
0.35  1.4
0.4  1.6
0.45  1.8
0.5  2.0

1  11  21  31  tc  tw  tk

1  11  21  31  tc  tw  tk
**Short-term impact on activity vs. long-term implications on debt**

<table>
<thead>
<tr>
<th></th>
<th>(1) Output increase after 1 year (%)</th>
<th>(2) Debt/GDP increase after 10 years (%)</th>
<th>Ratio (1)/(2)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Government spending Increase</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consumption</td>
<td>0.64</td>
<td>1.54</td>
<td>0.42</td>
</tr>
<tr>
<td>Investment</td>
<td>0.68</td>
<td>1.40</td>
<td>0.49</td>
</tr>
<tr>
<td>Transfers</td>
<td>0.15</td>
<td>1.24</td>
<td>0.12</td>
</tr>
<tr>
<td><strong>Tax cut</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wage</td>
<td>0.36</td>
<td>0.77</td>
<td>0.46</td>
</tr>
<tr>
<td>Capital</td>
<td>0.08</td>
<td>0.54</td>
<td>0.15</td>
</tr>
<tr>
<td>Consumption</td>
<td>0.25</td>
<td>0.78</td>
<td>0.32</td>
</tr>
</tbody>
</table>
Robustness tests

$$Y$$
(per cent)

SIMULATION RESULTS

quarters

quarters
## COMPOSITION OF THE FISCAL PACKAGE

Weighted average of euro area countries, in percentage of GDP

<table>
<thead>
<tr>
<th></th>
<th>2009</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Net effect on fiscal balances</strong></td>
<td>-0.9</td>
<td>-0.7</td>
</tr>
<tr>
<td><strong>Tax measures</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>For individuals</td>
<td>-0.3</td>
<td>-0.4</td>
</tr>
<tr>
<td>For businesses</td>
<td>-0.2</td>
<td>-0.2</td>
</tr>
<tr>
<td>On consumption</td>
<td>-0.1</td>
<td>-0.1</td>
</tr>
<tr>
<td>Contributions for public pensions, unemployment, healthcare, invalidity…</td>
<td>-0.1</td>
<td>-0.1</td>
</tr>
<tr>
<td>Others</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td><strong>Spending measures</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increase in government final demand</td>
<td>0.6</td>
<td>0.3</td>
</tr>
<tr>
<td>of which  public investment:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transfers to households</td>
<td>0.3</td>
<td>0.1</td>
</tr>
<tr>
<td>Transfers to businesses</td>
<td>0.2</td>
<td>0.2</td>
</tr>
<tr>
<td>Transfers to sub-national governments</td>
<td>0.2</td>
<td>0.1</td>
</tr>
<tr>
<td>Other spending</td>
<td>0.0</td>
<td>0.0</td>
</tr>
</tbody>
</table>

Note: The aggregate excludes Portugal and Greece.
Source: OECD Economic Outlook database.
## IMPACT
(difference from baseline)

<table>
<thead>
<tr>
<th>Metric</th>
<th>2009</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP (per cent)</td>
<td>0.8</td>
<td>0.6</td>
</tr>
<tr>
<td>Inflation (percentage point)</td>
<td>0.14</td>
<td>0.7</td>
</tr>
<tr>
<td>Government bond rates (percentage point)</td>
<td>0.05</td>
<td>0.08</td>
</tr>
<tr>
<td>Debt/GDP (percentage point)</td>
<td>0.8</td>
<td>1.8</td>
</tr>
</tbody>
</table>
Main results

Fiscal policy is effective to stimulate output but the effect varies across instruments: government investment (among spending) and wage tax (among revenue) are the most effective.

The fiscal package introduced in the euro area is estimated to boost activity by 0.8-0.6% in the next two years, but will also have (limited) fiscal sustainability implications.

Caveat and future work.
Thank you
Firms

Production function

\[ Y_t^j = \left( \text{ucap}_t^j K_t^j \right)^\alpha \left( L_t^j \right)^{1-\alpha} \left( K_t^g \right)^{\alpha_g} \]

Demand

\[ Y_t^j = \left( \frac{P_t}{P_t^j} \right)^\sigma \left( C_t + G_t + I_t \right) \]

Profit

\[ P_{t_t}^j = \frac{P_t^j}{P_t} Y_t^j - \frac{W_t}{P_t} L_t^j - \ell_t K_t^j - \frac{1}{P_t} (adj^P + adj^{ucap}) \]
2 types of households

Ricardian

Liquidity constrained

Endogenisation of $\omega$:

$$\omega = \gamma \exp(gap)$$
Adjustment costs

Price adjustment costs

\[ \text{adj}^P = \frac{1}{p^j_{t-1}} \left( \frac{v_p \Delta p^j_t}{2} \right) \]

Capacity utilisation

\[ \text{adj}^\text{ucap} = p_t K_t \left( y_{\text{ucap}, 1} (ucap_t^j - 1) + \frac{y_{\text{ucap}, 2}}{2} (ucap_t^j - 1)^2 \right) \]

Investment

\[ I_t^i = J_t^i \left( 1 + \frac{v_K}{2} \left( \frac{J_t^j}{K_t^j} \right) + \frac{v_l}{2} (\Delta J_t^i)^2 \right) \]

Real investment expenditure

Physical investment expenditure
Rigidities

Real wage

$$\frac{W_t}{P_t} = (1 - \kappa_w) \frac{W_{t-1}}{P_{t-1}} + \frac{1}{\gamma_w} \kappa_w \frac{1 + \gamma_w}{1 - \gamma_w} \left( \omega u_{t,t} + (1 - \omega) u_{t,t}^{\varepsilon} \right)$$

Wage persistence

Reservation wage