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The EU's new expenditure rule and its implications for monetary policy¹

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Abstract

This paper investigates whether the new expenditure rule of the European Union (EU) can restore dynamic stability and determinacy with bounded public debt in an otherwise unstable economic environment. We build upon the standard New Keynesian dynamic general equilibrium model so as to compare our results to the well-known results of Leeper (1991, 2016) and, more generally, to the literature on the fiscal-monetary policy mix. We find that the EU's new fiscal rule, despite its intentions, works practically like active fiscal policy. Given this, it does not leave room for active monetary (interest rate) policy; instead, the central bank has to accommodate the active fiscal policy which means that the policy interest rate can react only weakly to inflation. This will undermine the ECB's key mandate.

Keywords: Fiscal rules; Macroeconomic policy assignment

JEL classification: E62, E63, E52

1 Introduction

It is well established that a determinate solution with bounded public debt requires an appropriate mix of fiscal and monetary policies (see e.g. Leeper (1991, 2016)). For example, the conventional mix is that fiscal policy instruments should react to public debt imbalances and interest rate monetary policy should react to inflation more than one-for-one (this is what Leeper (1991) has called passive fiscal and active monetary policy). Alternatively, the same qualitative outcome can be achieved, at least in the context of the New Keynesian model, when fiscal policy does not react to public debt and interest rate monetary policy responds very weakly or not at all to inflation, which means that now it is jumps in the price level that restore macroeconomic stability and determinacy (this less conventional assignment is what Leeper (1991) has called active fiscal and passive monetary policy).

In policy circles, the approach has been different, especially with respect to fiscal policy. Policymakers usually resort to numerical targets perhaps because they are easier to communicate (examples include a balanced budget, an upper limit to the level of fiscal deficit, a public debt ceiling, a limit on public spending, etc). The debate on such rules has been particularly hot in the European Union (EU). Since the Maastricht Treaty of 1992, various rules have been introduced and debated without much success or agreement. Recently, the EU has adopted a new fiscal governance framework (see e.g. European Commission (2023, 2024a, 2024b) and European Parliament (2024a, 2024b)) that, although it maintains references to the 3% ceiling for fiscal deficits and the 60% long-term target for the debt ratio, it gives particular emphasis to net primary public expenditures. According to this rule, the growth rate of nominal net primary public expenditure should not exceed the growth rate of nominal GDP and, when the government debt exceeds 60% of GDP, this should be further adjusted to ensure a gradual debt reduction. This fiscal adjustment is shaped by the difference between a member-country's structural primary balance and a country-specific policy target value for this balance, where the latter is supposed to be consistent with "debt ratios on a plausibly downward path for member countries with a debt-to-GDP ratio above 60%".

This paper investigates whether the new expenditure rule of the EU can restore dynamic stability and determinacy with bounded public debt in an otherwise typically unstable economic environment. We thus revisit the appropriate mix of fiscal and monetary policies when fiscal policy is conducted as suggested by the EU, and compare this case to the two well-known cases mentioned in the opening paragraph above. In other words, we bring the policy literature closer to the academic literature on the mix of policy rules. To make our results easily comparable to the academic literature, we build on the standard New Keynesian Dynamic General Equilibrium (NK-DGE) model and compare our results to the well-known results of Leeper (1991,

2016).

Our main qualitative result is that the EU's new fiscal rule, despite its intentions, works practically like active fiscal policy. Given this, the central bank has to follow a passive or accommodative monetary policy which means that the policy interest rate is allowed to respond only weakly to inflation. By contrast, a relatively strong response to inflation (like, for instance, a more than one-to-one response, as prescribed by the Taylor principle) cannot deliver a unique stationary solution. As pointed out by Leeper (2016), when the actions of one policy are active, the other policy needs to be accommodative or passive. Therefore, the new EU's fiscal rule will come at a cost in terms of inflation targeting, or, putting the same differently, the EU's new fiscal framework seems to be incompatible with the ECB's key mandate, at least in the context of the NK-DGE model which has served as the workhorse framework for the study of the fiscal-monetary policy mix.

Section 2 presents the model and how policy is conducted. Section 3 parameterizes the model. Simulations and results are in section 4. Section 5 closes the paper. Algebraic details are in an Appendix.

2 Model

The model consists of households, firms, the government and the central bank, as in the standard NK framework.

2.1 Households

There are N identical households indexed by subscript $h = 1, 2, \dots, N$, where the population size N is constant. Each household h maximizes:

$$\sum_{t=0}^{\infty} \beta^t u(c_{h,t}, l_{h,t}; g_t^c) \quad (1a)$$

where $c_{h,t}$ and $l_{h,t}$ denote respectively h 's consumption and work time, g_t^c is per capita utility-enhancing public goods, and $0 < \beta < 1$ is a time discount factor.

For our numerical solutions, we will use a simple log-linear utility function like (our results do not depend on the functional form used):

$$u(c_{h,t}, l_{h,t}; g_t^c) = \mu_1 \log c_{h,t} + \mu_2 \log(1 - l_{h,t}) + \mu_3 \log g_t^c \quad (1b)$$

where $0 < \mu_1, \mu_2, \mu_3 < 1$ are preference parameters with $\mu_1 + \mu_2 + \mu_3 = 1$.

The budget constraint of each h written in real terms is:

$$(1 + \tau_t^c)c_{h,t} + b_{h,t} = (1 - \tau_t^y)(w_t l_{h,t} + d_{h,t}) + (1 + i_{t-1})\frac{p_{t-1}}{p_t}b_{h,t-1} + g_t^t \quad (2)$$

where w_t is the wage rate, $d_{h,t}$ is the dividend distributed by firms to each h , $b_{h,t}$ is h 's end-of-period sovereign bonds that earn a nominal interest rate i_t in the next period, p_t is the price of the final good, g_t^t is a lump-sum transfer to each h from the government and $0 \leq \tau_t^c, \tau_t^y < 1$ are tax rates on consumption and personal income.

Each h chooses $\{c_{h,t}, l_{h,t}, b_{h,t}\}_{t=0}^\infty$ to maximize (1a)-(1b) subject to (2). The first-order conditions are in Appendix A.1.

2.2 Firms and production

The production sector is as in the standard NK literature. There is a single final good produced by competitive final good firms that use differentiated intermediate goods as inputs à la Dixit-Stiglitz. Each differentiated intermediate good is produced by an intermediate good firm that acts as a monopolist in its own product market facing Rotemberg-type nominal fixities.

2.2.1 Final good firms

There are N final good firms indexed by subscript $f = 1, 2, \dots, N$. Each f produces $y_{f,t}$ by using intermediate goods according to a Dixit-Stiglitz aggregator:

$$y_{f,t} = \left[\sum_{i=1}^N \frac{1}{N^{1-\theta}} (y_{f,i,t})^\theta \right]^{\frac{1}{\theta}} \quad (3)$$

where $y_{f,i,t}$ is the quantity of intermediate good $i = 1, 2, \dots, N$ used by each final good firm f and $1/(1-\theta)$ is the degree of substitutability or complementarity between intermediate goods. As usually, we set $0 < \theta \leq 1$ with $\theta = 1$ meaning perfectly competitive product markets. Note that $N^{1-\theta}$ is included to avoid scale effects in equilibrium (see also e.g. Blanchard and Giavazzi (2003), Fang and Rogerson (2011) and Dimakopoulou et al (2024)).

Each f maximizes its profit which is in real terms:

$$\pi_{f,t} = y_{f,t} - \sum_{i=1}^N \frac{p_{i,t}}{p_t} y_{f,i,t} \quad (4)$$

where $p_{i,t}$ is the price of each intermediate good i .

The first-order condition for $y_{f,i,t}$ that also gives the familiar demand function for each i 's product is in Appendix A.2.

2.2.2 Intermediate goods firms

There are N intermediate goods firms indexed by subscript $i = 1, 2, \dots, N$. The dividend distributed by each i to its owners is (see Appendix A.3 for

details):

$$d_{i,t} \equiv (1 - \tau_t^\pi) \left(\frac{p_{i,t}}{p_t} y_{i,t} - w_t l_{i,t} \right) - i_{i,t} - \frac{\xi^p}{2} \left(\frac{p_{i,t}}{p_{i,t-1}} - 1 \right)^2 \bar{y}_t \quad (5)$$

where $y_{i,t}$, $l_{i,t}$ and $i_{i,t}$ are respectively i 's output, labor input and investment spending, $\xi^p \geq 0$ is a Rotemberg cost parameter associated with price changes,¹ and $0 \leq \tau_t^\pi < 1$ is the corporate tax rate.

Investment, $i_{i,t}$, augments the private capital stock, $k_{i,t}$, whose motion is:

$$i_{i,t} = k_{i,t} - (1 - \delta) k_{i,t-1} \quad (6)$$

where $0 < \delta < 1$ is a depreciation rate.

The firm's production function is assumed to be:

$$y_{i,t} = A_t k_{i,t-1}^{a_1} l_{i,t}^{\alpha_2} k_{g,t-1}^{1-a_1-a_2} \quad (7)$$

where $k_{g,t-1}$ is the outstanding stock of public infrastructure capital, $0 < a_1$,

$a_2 < 1$ are technology parameters and $A_t > 0$ is TFP (defined below).

Each firm i maximizes:

$$\sum_{t=0}^{\infty} \beta_{i,t} d_{i,t} \quad (8)$$

subject to (5)-(7) and the demand function for its own product. Since firms are owned by households, we will ex post postulate that the firm's discount factor, $\beta_{i,t}$, equals the households' marginal rate of substitution between consumption at t and $t+1$; thus, $\beta_{i,0} \equiv 1$ at $t=0$, $\beta_{i,t} \equiv \beta^t \frac{\lambda_{h,t}}{\lambda_{h,0}}$ at $t \geq 1$, where $\lambda_{h,t}$ is the Lagrange multiplier associated with household's budget constraint in (2).

The first-order conditions for $\{l_{i,t}, k_{i,t}\}_{t=0}^{\infty}$ are presented in Appendix A.3.

2.3 Government

The budget constraint of the government in per capita and real terms is:

$$g_t^c + g_t^i + g_t^t + (1 + i_{t-1}) \frac{p_{t-1}}{p_t} b_{t-1} = b_t + \tau_t^c c_{h,t} + \tau_t^y (w_t l_{h,t} + d_{h,t}) + \tau_t^\pi \left(\frac{p_{i,t}}{p_t} y_{i,t} - w_t l_{i,t} \right) \quad (9)$$

where b_t denotes the bonds issued at t and g_t^i is public investment spending. The latter augments public capital whose motion, in per capita terms, is:

$$k_{g,t} = (1 - \delta^g) k_{g,t-1} + g_t^i \quad (10)$$

where $0 < \delta^g < 1$ is a depreciation rate.

¹ \bar{y}_t denotes per firm output which is taken as given by each individual firm. This is not important but makes the dynamics smoother. See also e.g. Leeper et al (2021).

2.4 Macroeconomic equilibrium

Market-clearing conditions and the macroeconomic equilibrium system are respectively presented in Appendices A.4 and A.5. The equilibrium system consists of 9 equations in $\left\{y_t, c_t, l_t, k_t, k_t^g, b_t, w_t, d_t, \pi_t \equiv \frac{p_t}{p_{t-1}}\right\}_{t=0}^{\infty}$. This is for given values of the exogenously set monetary and fiscal policy instruments, $\{i_t, \tau_t^c, \tau_t^y, \tau_t^\pi, g_t^c, g_t^t, g_t^i\}_{t=0}^{\infty}$, whose behavior is defined next.

2.5 Monetary policy instruments

Regarding monetary policy, the nominal interest rate, i_t , follows a Taylor-type rule like:

$$i_t = \rho^i i_{t-1} + (1 - \rho^i) i + \phi(\pi_t - \pi) \quad (11)$$

where $\pi_t \equiv \frac{p_t}{p_{t-1}}$, $0 \leq \rho^i < 1$ is an autoregressive parameter, $\phi \geq 0$ is the monetary policy reaction to inflation, and variables without time subscripts denote long-run values (see below).

2.6 Fiscal policy instruments

Regarding fiscal policy instruments, we first translate, for convenience, the levels of public spending, g_t^c , g_t^t and g_t^i , to their shares in GDP; thus, we define $g_t^c \equiv s_t^c y_t$, $g_t^t \equiv s_t^t y_t$ and $g_t^i \equiv s_t^i y_t$, so that $0 < s_t^c, s_t^t, s_t^i < 1$ are now the policy instruments. Also, since we want to experiment with total primary public spending as a policy instrument when we study the EU's fiscal policy, we further define $s_t \equiv s_t^g + s_t^t + s_t^i$ for its GDP share and $g_t \equiv s_t y_t$ for its level, so that we equivalently have $s_t^c \equiv \lambda^c s_t$, $s_t^t \equiv \lambda^i s_t$, $s_t^i \equiv (1 - \lambda^c - \lambda^i) s_t$, which finally means that the independently set fiscal policy instruments are s_t , λ^c and λ^i .

In what follows, we will assume that $\tau_t^c, \tau_t^y, \tau_t^\pi, \lambda^c, \lambda^i$ remain constant (at their data average values) and experiment with alternative rules for s_t . As said, there have been two rather different approaches. There is the approach of policy institutions and the approach typically followed by the academic literature. We start with the latter since this is standard.

2.6.1 Public debt-contingent rule

The conventional approach of the academic literature is to assume that at least one of the independently set fiscal (spending-tax) policy instruments follows a debt-contingent rule according to which, in addition to an exogenous process (usually an $AR(1)$), fiscal policy instruments react to the outstanding public debt to GDP ratio as deviation from a policy target value (see e.g. Leeper et al (2010a, 2010b), Sims and Wolff (2018), Malley and Philippopoulos (2023) and many others). In the context of our model, this role is played by the GDP share of primary public spending, s_t , so that:

$$s_t = \rho^s s_{t-1} + (1 - \rho^s)s - \gamma \left(\frac{b_{t-1}}{y_{t-1}} - \frac{b}{y} \right) \quad (12)$$

where $0 \leq \rho^s < 1$ is an autoregressive parameter, $\gamma \geq 0$ is the fiscal policy reaction to the debt gap, and variables without time subscripts denote long-run values (see below).

It is useful for what follows to recall that according to Leeper (1991, 2016), Leeper et al (2017) and many others, $\gamma > 0$ in (12) and $\phi > 1$ in (11) describe a regime of active monetary policy and passive fiscal policy, while, $\gamma = 0$ and $0 \leq \phi < 1$ describe a regime of active fiscal policy and passive monetary policy. In the context of the baseline NK model as here, both regimes are expected to deliver a stable and unique path (see below on this).²

2.6.2 The EU's new net expenditure rule

In the new EU fiscal governance framework, as said in the Introduction above, although references to the 3% deficit target and the 60% debt target remain, the Stability and Growth Pact (SGP) relies on a single operational indicator in the form of the growth rate of net primary public expenditure (see e.g. European Commission (2023, 2024a, 2024b) and European Parliament (2024a, 2024b)). In particular, the growth rate of nominal net primary public expenditure should not exceed the growth rate of nominal GDP and, for countries with a government debt exceeding 60% of GDP, this should be further adjusted to ensure a gradual debt reduction. This fiscal adjustment is mainly shaped by the difference between the country's actual structural primary balance and a policy target value for the structural primary balance, where the latter is supposed to be consistent with "debt ratios on a plausibly downward path for member countries with a debt-to-GDP ratio above 60%"; this policy target is denoted as POL_t in what follows, and its value will be specified in subsection 3.2 below.³

²It should be noted that things might change when we move to richer models that include quantitative monetary policies, like sovereign bond purchases (QE) especially in the secondary market (see Dimakopoulou et al (2024)).

³Where does POL_t come from according to the EU? According to its new fiscal framework, this country-specific policy target for the structural primary balance is calculated by means of a Debt Sustainability Analysis (DSA) which takes place in a separate step. The DSA makes use of a single equation, the government's budget constraint, and calculates the path (or the distribution of paths) of public debt under different assumptions about the structural primary balance, future interest rates, growth rates, inflation, etc, as well as their stochastic properties (see e.g. European Commission (2025) for the DSA approach to fiscal sustainability). Then, the structural primary balance that is expected to lead to a declining debt ratio, as well to satisfy other fiscal safeguards, gives the value of POL_t (see Darvas et al (2024) for a detailed analysis). For an evaluation of the DSA approach to public debt sustainability in particular, and more generally of the use of the government budget constraint only to study public debt sustainability, given exogenous

To convert these institutional rules into a reference path for the growth rate of net primary public expenditure, we use the formula in e.g. European Commission (2023, p. 5) and European Parliament (2024b, Box 4), and also adopted by e.g. Dimakopoulou et al (2025) and Boivin and Darvas (2025), which implies that s_t should obey:⁴

$$s_t \leq s_{t-1} \left[1 - \Omega_t \frac{p_{t-1}}{p_t} \frac{y_{t-1}}{y_t} \right] \quad (13a)$$

where the corrective term, Ω_t , is defined as:

$$\Omega_t \equiv \frac{\left(POL_t + \frac{(g_{t-1} - t_{t-1})}{y_{t-1}} \right)}{\frac{g_{t-1}}{y_{t-1}}} \quad (13b)$$

where $\frac{(g_{t-1} - t_{t-1})}{y_{t-1}}$ is the primary fiscal deficit (resp. surplus) if positive (resp. negative) as share of GDP in the previous period and $\frac{g_{t-1}}{y_{t-1}}$ is primary public spending as share of GDP again in the previous period.

Notice that the required change in the primary balance, namely the numerator of Ω_t , $\left(POL_t + \frac{(g_{t-1} - t_{t-1})}{y_{t-1}} \right)$, can be small or even negative, and this can happen although public debt and hence POL_t are high, if a country happens to have a sizeable primary surplus, namely if $(g_{t-1} - t_{t-1})$ is negative enough.⁵

3 Parameter values, policy variables and steady state solution

This section first parameterizes the model using annual data of the Euro Area (EA) over the euro period 2002-2024 (unless otherwise stated), then presents the values of the model's exogenous variables and, finally, solves for the initial steady state defined as a situation in which variables do not

assumptions about growth rates, interest rates, etc, see e.g. European Parliament (2024b) and Economides et al (2024). By contrast, in our solutions, the value of POL_t will be model consistent - see subsection 3.2 below.

⁴Some algebraic details behind (13a-b): In (13a), which is for a given corrective term Ω_t , starting with nominal and total terms, if the growth rate of primary public spending should not exceed the growth rate of the country's GDP adjusted by Ω_t , then $\frac{G_t - G_{t-1}}{G_{t-1}} \leq \frac{Y_t - Y_{t-1}}{Y_{t-1}} - \Omega_t$. Since $s_t \equiv \frac{G_t}{Y_t} \equiv \frac{p_t g_t}{p_t y_t}$, by rearranging terms, we get (13a). Then, as said above, Ω_t in (13b) is set by using the formula of European Commission (2023, p. 5) and European Parliament (2024b, Box 4) and also adopted by Dimakopoulou et al (2025) and Boivin and Darvas (2025).

⁵We realize that the EU's rule is more complicated than that in (13a-b). For example, it refers to structural balances (but, since our model is deterministic, structural and non-structural primary balances will coincide); it includes future projections; it allows for deviations in case of crises; etc. Here, we do not incorporate all these details. However, we believe that (13a-b) can capture the key properties of the new fiscal rule.

change and exogenous policy variables are set as in the most recent data. As we shall see, this solution can serve as a reasonable departure point for the policy experiments in the next section.

3.1 Parameter values

Baseline parameter values, calibrated to EA data or set as in related studies, are listed in Table 1. Starting with preference parameters, households' time discount factor, β , is calibrated from the steady state version of the Euler equation for government bonds; with a sovereign interest rate at 3% as in the current data, this implies $\beta = 0.971$. The weights given to private consumption and leisure, μ_1 and μ_2 , in households' utility function are calibrated, for given μ_3 , from the steady state version of households' first-order condition for labor and the constraint $\mu_1 + \mu_2 + \mu_3 = 1$, by using data for the average share of private consumption to GDP (0.543), the average share of labour income to GDP (0.471), the percentage of available time devoted to non-work (0.682) and the average effective labour income and consumption tax rates (0.38 and 0.165 respectively);⁶ the resulting values of μ_1 and μ_2 , after setting μ_3 at 0.05,⁷ are 0.477 and 0.473 respectively.

Continuing with technology parameters, the TFP parameter, A , is normalized at 1. To set the Dixit-Stiglitz parameter, θ , and the exponent on labor in the production function, α_2 , we use the steady-state versions of the firm's profit function and first-order condition for labour. Specifically, using data for the average share of labour income to GDP (0.471), the average share of private investment to GDP (22%),⁸ the average effective corporate tax rate (22%), and using a net profit to output ratio around 10% which is a value close to the euro-area data, we get $\theta = 0.90$ and $\alpha_2 = 0.65$. In turn, following e.g. Baxter and King (1993), Leeper et al (2010b), Sims and Wolff (2018) and Ramey (2020), we set the exponent on public capital, $1 - \alpha_1 - \alpha_2$, at 0.05;⁹ this also gives $\alpha_1 = 0.3$. Regarding the depreciation rate of private capital, δ , we calibrate it using the steady-state version of equation (6). Specifically, by employing data on the average capital-to-output ratio (3.0) from the AMECO database over 2002-2023, we obtain a value for the

⁶Data on EA's private consumption to GDP ratio are taken from the database of Federal Reserve Bank of St. Louis and cover the period 2002-2022. Data on EA's labour income share, again for the period 2002-2022, are taken from Eurostat, whereas data on average total hours worked within a year, for the period 2002-2021, are taken from OECD. Notice here that, following usual practice, we have defined total hours available on a yearly basis as $52 \times 14 \times 7 = 5096$. Finally, the series of the effective tax rates are taken from Taxation Trends in the European Union (European Commission, 2022).

⁷We report that our main results are robust to changes in μ_3 , namely, the weight given to utility-enhancing public services, whose value is relatively agnostic and is usually set between 0 and 0.1 (see e.g. Baxter and King (1993) and Baier and Glomm (2001)).

⁸Data on the private investment-to-output ratio over 2002-2024 are from the AMECO database.

⁹We report that our main results are robust to changes in the value of $1 - \alpha_1 - \alpha_2$.

private capital depreciation rate equal to 7.3%. We then use the same value for the depreciation rate of public capital, δ^g . Finally, to set the parameter ξ^p , which measures the degree of price stickiness, we follow e.g. Keen and Wang (2007) and Bi et al. (2013); in particular, given the value for θ and the associated elasticity of substitution across intermediate goods, $\frac{1}{1-\theta} = 10$, it follows that the Rotemberg adjustment parameter, ξ^p , is 65.55, which is equivalent to assuming that 30% of the firms re-optimize each quarter in a Calvo-type model.¹⁰

Table 1
Baseline parameter values

Parameter	Description	Value	
μ_1	weight of consumption in utility	0.477	calibr
μ_2	weight of leisure in utility	0.473	calibr
μ_3	weight of public goods in utility	0.050	set
β	time discount factor	0.971	calibr
δ and δ^g	depreciation rate of priv and pub capital	0.073	calibr
A	TFP	1.000	set
α_1	share of capital in production	0.300	calibr
α_2	share of labour in production	0.650	calibr
$1 - \alpha_1 - \alpha_2$	contribution of pub capital in production	0.050	set
θ	substitutability parameter for interm goods	0.900	calibr
ξ^p	Rotemberg price adjust cost parameter	65.55	calibr

3.2 Policy variables

Values for the policy variables are listed in Table 2. Using data from Eurostat as of 2023 (these are the latest available data for effective tax rates when writing the paper), we set τ_t^c , τ_t^y , τ_t^π , λ^c and λ^i , which are respectively the effective tax rates on consumption, personal income and corporate profits, and government consumption and investment as shares of total public spending, at 0.16, 0.38, 0.20, 0.45 and 0.07 respectively. Given these values, in the steady state solution, for the public debt to GDP ratio to be as in the data in 2024 (88%), we need to set the steady state value of total primary government spending to GDP, s , at 0.45.¹¹ Also, we set the persistence parameter in the academic fiscal rule in (12) at 0 for comparability with the EC's spending rule in (13); our key results are not sensitive to this value.

In the EU's fiscal rule in (13), the policy target value for the primary fiscal balance as share of GDP, POL_t , is set at 0.026 at all t , meaning a primary fiscal surplus target of 2.6% of GDP. It should be stressed that this is the value that satisfies the government budget constraint (9) in the steady

¹⁰See e.g. Sims and Wolff (2017) for the condition under which Calvo-type and Rotemberg-type fixities are equivalent.

¹¹In the data, the respective value is 0.47.

state when the rest of the policy variables are set as in the data described above; in other words, in our paper, the value of POL_t is model-consistent.¹² Also note that this model-consistent value of POL_t allows us to get the same steady state solution as with (12), which will make our results comparable across different fiscal policy regimes. Finally, the feedback policy coefficient on the public debt gap in (12) will be reported later but, in general and following usual practice, we will set it at the lowest possible value needed for stability and determinacy.

Regarding the policy interest rate, we set i at 3%, which is around the average Euro area 10-year government bonds rate in 2024. We also set the persistence parameter in the associated Taylor rule at 0.7 as in e.g. Leeper et al (2011); but we will report explicitly in case this specific value matters.

Table 2
Policy variables

Parameter	Description	Value	
s	output share of total primary gov spending	0.45	calibr
λ^c	share of gov consumption over total government spending	0.45	data
λ^i	share of gov investment over total government spending	0.07	data
POL	primary fiscal balance, policy target	2.6%	calibr
τ^c	consumption tax rate	0.16	data
τ^y	personal income tax rate	0.38	data
τ^π	corporate tax rate	0.20	data
i	interest rate on gov bonds	0.03	data
ρ^i	persistence parameter in Taylor rule	0.70	set

3.3 Steady state solution

Using the above parameter and policy values, the steady state solution of the model is reported in Table 3. As can be seen, the solution makes sense and produces values reasonably close to the data. We thus feel that this solution can serve as a departure or starting point for the simulations that follow next.

¹²Compare this to what said in footnote 3 above about the European Commission's methodology. Using the latter, Darvas et al (2024, Table 1) list the values of the policy target, POL_t , for each EU and EA country, as well as for the EU and EA as a whole; for the EA this value was 1.1%. The difference from our value, 2.6%, can be attributed to the model-consistent, general equilibrium approach adopted here.

Table 3
Model solution of key variables and data

Variable	Description	Model	Data(2024)
c/y	private consumption to GDP	62%	54.3%
inv/y	private investment to GDP	15%	21%
k/y	private capital to GDP	2.10	2.90
l	work time	0.34	0.32

4 Results

Our main aim is to investigate which one of the two fiscal rules, (12) or (13), can guarantee dynamic stability and determinacy with a bounded public debt and how this relates to monetary policy response to inflation in (11). We thus shock the model by assuming, for instance, a temporary adverse TFP shock,¹³ and then search for policy mixes that can lead the economy back to its initial steady state in a unique way. In particular, we assume an $AR(1)$ rule for the TFP with persistence 0.7 and that there is an one-off 10% decrease in the first period.

For convenience, we start with the familiar debt-contingent fiscal rule in (12).

4.1 Debt-contingent fiscal rule

We start with the conventional policy assignment, or what Leeper (1991) has called passive fiscal and active monetary policy. In other words, we set $\gamma > 0$ in (12) and $\phi > 1$ in (11). As expected, this policy mix delivers stability and determinacy. The IRFs triggered by the adverse supply shock as defined above, when, for instance, we set $\gamma = 0.2$ and $\phi = 1.5$, are shown in Graph 1 by the continuous thick line in black.¹⁴ As can be seen, the assumed temporary adverse supply shock leads to a fall in real activity and thus an upward jump in the public debt to output ratio on impact, where the latter necessitates a cut in public spending in the very short term according to the debt-contingent fiscal rule in (12). The recessionary effects also lead to a mild fall in inflation on impact which triggers a temporary cut in the policy interest rate according to the Taylor rule in (11).

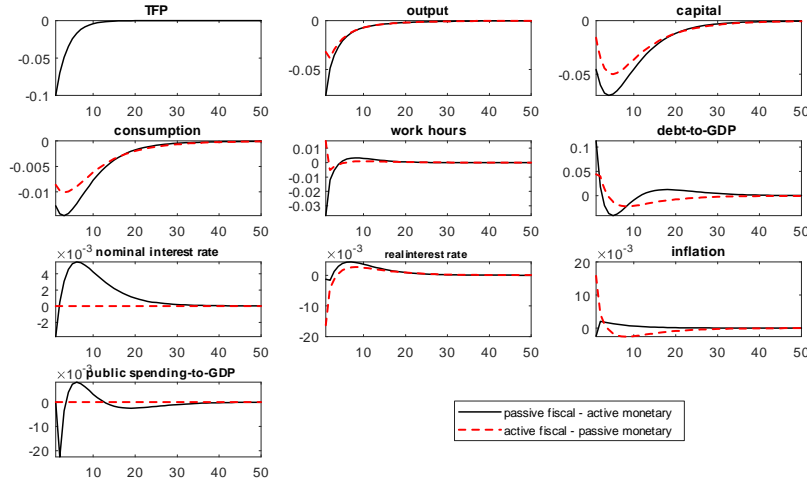
For reasons that will become clearer when we consider the EC's new fiscal rule, Graph 1 also includes the IRFs with active fiscal and passive

¹³We report that we have experimented with a variety of shocks, both positive and negative, and the main results do not change.

¹⁴We report that to the extent that $\gamma > 0$, we can get stability even when $\phi > 0.3$, although the critical value of ϕ above which we get stability in this regime is sensitive to the values of the persistence parameter in the Taylor rule in (11).

monetary policy. When we set $\gamma = \phi = 0$ in (11) and (12), the IRFs are shown by the dotted line in red in Graph 1.¹⁵ This policy mix also delivers stability and determinacy, as first shown by Leeper (1991).

Graph 1
IRFs with active and passive monetary policy



Before we move on to consider the implications of the EU's new fiscal rule in the next subsection, it is useful to identify the different economic channels through which stability is restored in the two popular policy regimes illustrated in Graph 1. Under passive fiscal and active monetary policy, the adverse supply shock leads to an upward jump in the debt-to-GDP ratio, which in turn causes the public spending ratio to fall on impact, consistent with its endogenous feedback in equation (12). Then, as the shock dissipates and output recovers, the debt ratio declines and so public spending can gradually increase. Inflation falls slightly on impact but subsequently rises and remains above its initial level for several periods, partly driven by the higher public spending ratio. Meanwhile, since the central bank raises the nominal interest rate by more than the increase in inflation, in accordance with the Taylor rule in equation (11), the real interest rate also rises. In other words, as noted by Leeper (2016, subsection 3.1), under this policy mix, dynamic stability and determinacy are achieved primarily through fiscal policy adjustments.

On the other hand, under active fiscal and passive monetary policy, the public spending ratio is kept constant. Inflation rises on impact but subsequently falls and remains below its initial level for several periods,

¹⁵We report that, to the extent that $\gamma = 0$ in (12), we get similar results with $0 \leq \phi \leq 0.3$ in (11), that is, with mild reaction to inflation in the Taylor rule.

thereby behaving in the opposite manner relative to the previous policy mix. Regarding the real interest rate, without a strong central bank response to inflation, it moves inversely with inflation: it falls on impact and then increases, as in the previous policy mix, although the subsequent rise is smaller. A relatively low real interest rate stimulates private consumption and reduces the government's interest payments compared to the previous case, which both help stability. In other words, as noted by Leeper (2016, subsection 3.2), under this policy mix, dynamic stability and determinacy are achieved primarily through adjustments in prices and inflation.

4.2 The EU's new net expenditure rule

Now, regarding fiscal policy, we replace (12) with (13a-b). Also we start by assuming that the Taylor principle is satisfied in (11) so that $\phi > 1$. Under this mix, the model exhibits dynamic instability.¹⁶ To get stability, we do need to reduce the monetary policy reaction to inflation, say in the region $0 \leq \phi \leq 0.3$ in (11).¹⁷ In other words, this regime constitutes another version of passive monetary policy combined with active fiscal policy. Fiscal policy is essentially active because, in the EU's fiscal rule in (13a-b), there is no direct or explicit response to outstanding public debt in this rule.¹⁸ And then, as is known, active fiscal policy must be accompanied by passive monetary policy, that is, by a sufficiently weak interest rate response to inflation.

However, there are quantitative differences from the standard active-fiscal and passive-monetary policy studied in the previous subsection. The IRFs under the EU's fiscal policy rule (13a-b) with $\phi = 0$ in (11) are shown in Graph 2, which, for comparison and ease of reference, also includes the two IRFs from Graph 1. As shown in Graph 2, public spending falls on impact because the adverse shock and the ensuing economic downturn worsen the primary fiscal balance, thereby requiring a larger fiscal correction according to (13a-b). Then, as the shock and downturn fade away over time, public spending rises sharply. This pattern resembles the passive-fiscal and active-monetary policy regime discussed above, except that the increase in public spending is now larger, which provides stronger support to aggregate

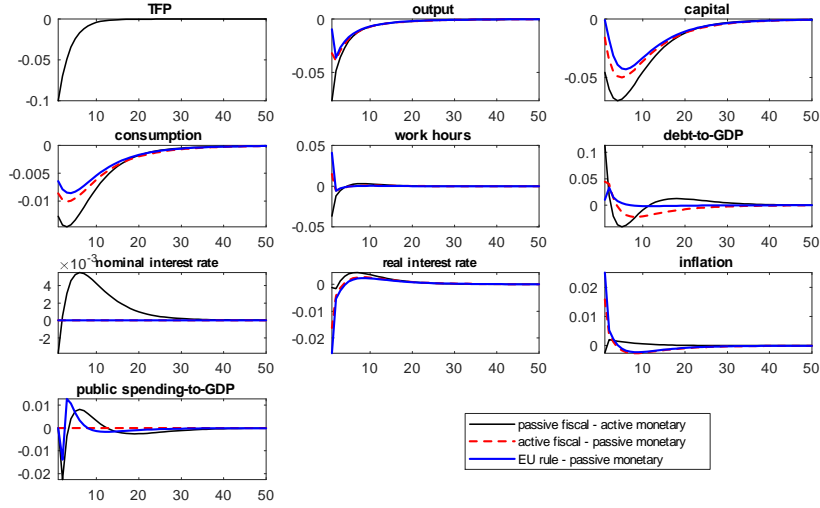
¹⁶We report that this holds, even if, on top of this, the tax rates react to the public debt gap.

¹⁷As in the previous case, the critical value of ϕ below which we can get stability in this regime is sensitive to the value of the persistence parameter in the Taylor rule in (11).

¹⁸As said in subsection 3.2 above, both in our paper and in the DSA analysis of the European Commission, the resulting value of POL_t is essentially a number, or a time path of numbers, and not an explicit function of outstanding public debt. Hence, if it happens that the path of public debt is unstable in the first-order difference equation for debt in (9), plugging (13a-b) into (9) cannot guarantee that stability is restored. In other words, a direct and explicit response to debt is needed as in equation (12). On this, see also the discussion in European Parliament (2024b, p. 1), as well as the quantitative study of the Greek economy in Dimakopoulou et al (2025).

demand and output. Inflation jumps markedly on impact and then declines, while, in the absence of an interest rate response to inflation, the real interest rate moves inversely with inflation. This resembles the active-fiscal and passive-monetary regime discussed above, except that the magnitude of fluctuations is now greater. In other words, the EU’s fiscal rule stabilizes the real economy more quickly, but at the cost of greater volatility in public spending compared with the passive-fiscal and active-monetary regime, and greater volatility in inflation compared with the active-fiscal and passive-monetary regime.

Graph 2
IRFs with the EU’s new fiscal rule



5 Conclusions and possible extensions

In this short paper, we examined the implications of the EU’s new spending rule in general equilibrium. We showed that this rule works practically like active fiscal policy which naturally implies that monetary (interest rate) policy has to be passive meaning that it cannot be free to react to inflation.

Since we studied the above within the standard NK model, we assumed away quantitative monetary policy. It would be an interesting extension to add quantitative monetary policy (see e.g. Dimakopoulou et al (2024) for a model for the EA) and then investigate the implications of the EU’s new spending rule for both types of monetary (interest rate and quantitative) policy. We leave this extension for future work.

Appendix

A.1 Households

The first-order conditions include the budget constraint and:

$$\lambda_{h,t} = \frac{\mu_1}{(1 + \tau_t^c)c_{h,t}} \quad (\text{A.1a})$$

$$\frac{\mu_2}{(1 - l_{h,t})} = \lambda_{h,t}(1 - \tau_t^y)w_t \quad (\text{A.1b})$$

$$\lambda_{h,t} = \beta \lambda_{h,t+1}(1 + i_t) \frac{p_t}{p_{t+1}} \quad (\text{A.1c})$$

where $\lambda_{h,t}$ is the Lagrange multiplier associated with the budget constraint.

A.2 Final good firms

The first-order condition for $y_{i,f,t}$ gives the familiar demand function (here we use $y_{f,i,t} = \frac{y_{i,t}}{N}$):

$$p_{i,t} = p_t \left(\frac{y_{i,t}}{y_{f,t}} \right)^{\theta-1} \quad (\text{A.2a})$$

Thus, in a symmetric equilibrium where intermediate goods firms are alike ex post, $y_{f,t} = y_{i,t}$, $p_t = p_{i,t}$ and $\pi_{f,t} = 0$.

A.3 Intermediate goods firms

The gross profit of each i , denoted as $d_{i,t}^{gross}$, is:

$$d_{i,t}^{gross} \equiv \frac{p_{i,t}}{p_t} y_{i,t} - w_t l_{i,t} \quad (\text{A.3a})$$

This gross profit is used for retained earnings, payment of corporate taxes to the government, payment of dividends to shareholders and payment of any kind of adjustment costs. Thus,

$$d_{i,t}^{gross} \equiv RE_{i,t} + \tau_t^\pi \left(\frac{p_{i,t}}{p_t} y_{i,t} - w_t l_{i,t} \right) + d_{i,t} + \frac{\xi^p}{2} \left(\frac{p_{i,t}}{p_{i,t-1}} - 1 \right)^2 \bar{y}_{i,t} \quad (\text{A.3b})$$

Purchases of new capital, $x_{i,t}$, are financed by retained earnings. Thus,

$$x_{i,t} \equiv k_{i,t} - (1 - \delta)k_{i,t-1} = RE_{i,t} \quad (\text{A.3c})$$

Therefore, combining the above equations, the dividend distributed by each firm i to its owners is:

$$d_{i,t} \equiv (1 - \tau_t^\pi) \left(\frac{p_{i,t}}{p_t} y_{i,t} - w_t l_{i,t} \right) - (k_{i,t} - (1 - \delta)k_{i,t-1}) - \frac{\xi^p}{2} \left(\frac{p_{i,t}}{p_{i,t-1}} - 1 \right)^2 \bar{y}_t \quad (\text{A.3d})$$

Using (A.3d) into (8) in the main text, the first-order conditions for $\{l_{i,t}, k_{i,t}\}_{t=0}^{\infty}$ are:

$$\begin{aligned}
(1 - \tau_t^\pi)w_t &= (1 - \tau_t^\pi)\theta \left(\frac{y_{i,t}}{y_{f,t}} \right)^{\theta-1} \frac{\partial y_{i,t}}{\partial l_{i,t}} - \\
&\quad - \xi^p \left(\frac{p_{i,t}}{p_{i,t-1}} - 1 \right) \frac{p_t}{p_{i,t-1}} (\theta - 1) \frac{(y_{i,t})^{\theta-2}}{(y_{f,t})^{\theta-1}} \bar{y}_t \frac{\partial y_{i,t}}{\partial l_{i,t}} + \\
&\quad + \beta \frac{\lambda_{h,t+1}}{\lambda_{h,t}} \xi^p \left(\frac{p_{i,t+1}}{p_{i,t}} - 1 \right) \frac{p_{i,t+1}}{p_{i,t}} \frac{p_t}{p_{i,t}} (\theta - 1) \frac{(y_{i,t})^{\theta-2}}{(y_{f,t})^{\theta-1}} \bar{y}_{t+1} \frac{\partial y_{i,t}}{\partial l_{i,t}} \quad (\text{A.3e}) \\
1 &= \beta \frac{\lambda_{h,t+1}}{\lambda_{h,t}} [1 - \delta + (1 - \tau_{t+1}^\pi)\theta \left(\frac{y_{i,t+1}}{y_{f,t+1}} \right)^{\theta-1} \frac{\partial y_{i,t+1}}{\partial k_{i,t}}] - \\
&\quad - \beta \frac{\lambda_{h,t+1}}{\lambda_{h,t}} \xi^p \left(\frac{p_{i,t+1}}{p_{i,t}} - 1 \right) \frac{p_{t+1}}{p_{i,t}} (\theta - 1) \bar{y}_{t+1} \frac{(y_{i,t+1})^{\theta-2}}{(y_{i,t+1})^{\theta-1}} \frac{\partial y_{i,t+1}}{\partial k_{i,t}} + \\
&\quad + \beta^2 \frac{\lambda_{h,t+2}}{\lambda_{h,t}} \xi^p \left(\frac{p_{i,t+2}}{p_{i,t+1}} - 1 \right) \frac{p_{i,t+2}}{p_{i,t+1}} \frac{p_{t+1}}{p_{i,t+1}} (\theta - 1) \bar{y}_{t+2} \frac{(y_{i,t+1})^{\theta-2}}{(y_{f,t+1})^{\theta-1}} \frac{\partial y_{i,t+1}}{\partial k_{i,t}} \quad (\text{A.3f})
\end{aligned}$$

A.4 Market-clearing conditions

The market-clearing conditions in the labor, dividend and good markets are respectively (recall that here there is an equal number, N , of households, final good firms and intermediate goods firms):

$$l_{h,t} = l_{i,t} \equiv l_t \quad (\text{A.4a})$$

$$d_{h,t} = d_{i,t} \equiv d_t \quad (\text{A.4b})$$

$$c_{h,t} + [k_{i,t} - (1 - \delta)k_{i,t-1}] + g_t^c + g_t^i + \frac{\xi^p}{2} \left(\frac{p_{i,t}}{p_{i,t-1}} - 1 \right)^2 \bar{y}_{i,t} = y_{f,t} \quad (\text{A.4c})$$

A.5 Macroeconomic equilibrium system

In a symmetric equilibrium, $y_{f,t} = y_{i,t} \equiv y_t$ and $p_{i,t} = p_t$. Also, $\lambda_{h,t} \equiv \lambda_t$, $k_{i,t} \equiv k_t$, $c_{h,t} \equiv c_t$, $l_{h,t} \equiv l_t$, etc. Then, collecting equations, we have the system:

$$\frac{\mu_2}{(1 - l_t)} = \frac{\mu_1}{(1 + \tau_t^c)c_t} (1 - \tau_t^y)w_t \quad (\text{A.5a})$$

$$\frac{(1 + \tau_{t+1}^c)c_{t+1}}{(1 + \tau_t^c)c_t} = \beta(1 + i_t) \frac{p_t}{p_{t+1}} \quad (\text{A.5b})$$

$$d_t = (1 - \tau_t^\pi)(y_t - w_t l_t) - [k_t - (1 - \delta)k_{t-1}] - \frac{\xi^p}{2} \left(\frac{p_t}{p_{t-1}} - 1 \right)^2 y_t \quad (\text{A.5c})$$

$$y_t = A k_{t-1}^{a_1} l_t^{\alpha_2} k_{g,t-1}^{1-a_1-a_2} \quad (\text{A.5d})$$

$$\begin{aligned} (1 - \tau_t^\pi)w_t &= (1 - \tau_t^\pi)\theta \frac{a_2 y_t}{l_t} - \xi^p \left(\frac{p_t}{p_{t-1}} - 1 \right) \frac{p_t}{p_{t-1}} (\theta - 1) \frac{a_2 y_t}{l_t} + \\ &+ \beta_{i,t+1} \xi^p \left(\frac{p_{t+1}}{p_t} - 1 \right) \frac{p_{t+1}}{p_t} (\theta - 1) \frac{y_{t+1}}{y_t} \frac{a_2 y_t}{l_t} \end{aligned} \quad (\text{A.5e})$$

$$\begin{aligned} 1 &= \beta_{i,t+1} [1 - \delta + (1 - \tau_{t+1}^\pi)\theta a_1 \frac{y_{t+1}}{k_t}] - \beta_{i,t+1} \xi^p \left(\frac{p_{t+1}}{p_t} - 1 \right) \frac{p_{t+1}}{p_t} (\theta - 1) a_1 \frac{y_{t+1}}{k_t} + \\ &+ \beta_{i,t+2} \xi^p \left(\frac{p_{t+2}}{p_{t+1}} - 1 \right) \frac{p_{t+2}}{p_{t+1}} (\theta - 1) \frac{y_{t+2}}{y_{t+1}} a_1 \frac{y_{t+1}}{k_t} \end{aligned} \quad (\text{A.5f})$$

$$g_t^c + g_t^i + g_t^t + (1 + i_{t-1}) \frac{p_{t-1}}{p_t} b_{t-1} = b_t + \tau_t^c c_t + \tau_t^y (w_t l_t + d_t) + \tau_t^\pi (y_t - w_t l_t) \quad (\text{A.5g})$$

$$k_{g,t} = (1 - \delta^g) k_{g,t-1} + g_t^i \quad (\text{A.5h})$$

$$c_t + k_t - (1 - \delta)k_{t-1} + g_t^c + g_t^i = y_t - \frac{\xi^p}{2} \left(\frac{p_t}{p_{t-1}} - 1 \right)^2 y_t \quad (\text{A.5i})$$

where $\beta_{i,t+1} = \beta \frac{(1+\tau_t^c)c_t}{(1+\tau_{t+1}^c)c_{t+1}}$ and $\beta_{i,t+2} = \beta^2 \frac{(1+\tau_t^c)c_t}{(1+\tau_{t+2}^c)c_{t+2}}$. There are thus 9 equations in 9 variables $\left\{ y_t, c_t, l_t, k_t, k_t^g, b_t, w_t, d_t, \pi_t \equiv \frac{p_t}{p_{t-1}} \right\}_{t=0}^\infty$. This is for given values of policy instruments, $\{i_t, \tau_t^c, \tau_t^y, \tau_t^\pi, g_t^c, g_t^t, g_t^i\}_{t=0}^\infty$.

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