

Fiscal behaviour in the European Union: rules, fiscal decentralization and government indebtedness

António Afonso

(ISEG/UTL-Technical University of Lisbon; UECE-Research Unit on
Complexity and Economics; European Central Bank)

Sebastian Hauptmeier

(European Central Bank)

These slides reflect the views of the authors and do not necessarily reflect those of the ECB
or the Eurosystem.

Outline

1. Introduction
2. Empirical strategy
3. Results and analysis
 1. Primary balance reaction functions
 2. Primary spending reaction functions
4. Conclusions

In this paper we

- i) use panel data analysis to assess the determinants of government's fiscal behaviour for the 27 EU countries for 1990-2005;
- ii) use a set of fiscal rules, a government decentralisation measure, and electoral dates among the determinants of fiscal discipline;
- iii) assess both primary balance and primary spending reaction functions.

Some related literature

- Some existing literature specifies fiscal reaction functions for the government, taking into account several determinants, ranging from government indebtedness to measures for rules and decentralisation:
- Afonso (2005),
- Ayuso-i-Casals et al. (2007),
- Wierds (2008),
- Debrun et al. (2008).

Fiscal policy reaction function

$$s_{it} = \beta_i + \delta s_{it-1} + \theta b_{it-1} + \lambda z_{it-1} + \phi f_{it} + \gamma x_{it} + \alpha t + u_{it}$$

s – primary balance-to-GDP ratio;

b – debt-to-GDP ratio;

z – output gap (difference between actual GDP and potential GDP as a % of potential GDP);

f – fiscal rule indicator;

x – institutional, political, control variables such as the degree of public **spending decentralization**, dummy variables for EU enlargement, EMU, SGP sub-periods.

For instance, if $\theta > 0$, the government increases the primary balance in order to react to the existing stock of public debt (Ricardian behaviour).

The fiscal rule index

- The index is based on a survey conducted by the European Commission in the context of the Working Group on the Quality of Public Finances in 2006 (questionnaires filled out by fiscal experts in EU Member States).
- Ayuso-i-Casals et al. (2007), construction of synthetic numerical indicators summarising for each EU country in a given year:
 - (i) the degree of intensity in the use of numerical fiscal rules (at the central and sub-central government level);
 - (ii) the potential effectiveness of the rules based on their characteristics (statutory base, body in charge of monitoring, enforcement mechanisms, degree of media visibility).

Public spending decentralization measure

$$dec_{it} = (StateG_{it} + RegLocG_{it}) / (CenG_{it} + StateG_{it} + RegLocG_{it})$$

- According to the ESA 95 structure,

$$dec = (S1312 + S1313) / (S1311 + S1312 + S1313).$$

- The sub-level state government (S1312) is present in federal states such as Austria, Germany and Spain.
- In most European Union countries the distinction is essentially between central government (S1311) and local/regional government (S1313).

| | Spending | | | Revenue | | | Taxes | | |
|----------------|----------|------|------|---------|------|------|-------|------|------|
| | 1990 | 2000 | 2005 | 1990 | 2000 | 2005 | 1990 | 2000 | 2005 |
| Austria | 39.1 | 40.8 | 36.9 | 43.7 | 42.6 | 38.8 | 31.2 | 28.5 | 26.5 |
| Belgium | 34.3 | 39.9 | 42.8 | 39.3 | 40.2 | 43.0 | 8.4 | 8.6 | 13.4 |
| Bulgaria | | | 19.5 | | | 17.3 | | 16.9 | 1.2 |
| Cyprus | | 4.4 | 5.6 | | 5.2 | 6.2 | | 2.1 | 1.5 |
| Czech Republic | | 23.6 | 27.2 | | 24.7 | 29.5 | | 20.8 | 26.2 |
| Denmark | 43.4 | 47.1 | 50.4 | 44.8 | 46.8 | 46.4 | 31.9 | 35.1 | 34.1 |
| Estonia | | 23.4 | 25.5 | | 22.4 | 23.6 | | 21.6 | 20.0 |
| Finland | 44.2 | 41.1 | 43.5 | 43.7 | 38.4 | 42.3 | 29.0 | 29.5 | 29.0 |
| France | 27.9 | 29.4 | 31.6 | 28.7 | 31.8 | 33.9 | 18.6 | 19.5 | 22.1 |
| Germany | | 64 | 58.2 | | 61.5 | 60.8 | | 50.8 | 49.8 |
| Greece | | 6.5 | 7.9 | | 7.7 | 9.6 | | 1.3 | 1.5 |
| Hungary | | 28.4 | 28.4 | | 29.9 | 33.1 | | 14.5 | 17.6 |
| Ireland | 25.9 | 32.8 | 18.5 | 27.6 | 29.2 | 18.9 | 2.9 | 2.3 | 2.7 |
| Italy | 26.7 | 35 | 36.8 | 31.0 | 35.7 | 39.1 | 7.9 | 20.5 | 23.3 |
| Latvia | | 33 | 30.4 | | 34.7 | 31.7 | | 25.5 | 24.3 |
| Lithuania | | 29.8 | 28.3 | | 32.6 | 29.0 | | 32.4 | 15.4 |
| Luxembourg | 19.1 | 16.3 | 15.2 | 18.0 | 16.1 | 15.0 | 8.8 | 7.8 | 6.3 |
| Malta | | 1.7 | 1.3 | | 2.3 | 1.7 | | 0.0 | 0.0 |
| Netherlands | 34.7 | 38.6 | 37.5 | 38.6 | 38.2 | 37.1 | 4.3 | 5.6 | 6.3 |
| Poland | | 36.9 | 34.9 | | 37.8 | 39.3 | | 20.4 | 20.4 |
| Portugal | 13.9 | 16.9 | 16.1 | 14.8 | 17.3 | 18.8 | 8.3 | 8.8 | 9.6 |
| Romania | | | 26.5 | | | 27.7 | | | 33.0 |
| Slovakia | | 6.6 | 24.1 | | 10.6 | 26.3 | | 6.6 | 19.3 |
| Slovenia | | 22.2 | 22.6 | | 24.3 | 23.8 | | 11.9 | 11.8 |
| Spain | | 46.7 | 58.2 | | 47.4 | 57.5 | | 24.7 | 45.7 |
| Sweden | | 42.6 | 44.2 | | 39.9 | 44.4 | | 39.4 | 43.7 |
| United Kingdom | 24.0 | 24.4 | 24.3 | 23.9 | 23.1 | 25.3 | 8.7 | 5.0 | 5.8 |

Share of sub-national
spending (revenue)
in government
spending (revenue)

State+Local/
Central+State+Local
%

Source: Eurostat.

Estimation approach

- Econometric issue: Results could suffer from the Nickell-Bias (FE downwardly bias the coefficient of the LSDV), when estimating our dynamically specified reaction function using a standard FE-estimator (Nickell, 1981).
- Monte Carlo evidence points to the superiority of bias correction methods in relatively narrow macro panels such as the one used in our analysis (e.g., Judson and Owen, 1999) [when N is small bias-corrected LSDV estimators outperform IV-GMM estimators]
- We then use the Bias Corrected Least Squares Dummy Variable (LSDVC) estimator proposed by Bruno (2005) (also suitable for unbalanced panels) to account for potential endogeneity.
- Panel unit root test results reveal that the null unit root can be rejected at the 10% level for all or most of the cases, thus supporting the stationarity of fiscal variables and of the output gap.

Reaction function for primary balances (LSDVC, 1990-2005)

| | 1 | 2 | 2 |
|--|-------------------|-------------------|-------------------|
| | LSDVC | | |
| Primary balance (-1) | 0.48*** (8.09) | 0.47*** (7.91) | 0.48*** (7.95) |
| Debt (-1) | 0.04** (2.55) | 0.03** (2.22) | 0.03** (2.30) |
| Output gap (-1) | 0.03 (0.49) | 0.04 (0.54) | 0.02 (0.34) |
| EMU dummy | 0.87* (1.75) | 0.94* (1.86) | 0.90* (1.78) |
| SGP dummy | 0.99* (1.80) | 0.98* (1.78) | 1.08* (1.94) |
| Election dummy | -0.43* (-1.83) | -0.42* (-1.77) | -0.43* (-1.79) |
| General government fiscal rule (-1) | 0.54** (2.56) | | |
| Central government fiscal rule (-1) | | 0.37* (1.82) | |
| Sub-national government fiscal rule (-1) | | 0.37 (1.21) | |
| Budget balance fiscal rule (-1) | | | 0.60*** (2.82) |
| Observations | 308 | 308 | 308 |

Run-up to EMU dummy, 1 between 1994 and 1998 for EU15, 0 otherwise.

SGP dummy, 1 after 1997 for the countries that are (adhered) in (to) the EU, 0 otherwise.

The relevance of government indebtedness

- The relevance of government indebtedness can be further assessed by interacting the level of the debt-to-GDP ratio with alternative debt ratio thresholds:

$$D_{it}^{TH} = \begin{cases} 1, & \text{if debt ratio} > TH, \text{ in country } i \text{ in period } t \\ 0, & \text{otherwise} \end{cases},$$

$$TH=0.6, 0.7, 0.8$$

Primary balance reaction function (LSDVC, 1990-2005), debt thresholds

| | 1 | 2 | 3 |
|-------------------------------------|-------------------|-------------------|-------------------|
| Primary balance (-1) | 0.48*** (8.13) | 0.48*** (8.15) | 0.50*** (8.43) |
| Output gap (-1) | 0.03 (0.49) | 0.03 (0.49) | 0.03 (0.42) |
| EMU dummy | 0.84* (1.66) | 0.84* (1.68) | 0.66 (1.42) |
| SGP dummy | 0.98* (1.77) | 0.99* (1.79) | 0.90* (1.65) |
| Enlargement dummy | -0.43* (-1.82) | -0.43* (-1.84) | -0.41* (-1.74) |
| Election dummy | 0.53** (2.49) | 0.54** (2.54) | 0.57*** (2.67) |
| General government fiscal rule (-1) | 0.48*** (8.13) | 0.48*** (8.15) | 0.50*** (8.43) |
| D60 (-1) x Debt (-1) [a] | 0.04** (2.37) | | |
| (1 - D60 (-1)) x Debt (-1) [b] | 0.04** (2.04) | | |
| D70 (-1) x Debt (-1) [c] | | 0.04** (2.51) | |
| (1 - D70 (-1)) x Debt (-1) [d] | | 0.04** (2.13) | |
| D80 (-1) x Debt (-1) [e] | | | 0.03** (2.46) |
| (1 - D80 (-1)) x Debt (-1) [f] | | | 0.05*** (3.20) |
| Observations | 308 | 308 | 308 |
| Wald test, H0: a=b; c=d; e=f | 0.63 | 0.77 | 0.10 |

Primary balance reaction function (LSDVC, 1990-2005), fiscal rules

| | 1 | 2 | 3 | 4 |
|------------------------------------|-------------------|-------------------|-------------------|-------------------|
| Primary balance (-1) | 0.50*** (8.22) | 0.47*** (7.95) | 0.47*** (8.10) | 0.48*** (8.16) |
| Debt (-1) | 0.04*** (2.64) | 0.03** (2.37) | 0.03** (2.04) | 0.04** (2.33) |
| Output gap (-1) | 0.03 (0.49) | 0.03 (0.52) | 0.04 (0.60) | 0.03 (0.49) |
| EMU dummy | 0.79 (1.59) | 0.87* (1.74) | 1.00* (1.95) | 0.87* (1.75) |
| SGP dummy | 0.95* (1.71) | 0.99* (1.78) | 0.95* (1.73) | 1.00* (1.80) |
| Enlargement dummy | -0.44* (-1.86) | -0.44* (-1.84) | -0.45* (-1.94) | -0.43* (-1.82) |
| Election dummy | 0.50*** (8.22) | 0.47*** (7.95) | 0.47*** (8.10) | 0.48*** (8.16) |
| Fisrulov (-1) x Debt (-1) | 0.01* (1.66) | | | |
| Fisrulov (-1) x D60 (-1) [a] | | 0.30 (1.01) | | |
| Fisrulov (-1) x (1 - D60 (-1)) [b] | | 0.61*** (2.72) | | |
| Fisrulov (-1) x D70 (-1) [c] | | | -0.05 (-0.13) | |
| Fisrulov (-1) x (1 - D70 (-1)) [d] | | | 0.64*** (2.84) | |
| Fisrulov (-1) x D80 (-1) [e] | | | | 0.51 (0.73) |
| Fisrulov (-1) x (1 - D80 (-1)) [f] | | | | 0.54** (2.55) |
| Observations | 308 | 308 | 308 | 308 |

Primary balance reaction function (LSDVC, 1990-2005), fiscal decentralisation

| | 1 | 2 | 3 | 4 |
|-------------------------------------|-------------------|--------------------|-------------------|-------------------|
| Primary balance (-1) | 0.52*** (9.43) | 0.50*** (9.89) | 0.50*** (9.57) | 0.49*** (9.19) |
| Debt (-1) | 0.03** (2.50) | 0.08*** (3.50) | 0.04*** (2.92) | 0.05*** (3.09) |
| Output gap (-1) | 0.07 (1.17) | 0.08 (1.35) | 0.07 (1.15) | 0.07 (1.19) |
| EMU dummy | 0.58 (1.00) | 0.32 (0.56) | 0.53 (0.91) | 0.48 (0.82) |
| SGP dummy | 1.17*** (2.65) | 1.18*** (2.84) | 1.15*** (2.61) | 1.12** (2.57) |
| Enlargement dummy | -0.37* (-1.71) | -0.40* (-1.91) | -0.35* (-1.66) | -0.37* (-1.73) |
| Election dummy | 0.48*** (2.85) | 0.43*** (2.58) | 0.50*** (2.95) | 0.43** (2.46) |
| General government fiscal rule (-1) | 0.52*** (9.43) | 0.50*** (9.89) | 0.50*** (9.57) | 0.49*** (9.19) |
| Subnational expenditure share (-1) | -0.04 (-0.84) | | | |
| Subn. exp. share (-1) x Debt (-1) | | -0.00** (-2.46) | | |
| Subnational tax share (-1) | | | -0.00 (-0.01) | |
| Subn. tax share (-1) x Debt (-1) | | | | -0.00 (-1.55) |
| Observations | 291 | 291 | 291 | 291 |

Primary spending reaction function

$$ps_{it} = w_i + w_1 ps_{it-1} + w_2 b_{it-1} + w_3 z_{it-1} + w_4 f_{it} + w_5 x_{it} + w_6 t + v_{it}$$

ps – primary spending-to-GDP ratio;

b – debt-to-GDP ratio;

z – output gap (difference between actual GDP and potential GDP as a % of potential GDP);

f – fiscal rule indicator;

x – institutional, political, control variables such as the degree of public **spending decentralization**, dummy variables for EU enlargement, EMU, SGP sub-periods.

Primary spending reaction function (LSDVC, 1990-2005), fiscal rules

| | 1 | 2 | 3 |
|--|--------------------|--------------------|--------------------|
| | | LSDVC | |
| Primary expenditure (-1) | 0.76*** (12.70) | 0.75*** (12.45) | 0.78*** (13.09) |
| Debt (-1) | 0.00 (0.21) | 0.01 (0.52) | 0.00 (0.07) |
| Output gap (-1) | 0.07 (0.95) | 0.08 (1.08) | 0.06 (0.84) |
| EMU dummy | -0.26 (-0.43) | -0.40 (-0.67) | -0.16 (-0.27) |
| SGP dummy | -0.12 (-0.19) | -0.18 (-0.29) | -0.08 (-0.13) |
| Election dummy | 0.41 (1.47) | 0.37 (1.37) | 0.43 (1.59) |
| General government fiscal rule (-1) | -0.36 (-1.40) | | |
| Central government fiscal rule (-1) | | -0.24 (-0.98) | |
| Sub-national government fiscal rule (-1) | | -0.70* (-1.88) | |
| Expenditure rule (-1) | | | -0.07 (-0.27) |
| Observations | 308 | 308 | 308 |

Primary spending reaction function (LSDVC, 1990-2005), spending decentralisation

| | 1 | 2 | 3 | 4 | 5 |
|--|--------------------|--------------------|--------------------|--------------------|--------------------|
| Primary expenditure (-1) | 0.81*** (16.14) | 0.80*** (15.66) | 0.81*** (15.79) | 0.80*** (16.85) | 0.80*** (15.95) |
| Debt (-1) | 0.00 (0.03) | -0.04 (-1.33) | -0.01 (-0.33) | -0.01 (-0.48) | -0.01 (-0.82) |
| Output gap (-1) | -0.00 (-0.00) | -0.01 (-0.12) | 0.00 (0.01) | -0.01 (-0.10) | 0.02 (0.28) |
| EMU dummy | 0.48 (0.75) | 0.70 (1.01) | 0.56 (0.84) | 0.58 (0.91) | 0.79 (1.22) |
| SGP dummy | -0.37 (-0.69) | -0.22 (-0.42) | -0.34 (-0.62) | -0.30 (-0.59) | -0.28 (-0.52) |
| Election dummy | 0.34 (1.40) | 0.33 (1.35) | 0.34 (1.42) | 0.35 (1.47) | 0.32 (1.33) |
| General government fiscal rule (-1) | -0.18 (-0.82) | -0.16 (-0.72) | -0.14 (-0.62) | -0.18 (-0.83) | -0.26 (-1.17) |
| Subnational expenditure share (-1) | 0.12** (2.20) | | | | |
| Subn. exp. share (-1) x Debt (-1) | | 0.00 (1.34) | | | |
| Subn. exp. share (-1) x D60 (-1) [a] | | | 0.13** (2.42) | | |
| Subn. exp. share (-1) x (1 - D60) (-1) [b] | | | 0.12** (2.20) | | |
| Subn. exp. share (-1) x D70 (-1) [c] | | | | 0.13** (2.26) | |
| Subn. exp. share (-1) x (1 - D70) (-1) [d] | | | | 0.11* (1.87) | |
| Subn. exp. share (-1) x D80 (-1) [e] | | | | | 0.17*** (2.66) |
| Subn. exp. share (-1) x (1 - D80) (-1) [f] | | | | | 0.10* (1.83) |
| Observations | 291 | 291 | 291 | 291 | 291 |
| Wald test, H0: a=b; c=d; e=f | | | 0.35 | 0.22 | 17 0.03 |

Fiscal reaction functions (LSDVC, 1990-2005), the relevance of elections

| | Primary balance | Cyclically adjusted primary balance | Primary spending |
|--|-------------------|-------------------------------------|--------------------|
| Primary balance (-1) | 0.48*** (8.04) | 0.51*** (8.74) | |
| Cyclically adjusted primary balance (-1) | | | |
| Primary expenditure (-1) | | | 0.76*** (12.70) |
| Output gap (-1) | 0.03 (0.43) | -0.05 (-0.80) | 0.07 (1.00) |
| EMU dummy | 0.90* (1.83) | 1.18** (2.43) | -0.30 (-0.50) |
| SGP dummy | 1.02* (1.86) | 0.35 (0.64) | -0.15 (-0.23) |
| General government fiscal rule (-1) | 0.55*** (2.63) | 0.48** (2.33) | -0.38 (-1.45) |
| Debt (-1) [α] | 0.04*** (2.68) | 0.04*** (2.69) | 0.00 (0.13) |
| Election dummy x Debt (-1) [π] | -0.01* (-1.65) | -0.01* (-1.73) | 0.01 (1.36) |
| Observations | 308 | 308 | 308 |

1. EU 27 governments increase the primary balance surplus as a result of increases in government debt;
2. EMU and SGP have a statistically significant positive effect on the improvement of the fiscal position;
3. If debt-to-GDP ratio is below the debt threshold of 80%, a stronger overall fiscal rule contributes to improve the primary balance;
4. Parliamentary elections negatively impinge on the improvement of the primary balance;
5. Increasing the ratio of state plus local spending over central government spending, contributes to an increase in the total primary spending-to-GDP ratio;
6. The improvement of the primary balance (or of the cyclically adjusted primary balance), as a response to the debt, decreases slightly when an election occurs.