Fiscal multipliers, public debt anchor and government credibility in a behavioural macroeconomic model

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Introduction

Aim of the paper:

- to fill a gap in the literature on fiscal discipline and government performance using a behavioural macroeconomic model
- government performance : both in terms of stabilising the economy (*via* fiscal multipliers) and of fiscal discipline

At the crossroad of three areas of literature:

- literature on fiscal discipline
- literature on the determinants of fiscal multipliers
- literature on fiscal credibility

Introduction

Research contribution:

- behavioural macroeconomics approach to document fiscal credibility
- an analysis of fiscal credibility and its impact on fiscal multipliers and public debt stability

Main results:

- when agents are optimistic about the future output gap and public debt, the fiscal multiplier tends to be larger whatever the nature of the fiscal shock.
- fiscal expansion has less of a negative effect on public debt.
- agents' expectations about public debt and the fiscal credibility of the government affect indicators of government performance (the fiscal multiplier and public debt stability).

Why a "behavioral" macroeconomic model ?

- A standard DSGE approach with **rational expectations** cannot handle mechanisms related to agents' responses to fiscal news, government credibility and so on...
- Different contributions highlight the importance of expectations formations to study the effects of fiscal policy shocks
- *Cognitive discount factor* in Gabaix (AER, 2020), *Fiscal news and noises* in Fève & Petriunti (2016, EER)
- Animal spirits in De Grauwe & Foresti (JEBO, 2020)

Standard 3 equations New Keynesian model framework (log-linearized equations) :

IS curve:

$$y_t = a_1 \tilde{E}_t y_{t+1} + (1-a_1) y_{t-1} - a_2 (r_t - \tilde{E}_t \pi_{t+1} + (\tau_t - \tilde{E}_t \tau_{t+1})) + a_3 (g_t - \tilde{E}_t g_{t+1}) + \epsilon_t \quad (1)$$

New-Keynesian Phillips curve:

$$\pi_t = b_1 \tilde{E}_t \pi_{t+1} + (1 - b_1)\pi_{t-1} + b_2 y_t + \eta_t \quad (2)$$

Taylor Rule:

$$r_t = c_1(\pi_t - \pi^*) + c_2 y_t + c_3 r_{t-1} + \mu_t \quad (3)$$

Fiscal policy block

AR(1) Public expenditure:

$$g_t = f_1 g_{t-1} + w_t \tag{4}$$

Simple rule for the tax rate on revenue:

$$\tau_t = z_1 \tau_{t-1} + z_2(\tilde{E}_t b_{t+1} - b^*) + z_3 y_{t-1} + \delta_t \tag{5}$$

Public debt accumulation:

$$b_t = r_{t-1} + x_1(b_{t-1} - \pi_{t-1}) + x_2 g_t - x_3(y_t + \tau_t) + v_t \tag{6}$$

Heuristics in forecasting

Two types of agents
[Brock and Hommes(1997), Brock and Hommes(1998)]:
Targeter / fundamentalist agents

$$\tilde{E} b^f_{t+1} = b^\star \tag{7}$$

Extrapolator / chartist agents

$$\tilde{E} b^c_{t+1} = b_{t-1} \tag{8}$$

Thus the expected debt in t+1 is written as :

$$\tilde{E} b_{t+1} = \alpha^f_{b,t} \tilde{E} b^f_{t+1} + \alpha^c_{b,t} \tilde{E} b^c_{t+1} \tag{9}$$

$$\tilde{E} b_{t+1} = \alpha^f_{b,t} b^T + \alpha^c_{b,t} b_{t-1} \tag{10}$$

Forecasting rule selection

Using the Mean Square Forecasted Error criterion to select the best rule each period [De Grauwe(2012)]:

$$U^f_{b,t} = -\sum \omega_q (b_{t-q-1} - \tilde{E}^f_{t-q-2} b_{t-q-1})^2 \tag{11}$$

$$U^c_{b,t} = -\sum \omega_q (b_{t-q-1} - \tilde{E}^c_{t-q-2} b_{t-q-1})^2 \tag{12}$$

With $\omega_q = (1-\rho)\rho^q$, ρ considered as the memory of agents [Sargent et al.(1993)].

$$U^f_{b,t} = \rho U^f_{b,t-1} - (1-\rho)(b_{t-1} - \tilde{E}^f b_{t-1})^2 \tag{13}$$

$$U^c_{b,t} = \rho U^c_{b,t-1} - (1-\rho)(b_{t-1} - \tilde{E}^c b_{t-1})^2 \tag{14}$$

$$\alpha^f_{b,t} = P(U^f_{b,t} + \varepsilon_f > U^c_{b,t} + \varepsilon_c) = \frac{e(\lambda U^f_{b,t})}{e(\lambda U^f_{b,t}) + e(\lambda U^c_{b,t})} \tag{15}$$

$$\alpha^c_{b,t} = 1 - \alpha^f_{b,t} \tag{16}$$

Defining Animal Spirits

Thus we can compute animal spirits that create waves/cycles of optimism and pessimism
[De Grauwe(2012), Akerlof and Shiller(2010)]

$$S_{b,t} = \begin{cases} -\alpha^c_{b,t} + \alpha^f_{b,t} & \text{if } b_{t-1} > b^\star \\ \alpha^c_{b,t} - \alpha^f_{b,t} & \text{if } b_{t-1} < b^\star \end{cases} \tag{17}$$

Which can be rewritten as : (because $\alpha^c_{b,t} + \alpha^f_{b,t} = 1$)

$$S_{b,t} = \begin{cases} 1 - 2\alpha^c_{b,t} & \text{if } b_{t-1} > b^\star \\ -1 + 2\alpha^c_{b,t} & \text{if } b_{t-1} < b^\star \end{cases} \tag{18}$$

Government credibility

- How to define **government credibility** ?
- Index based on [End and Hong(2022)]

$$PrivBias_t = |\tilde{E}_{t-1} b_t - b_t| \tag{19}$$

$\longrightarrow$ A value close to 0 indicates that the agents' expectations are in line with the actual level of debt that arises, and can be interpreted as a good anchoring of expectations by the agents.

Calibration

$\beta = 0.99$	$\sigma = 2$	$\pi^* = 2\ \%$	
$b^* = 0\ \%$	$\rho = 0.5$	$\lambda = 2$	
$a_1 = 0.5$	$a_2 = 0.2$	$a_3 = 0.25$	demand equation
$b_1 = 0.1$	$b_2 = 0.05$		Phillips curve equation
$c_1 = 1.25$	$c_2 = 1$	$c_3 = 0.9$	Taylor Rule equation
$f_1 = 0.6$			public expenditure equation
$z_1 = 0.9$	$z_2 = 0.05$	$z_3 = 0.4$	tax equation
$x_1 = 1.01$	$x_2 = 0.4$	$x_3 = 0.33$	public debt equation

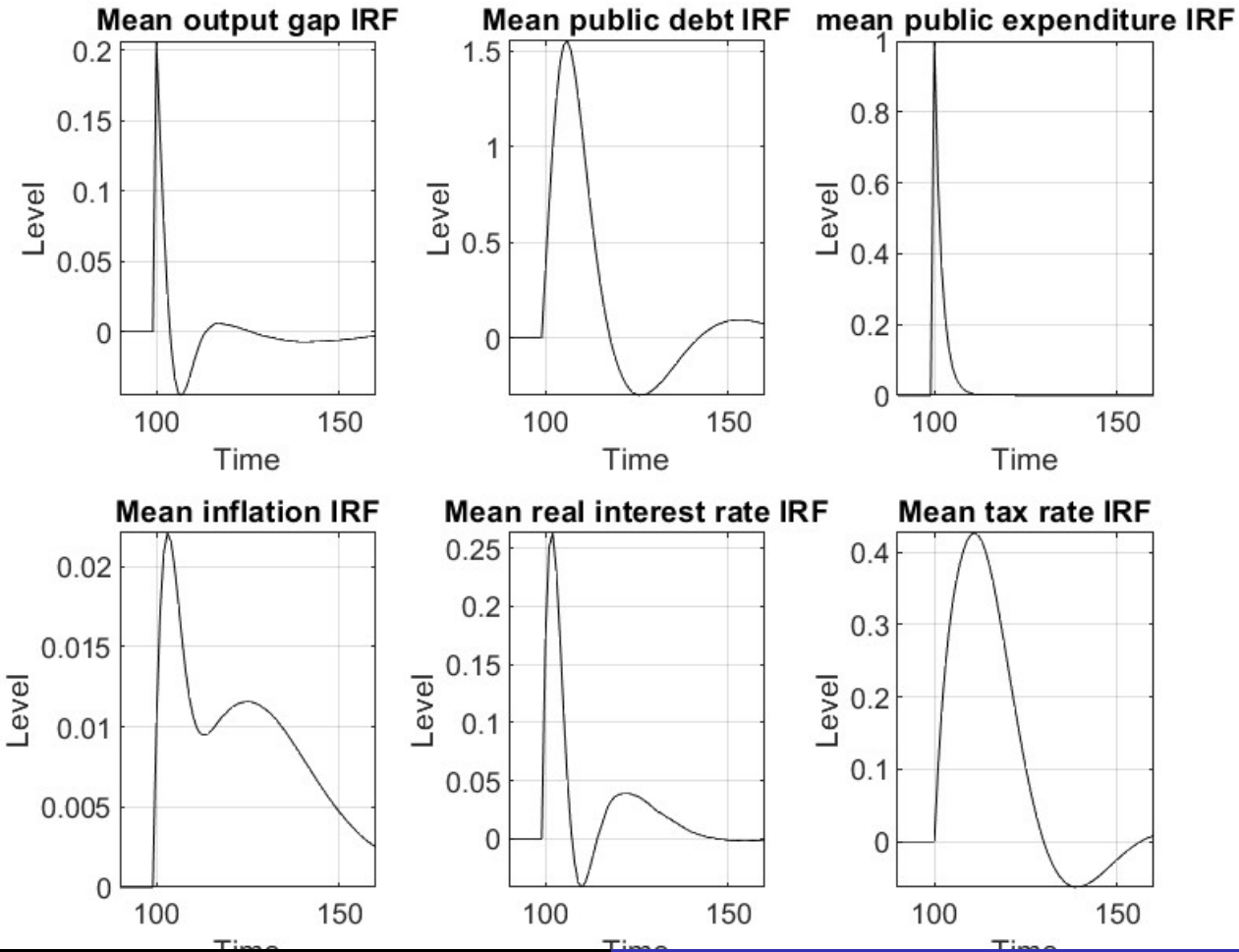
Simulations methodology

- The model is simulated over 1000 periods with random shocks
- We add a fiscal policy shock at the 100th period
- We observe the difference of the dynamic w/o the fiscal shock
- We run this simulation 2000 times (the economy is not at the same state at each run)

Main results (1): IRFs

- **IRFs (positive public expenditure shock):**

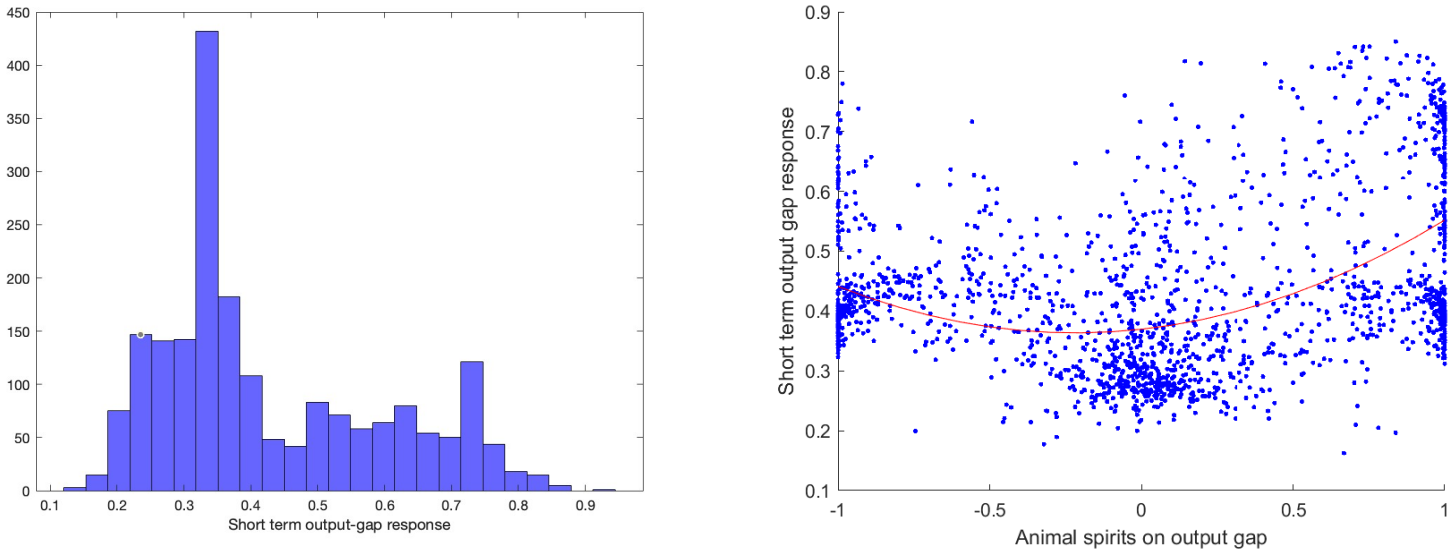
Figure: Mean impulse response functions of the variables after an increase in public expenditure



Main results (2): State dependency of fiscal multiplier

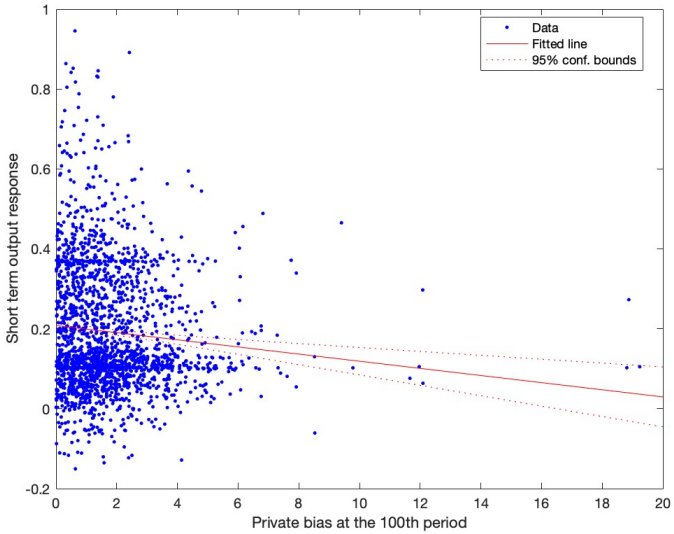
- Optimism/Pessimism and fiscal multipliers (positive PE shock)

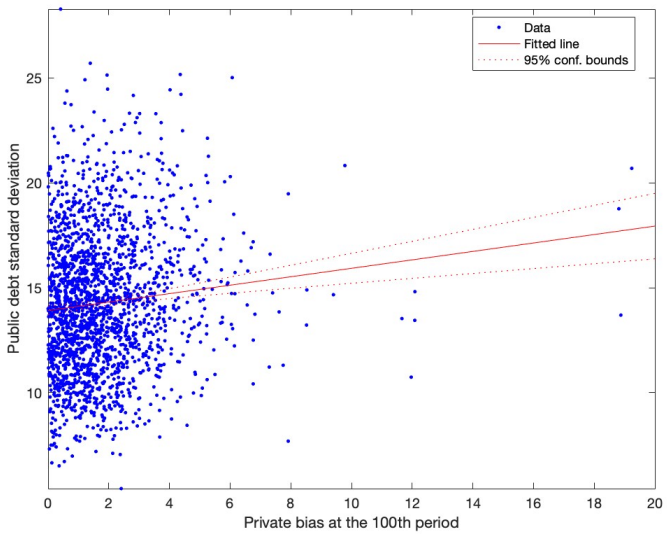
Figure: State depency of fiscal multiplier



Main results (3): Government credibility

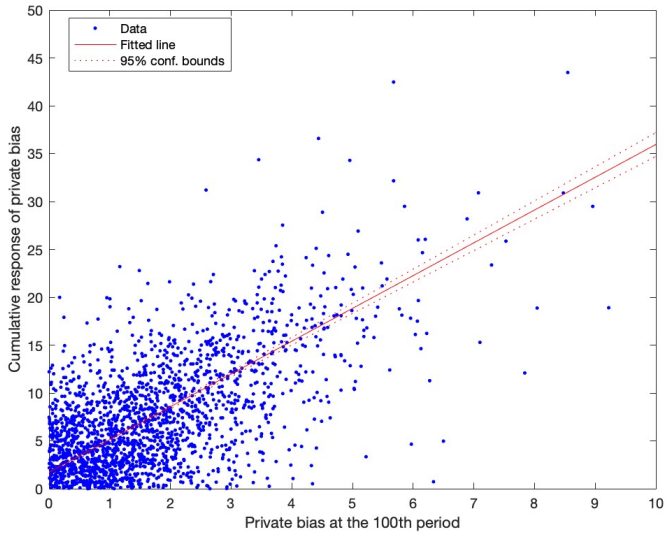
- Impact of government credibility on fiscal multiplier and debt volatility





Main results (4): Government credibility

- Impact of fiscal expansion on government credibility



Conclusion

- Key takeaways
  1. Ricardian equivalence is subject to optimism/pessimism of the market about debt sustainability
  2. Fiscal credibility affects the fiscal multiplier and the dynamic of public debt
- Future research avenues
  1. Implementing other way to model bounded rationality process (Gabaix, 2020)
  2. Introducing financial markets (government spread, imperfect financial markets, spillover effects in on open economy) ?

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