FISCAL POLICY EFFECTS IN THE EUROPEAN UNION

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2nd Convention of the SFB 649
Motivation

➤ **Theoretically**: (Excessive) government deficits may lead to substantial increases in the overall price level.

➤ **Empirically**: No completing evidence neither for nor against the theoretically implied mechanism between public debt and prices.

➤ As long as the relevance of public debt for the determination of the price level is not clear, the necessity of the SGP will be under question (→ credibility problem).
Aim of this paper

- Investigation of German and Spanish data
  - Example of two countries with the same monetary policy but different runs of inflation in recent years

Research questions:

1. Does the fiscal theory of the price level play a role in describing German and Spanish inflation rates?
2. Does fiscal policy behavior constitute the differences in inflation between Germany and Spain?
3. Do we need a SGP?

FTPL: In a world with price rigidities fiscal policy has an impact on the price level, if it follows an exogenous process (non-Ricardian fiscal policy).

If fiscal policy is non-Ricardian, there is a relationship between fiscal policy and private sector’s budget constraint inducing a link between fiscal policy and households’ path of consumption.
A very limited number of papers deals with the empirical relevance of the FTPL.

It is hard to test statistically for the validity of the FTPL.

Cochrane (1998): “FTPL per se has no testable implications for the time series of debt, surplus and price level” → government budget constraint must be fulfilled at any point of time.

<table>
<thead>
<tr>
<th>Author</th>
<th>Method</th>
<th>Country analyzed</th>
<th>FTPL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Afonso (2002)</td>
<td>Panel</td>
<td>EU-15</td>
<td>-</td>
</tr>
<tr>
<td>Bohn (1998)</td>
<td>OLS</td>
<td>USA</td>
<td>-</td>
</tr>
<tr>
<td>Canzoneri, Cumby and Diba (2000)</td>
<td>VAR</td>
<td>USA</td>
<td>-</td>
</tr>
<tr>
<td>Davig and Leeper (2005)</td>
<td>MS model</td>
<td>USA</td>
<td>+</td>
</tr>
<tr>
<td>Favero and Monacelli (2005)</td>
<td>MS model</td>
<td>USA</td>
<td>+</td>
</tr>
<tr>
<td>Janssen, Nolan and Thomas (2002)</td>
<td>VECM</td>
<td>UK</td>
<td>-</td>
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</table>
In this paper: two different approaches to cross-check the results.

1. **Deficit-Debt Approach**: How do government liabilities divided by GDP react to changes in the surplus-GDP ratio? (Canzoneri, Cumby and Diba, 2000)

2. **Regime-Switching Approach**: Does monetary and fiscal policy follow certain patterns? (Davig and Leeper, 2005)
The model I

Starting with the government budget constraint in nominal terms

\[ B_t = (T_t - G_t) + (M_{t+1} - M_t) + \frac{B_{t+1}}{1 + i_t}, \]

where \( B_t \) denotes government debt, \( T_t \) taxes, \( G_t \) government expenditures, \( M_t \) stock of base money and \( i_t \) nominal interest rates.

\[ \iff \frac{M_t + B_t}{P_t y_t} \bigg/ \frac{L_t}{Y_t} = \frac{T_t - G_t}{P_t y_t} + \frac{M_{t+1}}{P_t y_t} \frac{i_t}{1 + i_t} + \frac{y_{t+1}/y_t}{(1 + i_t)P_t/P_{t+1}} + \frac{M_{t+1} + B_{t+1}}{P_{t+1} y_{t+1}} \]

\[ \rightarrow \frac{L_t}{Y_t} = \frac{S_t}{Y_t} + \beta_t \frac{L_{t+1}}{Y_{t+1}} \]
Fiscal policy is said to be...

- **Ricardian**, if surpluses follow an endogenous process s.t. the sequence of $S_t$ is determined within the system, while the sequence of $\beta_t$ and $Y_t$ is determined outside the system.

- **non-Ricardian**, if the sequence $S_t$ is determined by an arbitrary exogenous process s.t. $\beta_t$ and $Y_t$ adjust instead of $S_t$ to make the government budget constraint hold.

$\rightarrow$ VAR to model the interrelationship between surplus and liabilities
The estimation strategy

The regression equation:

\[
\begin{bmatrix}
S_t/Y_t \\
L_t/Y_t
\end{bmatrix} = const + \sum_{s=1}^{p} \begin{bmatrix}
B_{11}(s) & B_{12}(s) \\
B_{21}(s) & B_{22}(s)
\end{bmatrix} \begin{bmatrix}
S_{t-s}/Y_{t-s} \\
L_{t-s}/Y_{t-s}
\end{bmatrix} + \begin{bmatrix}
u_{1t} \\
u_{2t}
\end{bmatrix},
\]

where \( p = 2 \).

Bayesian VAR in \( S_t/Y_t \) and \( L_t/Y_t \) with flat prior and sign restrictions:

- We use sign restrictions on the impulse responses to identify those responses which generally follow a Ricardian pattern in contrast to those which exhibit non-Ricardian characteristics.
- Ricardian policy behavior implies that a shock in \( S_t/Y_t \) leads to a negative impact on \( L_{t+1}/Y_{t+1} \).
- Sign restriction is binding for only one period
The data

▶ Source: International Monetary Fund

<table>
<thead>
<tr>
<th>Variable</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>$B_t$</td>
<td>Total government debt</td>
</tr>
<tr>
<td>$M_t$</td>
<td>Money in circulation</td>
</tr>
<tr>
<td>$L_t$</td>
<td>$B_t + M_t$</td>
</tr>
<tr>
<td>$S_t$</td>
<td>Difference between total government revenues and expenditures</td>
</tr>
<tr>
<td>$Y_t$</td>
<td>Nominal GDP, seasonally adjusted</td>
</tr>
<tr>
<td>$i_t$</td>
<td>Germany: 3-month interbank deposit rate, Spain: Bank of Spain rate</td>
</tr>
</tbody>
</table>
The results: Germany before 1990

Abbildung: Germany, response to a Surplus/GDP shock for the period 1970-1990 in % with 68% error bands. 70% of the impulse responses match the sign restriction.
The results: Germany before 1990 with interest rates included

Abbildung: Germany, response to a Surplus/GDP shock for the period 1970-1990 in % with 68% error bands. 70% of the impulse responses match the sign restriction.

At first glance: Ricardian pattern, but...
The problem of leaving interest rates unrestricted

- Following CCD liabilities are defined as the sum of monetary base and public debt.
- Interest rate increases have a negative impact on monetary base and hence on liabilities itself.
- Without sign restriction on interest rates we just see an average response of interest rates, which indeed seems to be rather unaffected by the fiscal shock.
- → Identification problem!
- Solution: Sign restriction on interest ensuring that the remaining impulse responses are Ricardian and not induced by monetary policy → negative sign on interest rates.
The results: Germany before 1990 with negative sign restriction on interest rates

Abbildung: Germany, response to a Surplus/GDP shock for the period 1970-1990 in % with 68% error bands. 35% of the impulse responses match the sign restriction.

Purely Ricardian pattern
The results: Germany before 1990 with positive sign restriction on interest rates

Abbildung: Germany, response to a Surplus/GDP shock for the period 1970-1990 in % with 68% error bands. 35% of the impulse responses match the sign restriction.

Impulse responses are induced by monetary policy shock
The results: Germany after 1990 with interest rates included

Abbildung: Germany, response to a Surplus/GDP shock for the period 1991-1998 in % with 68% error bands. 65% of the impulse responses match the sign restriction.

Again, at first glance: Ricardian pattern
The results: Germany after 1990 with negative sign restriction on interest rates

Abbildung: Germany, response to a Surplus/GDP shock for the period 1970-1990 in % with 68% error bands. 30% of the impulse responses match the sign restriction.

Impact on $L_t/Y_t$ hardly persistent $\rightarrow$ Ricardian interpretation hardly justifiable
The results: Germany after 1990 with positive sign restriction on interest rates

Abbildung: Germany, response to a Surplus/GDP shock for the period 1970-1990 in % with 68% error bands. 30% of the impulse responses match the sign restriction.

Impulse responses are induced by monetary policy shock.
The results: Spain with interest rates included

Abbildung: Spain, response to a Surplus/GDP shock for the period 1986-1998 in % with 68% error bands. 60% of the impulse responses match the sign restriction.
The results: Spain with negative sign restriction on interest rates

Abbildung: Spain, response to a Surplus/GDP shock for the period 1986-1998 in % with 68% error bands. 30% of the impulse responses match the sign restriction.
The results: Spain with positive sign restriction on interest rates

Abbildung: Spain, response to a Surplus/GDP shock for the period 1986-1998 in % with 68% error bands. 30% of the impulse responses match the sign restriction.

Impulse responses are induced by monetary policy shock → no evidence for Ricardian policy behavior
Summarizing the results

- In Germany and Spain evidence for non-Ricardian fiscal policy

<table>
<thead>
<tr>
<th></th>
<th>Ricardian</th>
<th>Non-Ricardian</th>
</tr>
</thead>
<tbody>
<tr>
<td>Germany 1970-1990</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Germany 1991-1998</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Spain 1986-1998</td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

- CCD approach has a potential identification problem → identification of fiscal shocks by sign restriction on interest rates.
Regime-switching approach: The idea

- To uncover changes in (monetary and) fiscal policy behavior with the help of simple policy rules.
- Method: Bayesian analysis of a Markov-switching model to avoid any statements about characteristics of the data w.r.t. stationarity.
Policy rule specifications

▶ Fiscal policy:

\[ \tau_t = \gamma_G(S^F_t)G_t + \gamma_Y(S^F_t)Y_t + \gamma_B(S^F_t)B_t + \sigma_\Delta \varepsilon^\Delta \]

- \( \tau_t \): government revenues
- \( G_t \): government expenditures
- \( Y_t \): real output
- \( B_t \): nominal government debt
- \( S^F_t \): state of fiscal policy at time \( t \)
- \( \sigma_\tau \): time-invariant standard error

We use the information from the deficit-debt approach for the specification of the parameters’ prior distributions, i.e. we specify the prior distribution for the parameters to be normally in general, but with changing mean for \( \gamma_B \).

\[ E[\gamma_B] = \begin{cases} 0, & \text{if deficit-debt approach indicates NR policy} \\ 1, & \text{otherwise} \end{cases} \]
The data

- Source: International Monetary Fund

<table>
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<tr>
<th>Variable</th>
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</tr>
</thead>
<tbody>
<tr>
<td>$B_t$</td>
<td>Total government debt, annual percentage changes</td>
</tr>
<tr>
<td>$\tau_t$</td>
<td>Total government revenues, annual percentage changes</td>
</tr>
<tr>
<td>$G_t$</td>
<td>Total government expenditures, annual percentage changes</td>
</tr>
<tr>
<td>$Y_t$</td>
<td>Real GDP, annual percentage changes, seasonally adjusted</td>
</tr>
</tbody>
</table>
Results for fiscal policy: Germany before 1990

Temporal Distribution of Regime 1 (Passive Fiscal Policy)

Temporal Distribution of Regime 2 (Weakly Passive Fiscal Policy)
Results for fiscal policy: Germany after 1990

Temporal Distribution of Regime 1 (Active Fiscal Policy)

Temporal Distribution of Regime 2 (Weakly Passive Fiscal Policy)
Results for fiscal policy: Spain

Temporal Distribution of Regime 1 (Active Fiscal Policy)

Temporal Distribution of Regime 2 (Weakly Passive Fiscal Policy)
Conclusions

The FTPL does play a role in explaining the data:

1. In the case of Spain: Strong evidence for non-Ricardian policy behavior.
2. Germany shows weak passive fiscal policy behavior before its reunification, active behavior afterwards.

Explanation of the inflation rate differentials through the FTPL mechanism is not possible:

- Non-Ricardian policy behavior in both countries after 1990.

Generally, deficit-debt approach with sign restrictions is a valuable instrument.

- Should only be used when controlling for interest rates, as seemingly Ricardian pattern may be induced by monetary policy.
Policy Implications

- A limit on borrowing is needed to guarantee the success of a monetary union.
- The SGP is important and rather needs strengthening than weakening.