

FISCAL POLICY RULES IN A STOCK-FLOW CONSISTENT MODEL

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Área 1: Macroeconomia, política econômica e financiamento do desenvolvimento

Abstract

The present paper analyzes four fiscal policy rules in a Stock-Flow Consistent model. The rules are: (i) government expenditures as a fixed proportion of GDP; (ii) government deficit as a fixed proportion of GDP; (iii) government debt as a fixed proportion of GDP; and (iv) a balanced budget. Then the economic trends implied by each rule are analyzed, and they are all compared. Some of the main findings can be summarized as follows: the more expansionist (or less contractionist) rules present higher growth rates, as expected; there is an inverse relationship between government debt and private debt, with government debt higher under the first rule, and lower in the balanced budget rule, the opposite happening in the case of private debt. Finally, considering enterprises' profitability, we conclude that the best rule for firms is the first one, and, for the banking sector, also not surprisingly, it is the balanced budget rule.

Keywords: Fiscal Rules; Stock-Flow Consistent models

JEL Classification: B00, E12, E62.

Resumo

O presente artigo analisa quatro regras fiscais em um modelo de Consistência entre Estoques e Fluxos. As regras são: (i) gastos do governo como uma proporção fixa do PIB; (ii) déficit do governo como uma proporção fixa do PIB; (iii) dívida do governo como uma proporção fixa do PIB; (iv) orçamento equilibrado. Em seguida as tendências econômicas geradas pelas distintas regras são analisadas e comparadas. Alguns resultados importantes são os seguintes: as regras mais expansionistas (ou menos contracionistas) apresentam, não de forma surpreendente, as maiores taxas de crescimento; há uma relação inversa entre a dívida do governo e a dívida privada, com a dívida do governo em seu maior patamar sob a primeira regra, e mais baixa sob a última; o oposto acontece no caso da dívida privada. Finalmente, considerando a lucratividade, conclui-se que o melhor cenário para as firmas é a primeira regra fiscal, ao passo que a melhor para os bancos, também não surpreendente, é a regra de orçamento equilibrado.

Palavras-chave: Regras Fiscais; Modelos de Consistência entre Estoques e Fluxos

1 Introduction

In its latest country report about Brazil, the IMF stated that:

Fiscal outcomes have been disappointing. In 2015 the non-financial public sector primary deficit reached 1.9 percent of GDP and the overall deficit was 10.4 percent of GDP. The primary deficit in 2016 is expected to reach 2.7 percent of GDP, and the overall balance would be close to that observed in 2015 (IMF, 2016, p.2).

And, as a consequence:

The government that took office [but not by means of election, SAK & MM] in May 2016 has announced a series of measures to address long standing fiscal imbalances and budget rigidities. A strong push to implement the proposed measures on the expenditure side would go a long way towards restoring policy credibility and market confidence with positive effects on investment and growth. Early implementation of key fiscal policy measures would also help moderate inflation expectations and facilitate monetary policy easing (IMF, 2016, p.1).

Since May 2016, the government announced a series of measures to strengthen macro policies and restore credibility. Notably, the government has sent to Congress a constitutional amendment limiting the growth in federal noninterest spending to the rate of consumer price inflation of the previous year for the next 20 years. The government has also announced a reform of the social security system, needed in its own right and also necessary to make the expenditure limit viable (IMF, 2016, p.2).

To the best of our knowledge, neither the Brazilian government nor the IMF have provided any sound estimates regarding the short and long run impacts of those stringent fiscal measures. But, is there a coherent tool to think about macroeconomic policies such as those adopted in Brazil? The new government in Brazil adopted a full-fledged orthodox approach to macro policy, one that has been systematically rejected by the ballots¹. So, it is not far fetched to assume that the new austerity policies are based on mainstream economics reasoning. Is this approach a reliable guide to fiscal policy?

Actually, it seems that the current state of mainstream macroeconomic theory is one of disarray. For instance, the Dynamic Stochastic General Equilibrium (DSGE) approach, the current workhorse of mainstream macro, has been challenged. Romer (2016) argues that “For more than three decades, macroeconomics has gone backwards” (p. 1), that “macroeconomists started invoking imaginary driving forces to explain fluctuations” (p. 15) and that “they seemed to forget things that had been discovered about the identification problem” (p. 15). Blanchard (2016) claims that he sees “the current DSGE models as seriously flawed” (p. 1) and criticizes their simplifying assumptions, their estimation method, their normative implications and their bad appeal as a communication device.²

Is there any other approach able to deal coherently with macroeconomic theory and policy in general and fiscal policy in particular? It is the claim of this paper that the Stock-Flow Consistent (SFC) method can provide such framework. An advantage of such approach is that “[...]there are no black holes: every flow comes from somewhere and goes somewhere” (GODLEY, 1996; p. 7). According to Dos Santos (2002, p.1), SFC models are “crucial for sound macroeconomic reasoning in general and, therefore,

¹And even the IMF has raised doubts about it (Ostry et al., 2016).

²A delightful review of these critics is provided by Keen (2017).

its widespread adoption would increase both the transparency and the logical coherence of most macro models”. Regarding macro policy, SFC models are used also by central banks, like the Bank of England (see Burgess et al. 2016). And even by financial institutions, such as Goldman Sachs (see Hatzius and Stehn, 2012).

Following this path, in this paper the SFC method will be applied to study different fiscal policy rules, so that one can consider what is likely to happen in Brazil, although the austerity policy pursued in that country is not modeled because it does not fit any other previous experience³. Such a fiscal rule goes against recent empirical findings regarding the negative impact of austerity on output and employment, such as Blanchard and Leigh (2013), Borsi (2016) and Klein (2016). Therefore, the goal of the present paper is to analyze four different fiscal policy rules and their responses to adverse shocks in a SFC model. Our main inspirations are Godley and Lavoie (2007, chapter 11), Dafermos (2012), Le Heron (2012), and Pedrosa and Macedo e Silva (2016). Some of these works have carried out simulation exercises regarding fiscal rules, but we have a scenario (government spending as a fixed proportion of GDP) so far not considered in the literature.

The paper is organized as follows: the first section sets up the accounting framework and discusses the behavioral equations. The second section analyzes the evolution of the economy under four different fiscal rules: (i) government *expenditures* as a fixed proportion of GDP; (ii) government *deficit* as a fixed proportion of GDP; (iii) government *debt* as a fixed proportion of GDP; and (iv) a balanced budget⁴. The last section provides the concluding remarks.

2 The model

2.1 The accounting framework

Our model is made up of five sectors: households, firms, commercial banks, a central bank, and the government. The sectoral balance sheets are presented on table 1. Many simplifying assumptions are made: (i) households do not take out loans and also (ii) do not hold cash; (iii) firms also do not hold cash and (iv) do not accumulate inventories; and (v) commercial banks do not issue equities.

Table 2 represents the transactions-flow matrix of our fictional economy. The upper part represents current sales and purchases of goods and services and money incomes. The middle part records the flows of financial payments. The lower part represents the changes in the stocks held by each sector.

³ The Washington Post called it the “mother of all austerity plans”. See << https://www.washingtonpost.com/news/worldviews/wp/2016/12/16/brazil-passes-the-mother-of-all-austerity-plans/?utm_term=.f38a6cf8deb3>>

⁴ The fourth fiscal rule is the closest one to aim of the Brazilian austerity plan. Since government outlays are constrained by last year inflation, and government revenues depend on nominal GDP (real GDP plus inflation), when the economy experiences real growth, revenues will raise faster than expenditures, eventually balancing the budget if this trend is likely. Of course, the path of nominal GDP depends on the very impacts of the austerity plan.

Table 1 – Balance sheet

	Households	Firms	Banks	Government	Central bank	Σ
Deposits	+ D		- D			0
Tangible Capital		+ K				+ K
Equities	+ e	- e				0
Treasury bills	+ B _h		+ B _b	- B	+ B _{cb}	0
High-powered money			+ H _b		- H	0
CB advances			- A		+ A	0
Loans		- L	+ L			0
Balance	- V	- Vf	0	- B	0	+ K
Σ						

Table 2 – Transactions flow

		Firms			Central bank				
		Households	Current	Capital	Banks	Government	Current	Capital	Σ
Consumption		- C	+ C						0
Government expenditures			+ G			- G			0
Investment			+ I	- I					0
Taxes		- T				+ T			0
Wages		+ WB	- WB						0
Firms' profits		+ FD _f	- F _f	+ FU _f					0
Banks' profits		+ Fb			- Fb				0
Central bank's profits						+ Fcb	- Fcb		0
Interest on	Deposits	+ r _{d-1} .D ₋₁			- r _{d-1} .D ₋₁				0
	Loans		- r _{l-1} .L ₋₁		+ r _{l-1} .L ₋₁				0
	CB advances				- r _{A-1} .A ₋₁		+ r _{A-1} .A ₋₁		0
	Treasury bills	+ r _{b-1} .B _{b-1}			+ r _{b-1} .B _{b-1}	- r _{b-1} .B ₋₁	+ r _{b-1} .B _{cb-1}		0
Change in	Deposits	- ΔD			+ ΔD				0
the stocks of	Loans			+ ΔL	- ΔL				0
	High-powered money				- ΔH_b		+ ΔH		0
	Treasury bills	- $\Delta B_{h,p_B}$			- $\Delta B_{b,p_B}$	+ ΔB_{p_B}		- $\Delta B_{cb,p_B}$	0
	CB advances				+ ΔA			- ΔA	0
	Equities	- $\Delta e.p_e$		+ $\Delta e.p_e$					0
Σ		0	0	0	0	0	0	0	0

Of course, more simplifying assumptions can be inferred from this second table. One of them is that banks' profits are completely distributed to households. The same happens between the central bank and the government.

2.2 The behavioral equations

2.2.1 Equations for Households

The first equation for the household sector is the definition of personal income:

$$YP = WB + FD_f + F_b + r_{d-1} D. \quad (1)$$

Where YP is personal income, WB is wage bill, FD_f is distributed profits of firms, F_b represents the profits of banks, which we assume to be totally distributed to its owners, r_d is the interest rate paid on deposits, D is the stock of deposits, r_b is the interest rate paid on government bonds, and B_h are the bonds held by households. Negative numbers represent past periods.

The personal income is subject to taxation. The income left from taxation is the regular disposable income, YD_r :

$$YD_r = YP - T \quad (2)$$

$$T = \theta \cdot YP \quad (3)$$

In addition to the regular sources of income, households also gain purchasing power by capital gains realized in financial markets. The sum of the regular disposable income with the capital gains gives the Haigh-Simons disposable income:

$$YD_{hs} = YD_r + CG \quad (4)$$

$$CG = \Delta p_e e_{d-1} \quad (5)$$

The stock of wealth of households is the wealth of the previous period plus the difference between Haigh-Simons disposable income and consumption:

$$V = V_{-1} + YD_{hs} - C \quad (6)$$

The consumption level depends on the lagged regular disposable income and on the lagged stock of wealth.

$$C = \alpha_1 YD_{r-1} + \alpha_2 V_{-1} \quad (7)$$

The wealth of households is allocated between government bonds, firms' equities, and banking deposits. We simplify the portfolio choice, assuming that households want to hold a fixed proportion of bonds and equities, according to its Perceived Degree of Uncertainty (PDU). Banking deposits are a residual.

$$B_h = (h_{10} + h_{11} \cdot PDU) \cdot V_{-1} \quad (8)$$

$$e_d = (h_{20} - h_{21} \cdot PDU) \cdot V_{-1} \quad (9)$$

$$D = V - B_h - e_d \quad (10)$$

The PDU is employed by Dafermos (2012) in his discussion about the linkages between liquidity preference, uncertainty, and economic recession. We utilize this variable in almost all the equations of our model: households' portfolio choice, firms' investment decision, and banks' credit rationing and excess reserves holdings. The correspondence, though, is not a perfect one, since our model is simpler than the one proposed in Dafermos (2012). Like him, we assume that the PDU is the same for all sectors.

In SFC models, households' portfolio choice is usually done along *Tobinesque* lines. Here, though, we avoid the complications that arise from this approach, following

instead a simpler modeling, similar to the one presented in Dos Santos and Zezza (2008) and Pedrosa and Macedo e Silva (2016).

2.2.2 Equations for Commercial Banks

The first equation here follows directly from the accounting framework: banks' profits are composed of the interest rate charged on loans (r_l) multiplied by the stock of loans plus the interest receipts from its holdings of government bonds (B_b), minus the interest paid on deposits and on central bank advances (A).

$$F_b = r_{l-1} L_{-1} + r_{b-1} B_{b-1} - r_d \quad (11)$$

The new loans given to firms are subject to a credit rationing, which depends on the PDU, on the leverage ratio of firms (L/K) and on the basic interest rate. The stock of loans at the end of the period (L) is the previous period stock minus repayments (rep), plus the new loans given in the current period. This formulation is based on Dafermos (2012) and Le Heron and Mouakil (2008).

$$K_{-1} \quad (12)$$

$$L_{-1} / \square + \rho_3 r_b$$

$$CR = \rho_1 PDU + \rho_2 \quad (13)$$

$$NL = L_D (1 - CR) \quad (13)$$

$$L = (1 - rep) L_{-1} + NL \quad (14)$$

Banks' holdings of high powered money are composed of reserve requirements upon deposits (μ) and excess reserves, η . The amount of excess reserves depends positively on the PDU and negatively on the base interest rate, which represents the opportunity cost of holding excess reserves:

$$H_b = (\mu + \eta) \cdot D \quad (15)$$

$$\eta = \eta_0 + \eta_1 PDU - \eta_2 r_b \quad (16)$$

We distinguish between two cases regarding the demand for government bonds and central bank advances. If deposits net of required reserves are higher than loans, banks will use these extra resources to acquire government bonds and advances will be equal to excess reserves. But if loans are higher than deposits net of required reserves, no government bonds are held and central bank advances are demanded to fill the gap.

$$B_{bn} = D - \mu \cdot D - L \quad (17)$$

$$B_b = \begin{cases} B_{bn}, \wedge B_{bn} \geq 0 \\ 0, \wedge B_{bn} < 0 \end{cases} \quad (18)$$

$$A = \begin{cases} \eta \cdot D, \wedge B_{bn} \geq 0 \\ H_b + L - D, \wedge B_{bn} < 0 \end{cases} \quad (19)$$

Discussing the first case above, Dafermos (2012), who uses the same approach, argues that

the amount of excess reserves represents the cash not lent by banks in a surplus position to their counterparties in a deficit position. Thus, a specific amount of excess reserves translates into an equivalent amount of advances, which the banks in a deficit position are forced to get from the central bank (DAFERMOS, 2012; p. 766).

Finally, the interest rate on loans is simply a mark-up m_l upon the basic interest rate, whereas the interest rate paid on deposits is the basic interest rate minus a spread m_d .

$$r_l = r_b + m_l \quad (20)$$

$$r_d = r_b - m_d \quad (21)$$

2.2.3 Equations for Firms

We start our discussion about firms' equations from their costs, which are very simplified in our model. The wage bill of the economy is the number of employed workers multiplied by the average wage. We assume that wages grow with labor productivity, and that the number of employed workers is the output Y divided by the labor productivity.

$$WB = N \cdot W \quad (22)$$

$$W = W_{-1} (1 + g_{pr}) \quad (23)$$

$$N = y / pr \quad (24)$$

$$pr = pr_{-1} (1 + g_{pr}) \quad (25)$$

The productivity of labor grows at an exogenous rate g_{pr} . In the calibration process, we assume that this ratio is 1.85%. Although the simulation exercise is generic, we use the Brazilian numbers here. According to Cavalcante and De Negri (2014, p. 149), this was the Brazilian labor productivity growth rate between 2001 and 2011.

We assume that the production of firms is sold out each period, and is distributed between households' consumption (C), firms' investment (I), and government purchases (G). Subtracting the wage costs and the interest on loans from output, it gives us the definition of firms' profits. A proportion s_f of them is retained by the firm, and the rest of it is distributed to households.

$$Y = C + I + G \quad (26)$$

$$F_f = Y - WB - r_{l-1} L_{-1} \quad (27)$$

$$FU_f = s_f F_f \quad (28)$$

$$FD_f = F_f - FU_f \quad (29)$$

The desired investment (i_d) depends on the lagged capacity utilization, on the undistributed profits normalized by the nominal capital stock, on the interest rate on loans⁵, and on a β_0 which represents the "animal spirits" of the entrepreneurs. This last parameter depends on a constant χ_0 and on the PDU. The rate of capacity utilization is defined as the ratio between output (Y) and potential output-capital ratio (v) times the stock of capital (K).

$$i_d = \left(\beta_0 + \beta_1 u_{-1} + \beta_2 \left(\frac{FU_f}{K_{-1}} \right) - \right) \quad (30)$$

$$\beta_0 = \chi_0 - \chi_1 \cdot PDU \quad (31)$$

$$K = K_{-1} + I \quad (32)$$

$$u = \frac{Y}{v \cdot K_{-1}} \quad (33)$$

⁵ This equation is based on Lavoie and Godley (2001-02). The only difference is that we simplified away the influence of Tobin's q .

Investment can be financed by loans, retained profits, and issuance of equities. We treat the demand for loans as the residual of the financing decisions, and it is subject to the above described credit rationing from banks. The realized investment is thus influenced by the amount of loans that the firms actually receive.

$$L_D = I_d - FU_f - p_e \Delta e + rep \cdot I \quad (34)$$

$$I = \Delta L + FU_f + p_e \Delta e \quad (35)$$

Following Dos Santos and Zezza (2008, p. 454) and Pedrosa and Macedo e Silva (2016, p. 7), we assume that firms keep a fixed proportion x between equities and the stock of capital. Equities' price is given by the interaction of demand and supply.

$$e = x \cdot k_{-1} \quad (36)$$

$$p_e = \frac{e_d}{e} \quad (37)$$

2.2.4 Equations for Central Bank

The Central Bank makes profits, F_{cb} , which are completely distributed to the government. They are composed of the interest receipts upon the advances given to the commercial banks and the earnings from governments' bonds held.

$$F_{cb} = r_{A-1} A_{-1} + r_{b-1} B_{cb-1} \quad (38)$$

We assume, for simplicity, that the interest rate on central bank advances (r_A) is the same as the interest on governments' bonds.

$$r_A = r_b \quad (39)$$

All the high-powered money demanded by commercial banks is supplied.

$$H = H_b \quad (40)$$

We assume that the central bank is the residual purchaser of government bonds⁶.

$$B_{cb} = B - B_h - B_b \quad (41)$$

The stock of bonds is the stock of the previous period plus the fiscal result of the government (DG).

$$B = DG + B_{-1} \quad (42)$$

The redundant equation, implied by all the others, is the one that guarantees the closure of central bank's balancesheet:

$$H = A + p_b B_{cb} \quad (43)$$

2.2.5 Equations for Government under the four different fiscal rules

Our intention is to analyze the dynamics that arise from different fiscal policy rules. We study four cases, drawing heavily on Le Heron (2012). Under the first rule, the government seeks to maintain a fixed proportion of spending relative to GDP, that is, a fixed proportion of G/Y .

$$G = \sigma_1 Y_{-1} \quad (44)$$

$$DG = G + (r_{b-1} B_{-1}) - T - F_{cb} \quad (45)$$

⁶ Thus, the central bank can run out of government's bonds if the other sectors purchase all the supply. In this case we can assume that monetary policy is conducted via required reserves and reserves' remuneration and rediscount rather than by open market operations.

The second rule is one in which the government has a target proportion for the budget deficit. In this case, we have:

$$G = DG - (r_{b-1} B_{-1}) + T + F_{cb} \quad (46)$$

$$DG = \sigma_2 Y_{-1} \quad (47)$$

Under the third rule, the fixed proportion is related to the debt (target debt, B^T):

$$G = DG - (r_{b-1} B_{-1}) + T + F_{cb} \quad (48)$$

$$DG = \Delta B \quad (49)$$

$$\Delta B = B^T - B_{-1} \quad (50)$$

$$B^T = \sigma_3 Y_{-1} \quad (51)$$

Finally, the last rule is the one in which the budget is balanced:

$$G = T + F_{cb} - r_{b-1} B_{-1} \quad (52)$$

$$\Delta B = 0 \quad (53)$$

Simulating different fiscal policy rules in a SFC model is not a novel exercise. Le Heron (2012) carried out a similar operation, comparing six different fiscal regimes. The targets considered here for the budget deficit and for the government debt, as well as the balanced budget rule, were analyzed by him. Our rule of a fixed proportion of spending relative to GDP is innovative when compared to this author. Pedrosa and Macedo e Silva (2016) also compared three fiscal rules, none of them similar to ours. They considered (i) government expenditures as a constant fraction of the capital stock, (ii) government expenditures varying according to deviations of capacity utilization from its long-term trend, and (iii) an austerity case, where expenditures decrease if the lagged public debt increased.

It is important to note that our model is a very simple one: it ignores inflation, utilizes a very straightforward approach to portfolio choice, and simplifies the wage bargaining process. Another drawback of our model is that the economy is closed, which is reasonable only considering the Brazilian case. Moreover, households do not take loans, firms do not hold cash and do not accumulate inventories, all of them being unrealistic assumptions⁷. Also, there are no supply side constraints.

2.3 A note on the calibration of the model

It must be remarked that only a few parameters of the model represent a real economy, since the exercise is supposed to be generic enough to account for many real-world economies. However, since the goal of the simulation is to shed some light on the likely outcomes of Brazilian austerity policies, the values of the parameters σ_i are the mean value of the government's purchases share in output, government deficit, and government debt for Brazil from 2006 to 2016⁸. The labor productivity growth rate, as mentioned above, is taken from Cavalcante and De Negri (2014). The simulation starting values for households' consumption, firms' investment, and government purchases also represent an approximate proportion of those entries for the Brazilian national accounts⁹.

⁷ See Benati and Lubik (2014) for an empirical discussion of inventories. Denis and Silbikov (2009) discusses firms' cash holdings. See Mian, Sufi, and Verner (2015) for households' debt.

⁸ The data are available at <<http://sidra.ibge.gov.br>> and <<http://www.bcb.gov.br/pt-br/#!/n/SERIESTEMPORAIS>>

⁹ They are approximate proportions because our model represents a closed economy. The Brazilian output share corresponding to the small external sector was split in equal parts to households, firms, and

The majority of our parameters use the same values presented in Dafermos (2012), but parameters from Godley and Lavoie (2007, chapter 11), Le Heron (2012), and Pedrosa and Macedo e Silva (2016) were also employed.

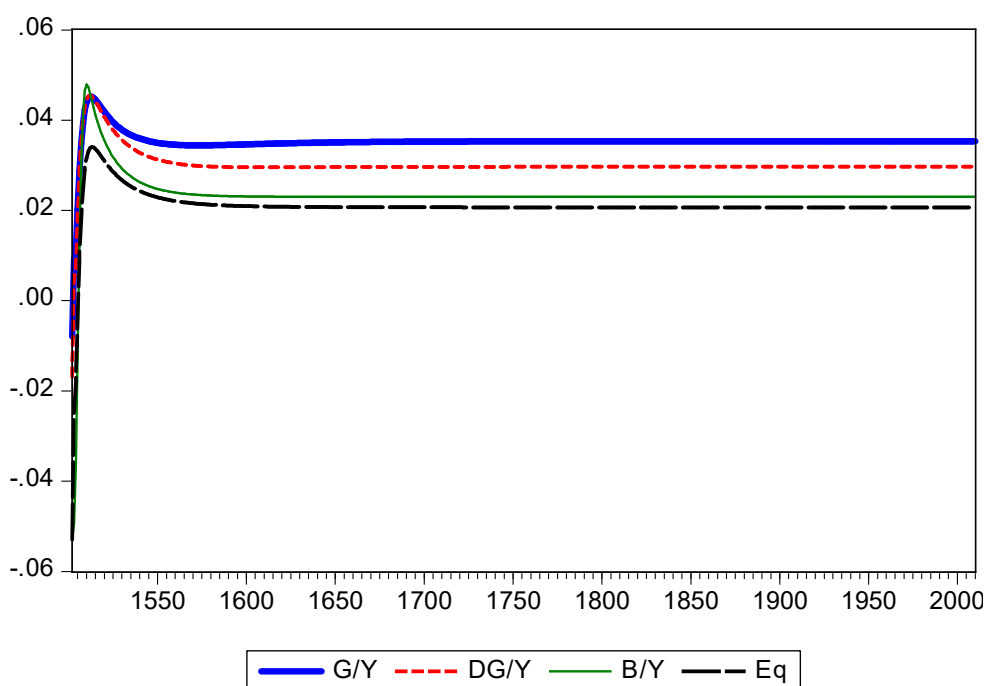
3 The behavior of the model under the different fiscal rules

Our goal here is to run the model with the four fiscal rules presented above. All simulations have the same initial values for the endogenous variables, the same parameters, and the same equations, except, of course, for the fiscal policy equations. Thus, the differences that arise in economic outcomes are caused exclusively by the fiscal rules themselves.

It is important to note that the time frame of the graphs is fictitious. Here we follow the same time frame of Dafermos (2012), running the model for 510 periods, from 1500 to 2010. The label itself is just a convenience and do not represent the number of times that the earth revolves around the sun. It could range from 1 to 510 without any change in the results. Other authors, like Godley and Lavoie (2007), use periods that run from 1950 to 2010.

Regarding the findings, the discrepancies between the growth rates for output of the four rules are significant, as can be seen on figure 1. The initial soaring in the growth rates is caused by the reinforcing role of consumption and investment growth, which causes output increases and, in the next period, generates higher government expenditures. The reduction in the pace of growth rate is caused by a deceleration in consumption growth, which is caused by lower increases in households' income. In the steady state, the fixed G/Y ratio gives the higher GDP growth: 3.53% per period. Next, we have a fixed DG/Y ratio with 2.96%; a target for B/Y with 2.3%, and the balanced budget with 2.06%.

Figure 1 – GDP growth rate under the four fiscal rules



Source: Elaborated by the authors.

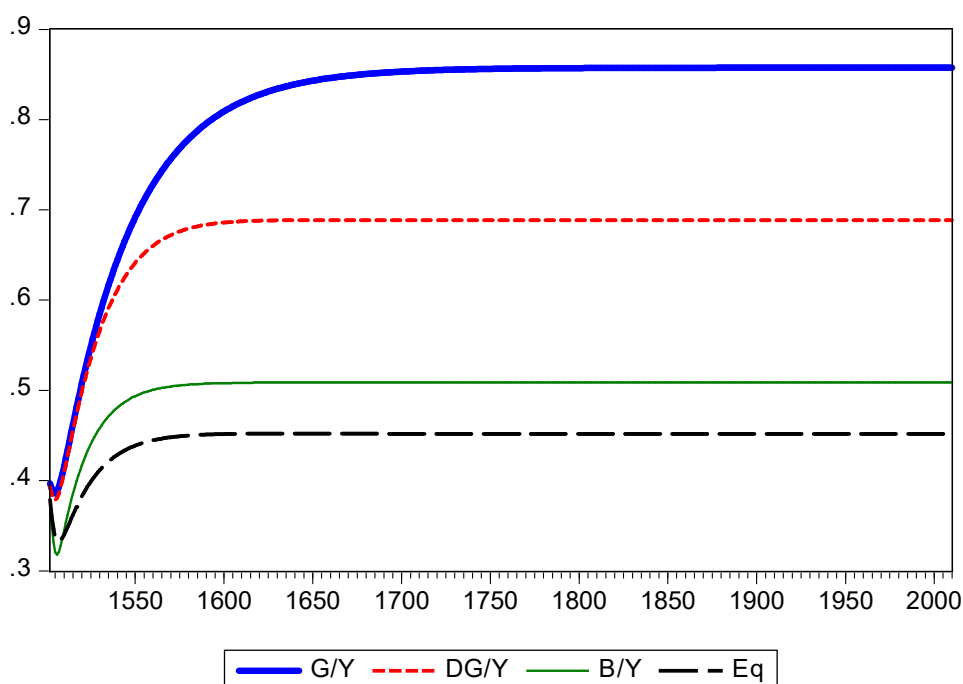
government in the calibration of the model.

The growth patterns impact the capacity utilization of firms. Regarding this variable, the fiscal rules rank the same way as above, with the fixed proportion of government purchases over GDP (G/Y) at the top and the balanced budget at the bottom (figure 2). The values are, respectively, 0.85; 0.68; 0.5; and 0.45. The initial fall both in the B/Y and in the balanced budget rule is caused by negative growth rates, which is due to government restrictive purchases in order to meet its debt target (B/Y rule) or to maintain the budget balanced. It is important to note that the starting point of the capacity utilization is extremely low, but the first two rules were able to reach higher values, whereas the third rule achieved a mild growth, and the last one contributes to a state of permanent depressed capacity utilization.

The aggregate demand composition also differs among the fiscal rules. The highest consumption share (defined as the value of consumption divided by the value of output) is the one generated by the B/Y and balanced budget rules, which also present the highest investment rate (figures 3 and 4). The G/Y and DG/Y rules present the highest government expenditures share of output (figure 5). Nonetheless, the four fiscal rules present an investment trajectory that is incompatible with a rapid growing economy. So, public investment must perform a relatively high share of government outlays. Since government spending share of output is relatively small even under the less contractionary rule, this means that private consumption might be crowding out private investment in terms of some durable goods.

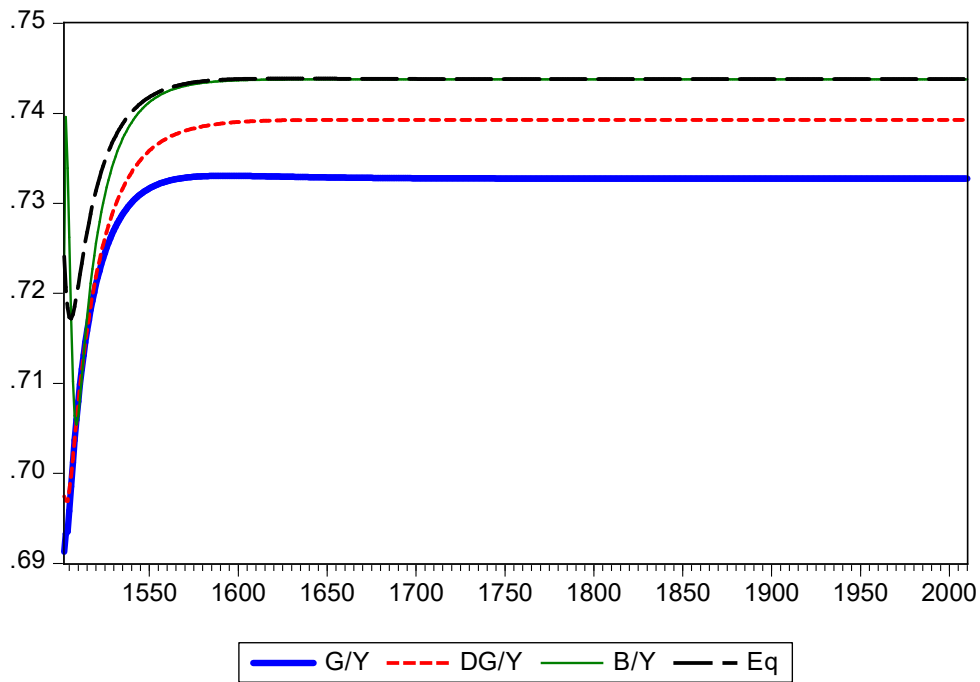
There is an apparent paradox here. According to Kalecki (1965) and Steindl (1976), higher capacity utilization rates lead to higher investment. Our model, however, presents a different result: the rules with the smaller steady-state capacity utilization rates are the ones with the higher investment share in output. However, if we take the investment relative to the stock of capital (instead of output), we get an opposite ranking of the fiscal rules, with the G/Y rule in the higher position and the balanced budget rule in the lower position (figure 6).

Figure 2 – Capacity utilization under the four fiscal rules



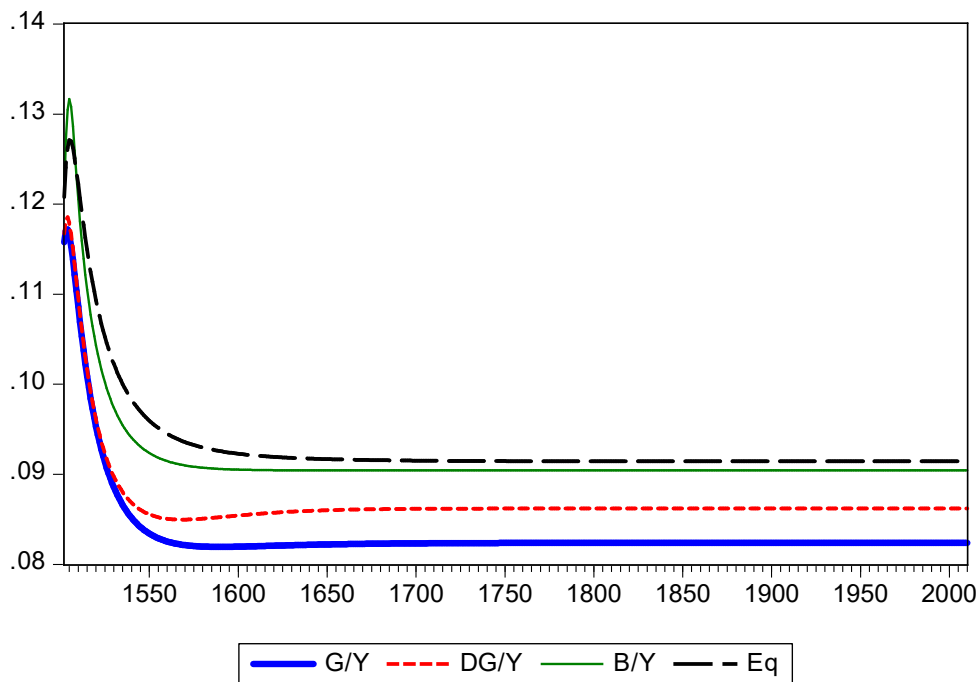
Source: elaborated by the authors.

Figure 3 – Consumption as share of output under the four fiscal rules



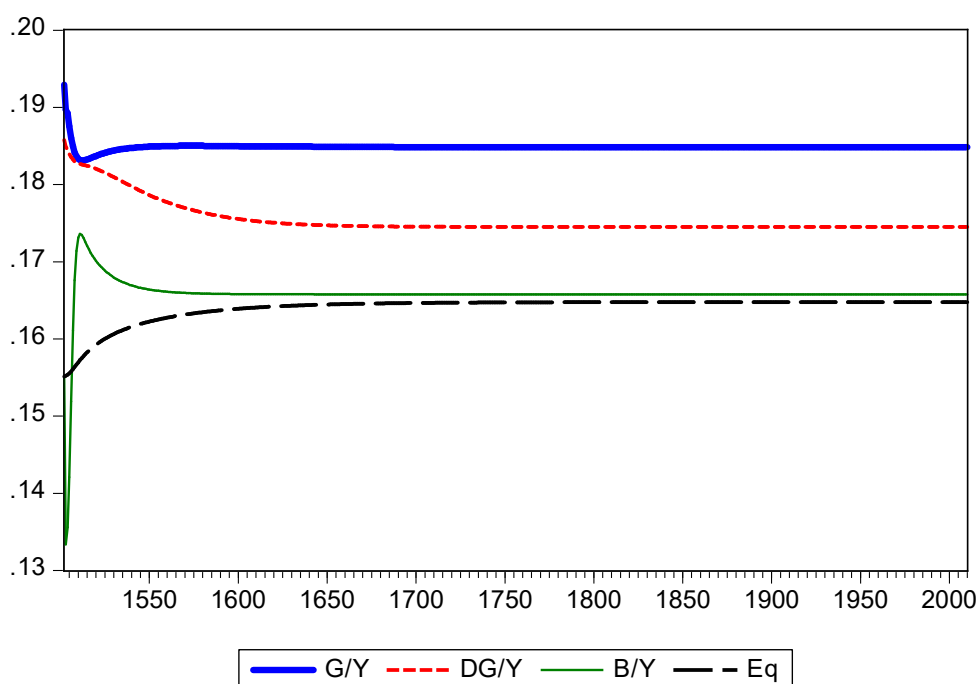
Source: elaborated by the authors.

Figure 4 – Investment rates under the four fiscal rules



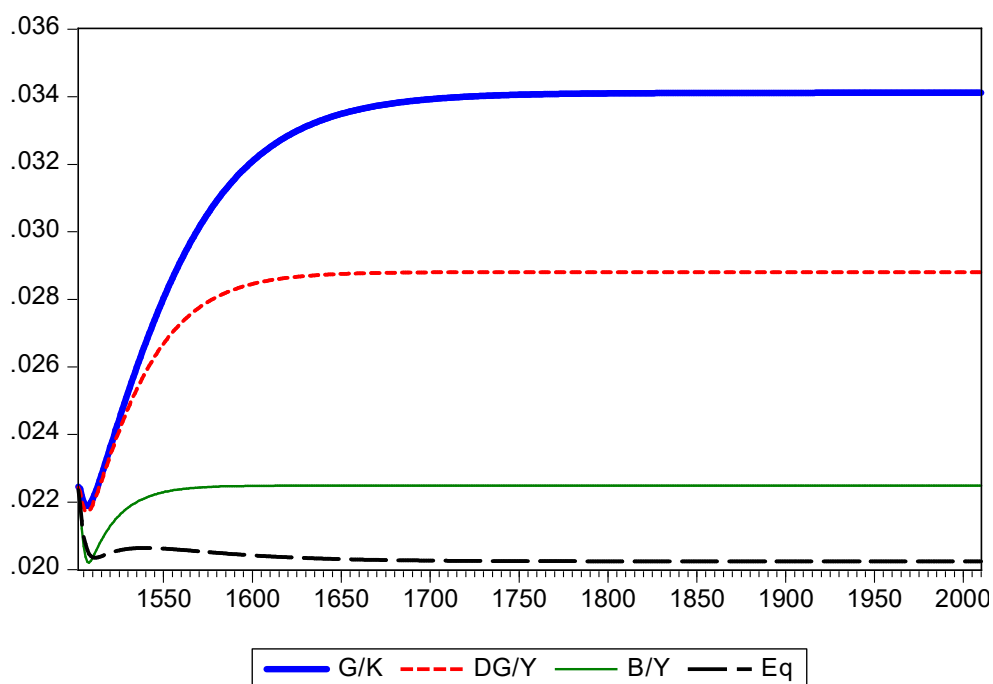
Source: Elaborated by the authors.

Figure 5 – Government expenditures as share of output under the four fiscal rules



Source: Elaborated by the authors.

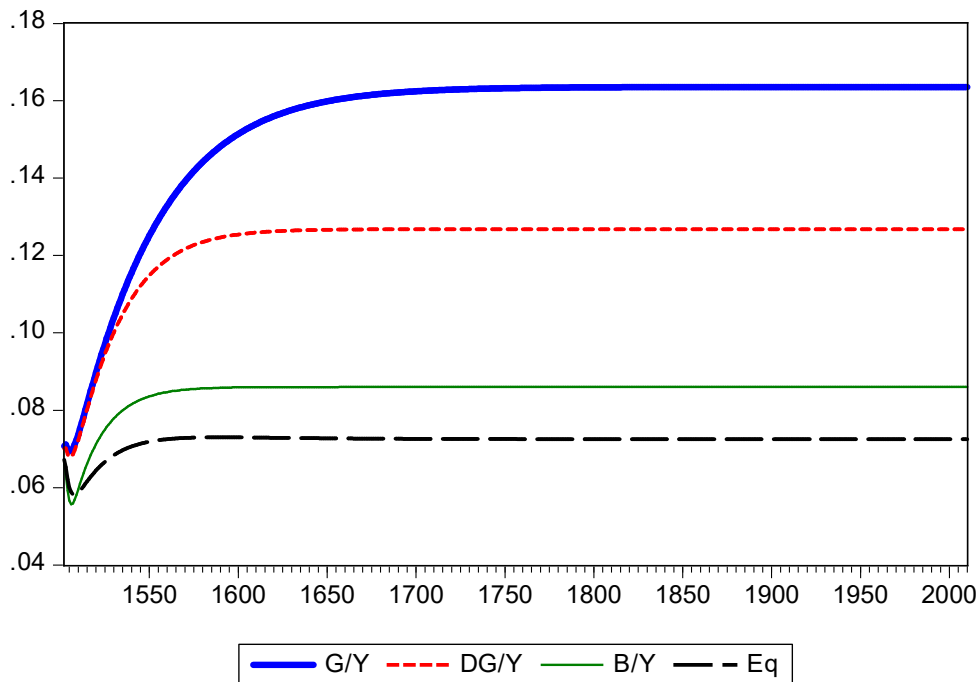
Figure 6 – Investment relative to the stock of capital under the four fiscal rules



Source: Elaborated by the authors.

A consequence of the higher (lower) output growth rates and higher (lower) capacity utilization is the higher (lower) profitability of firms, here defined as the ratio between profits and stock of capital (F_t/K_t). It is interesting to note that this result is the same predicted by Kalecki (1965), who argues that public expenditures generate higher private profits. This is precisely what happens here: the rule with the higher steady-state government expenditures as share of output (G/Y rule) has also the higher firms' profitability (figure 7).

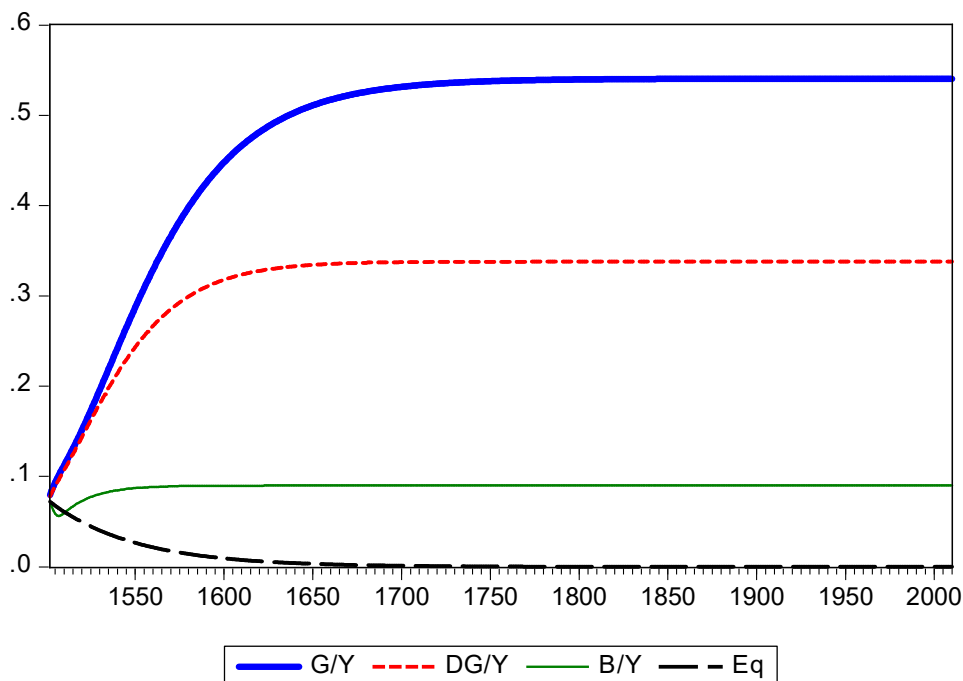
Figure 7 – Firms' profitability under the four fiscal rules



Source: Elaborated by the authors.

The government debt relative to the stock of capital is obviously dissimilar among the fiscal rules. The first rule (G/Y) is the one that generates the higher steady-state public debt as a percentage of capital stock (0.54), followed by the deficit target (0.33) and by the debt target (0.08). The government debt in the balanced budget approaches zero in the steady state (figure 8).

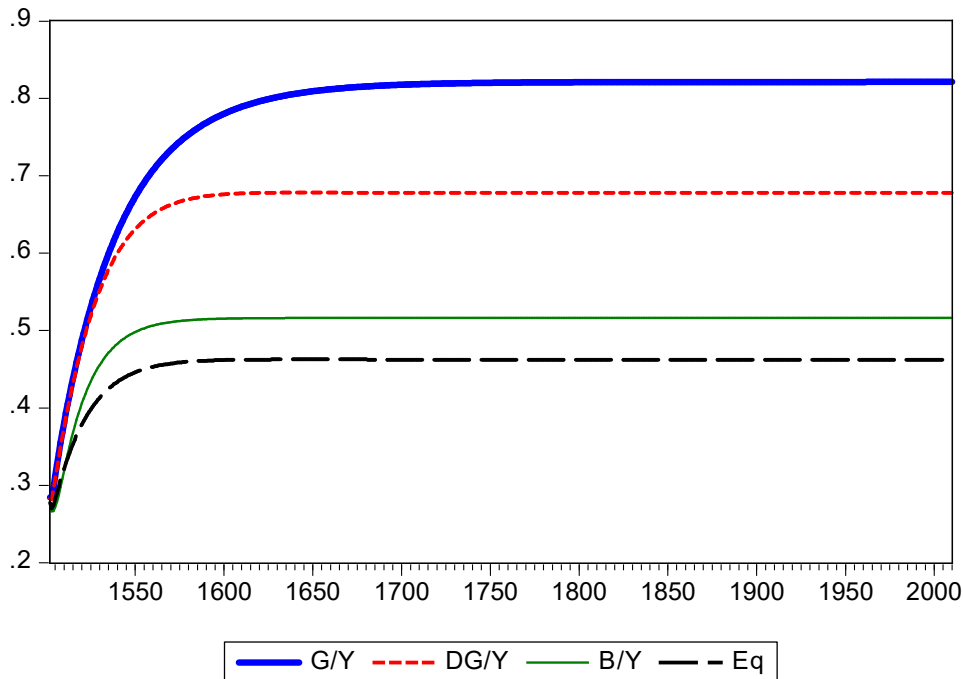
Figure 8 – Government debt relative to the stock of capital under the four fiscal rules



Source: Elaborated by the authors.

Since government bonds are a significant part of households' wealth, it is expected that the ratio V/K would change according to the fiscal rules. The rank of rules here is the same outlined above: fixed G/Y in the first position, and the balanced budget rule in the last place (figure 9).

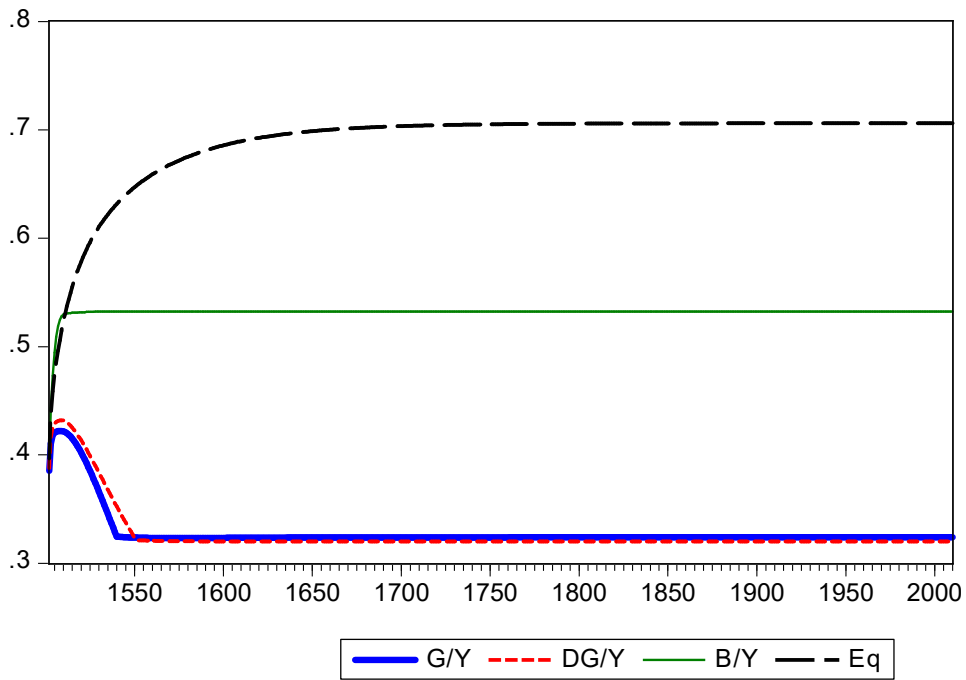
Figure 9 – Households' wealth relative to the stock of capital of the economy under the four fiscal rules



Source: Elaborated by the authors.

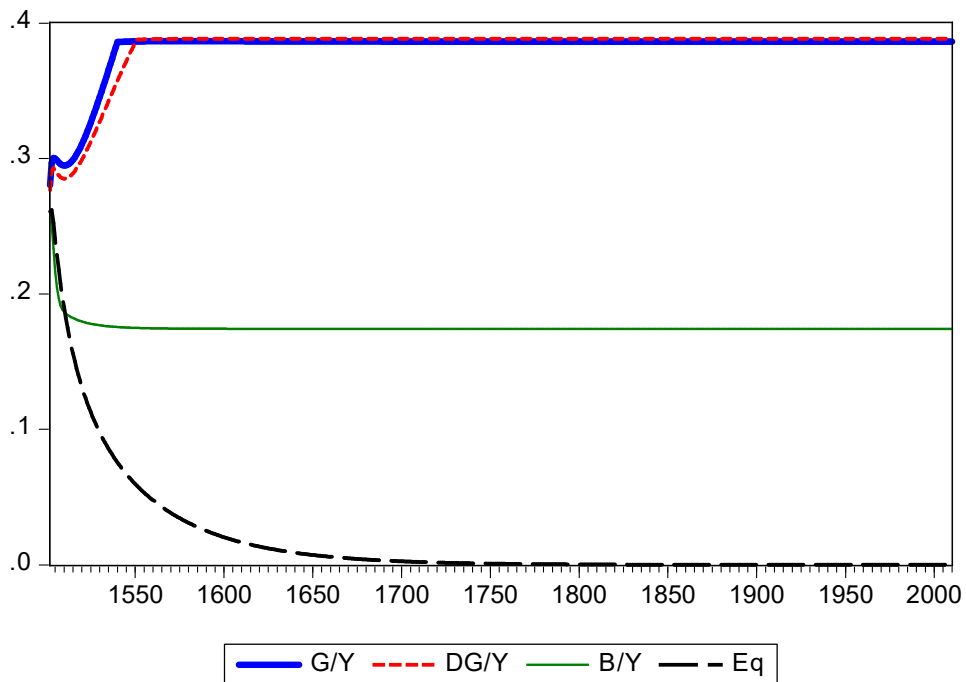
The composition of households wealth also differs among the scenarios. Banks' deposits have its higher importance under the balanced budget rule. This is a consequence of the simple portfolio choice adopted in the exercise: households want to hold a fixed proportion of its wealth in the form of government debt; since this debt does not grow, but the wealth does, they must put their resources somewhere else; their demand for equities is fixed; the only flexible element here are the deposits. The figure that displays the proportion of government bonds in their wealth (figure 11) is just the opposite of their deposits' proportion (figure 10). Equities holdings are roughly the same throughout the fiscal rules (figure 12).

Figure 10 – Deposits as share of households' wealth under the four fiscal rules



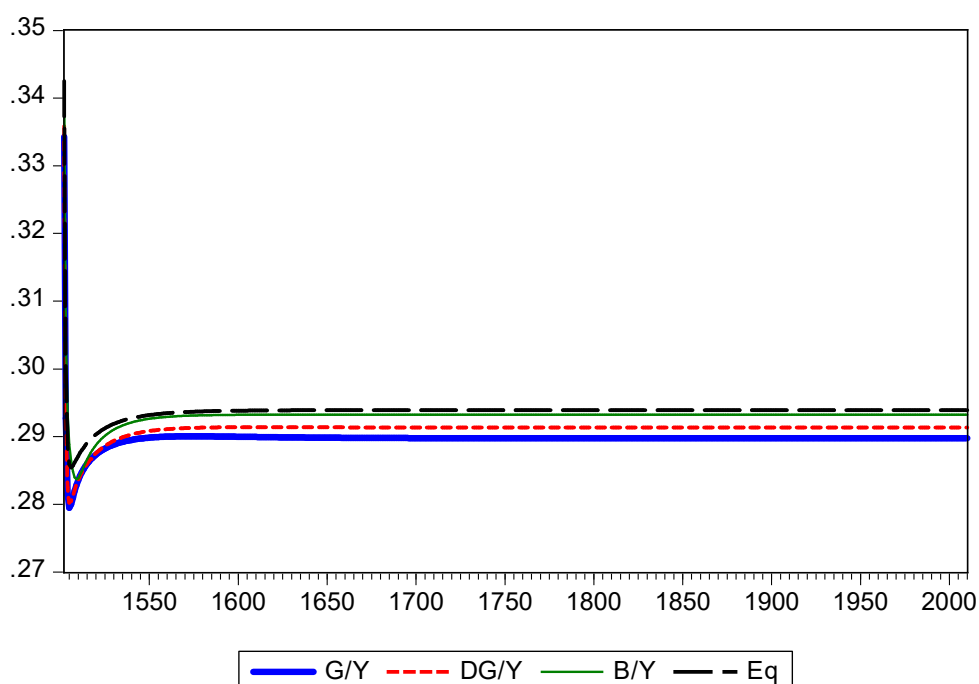
Source: elaborated by the authors.

Figure 11 – Government bonds as share of households' wealth under the four fiscal rules



Source: Elaborated by the authors.

Figure 12 – Equities as share of households’ wealth under the four fiscal rules

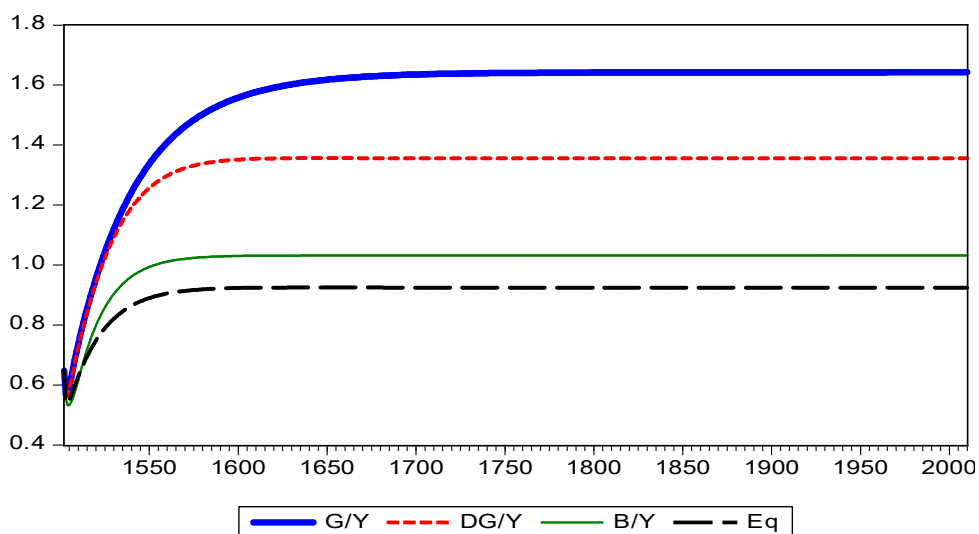


Source: Elaborated by the authors.

It must be noted that, under the first two rules, households increase their holdings of government bonds until it reaches their desired level. Under the last two rules, households are not able to reach their desired holdings of government bonds because there are not enough bonds available to them. Under the B/Y rule, this happens because government has a debt target that is below households’ demand for bonds. Under the balanced budget rule, the government never runs a deficit, and hence there is no supply of new bonds.

Equities prices reach diverse steady state values. The differences can be explained by the growth rate of output, which increases households’ wealth and thus the demand for equities (figure 13).

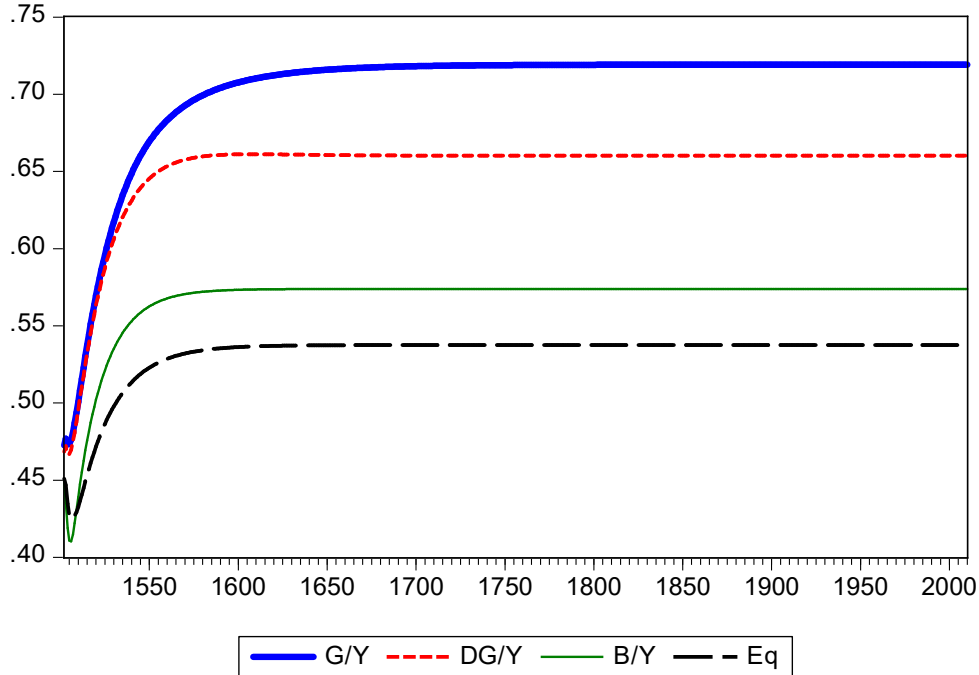
Figure 13 – Equities’ prices under the four fiscal rules



Source: Elaborated by the authors.

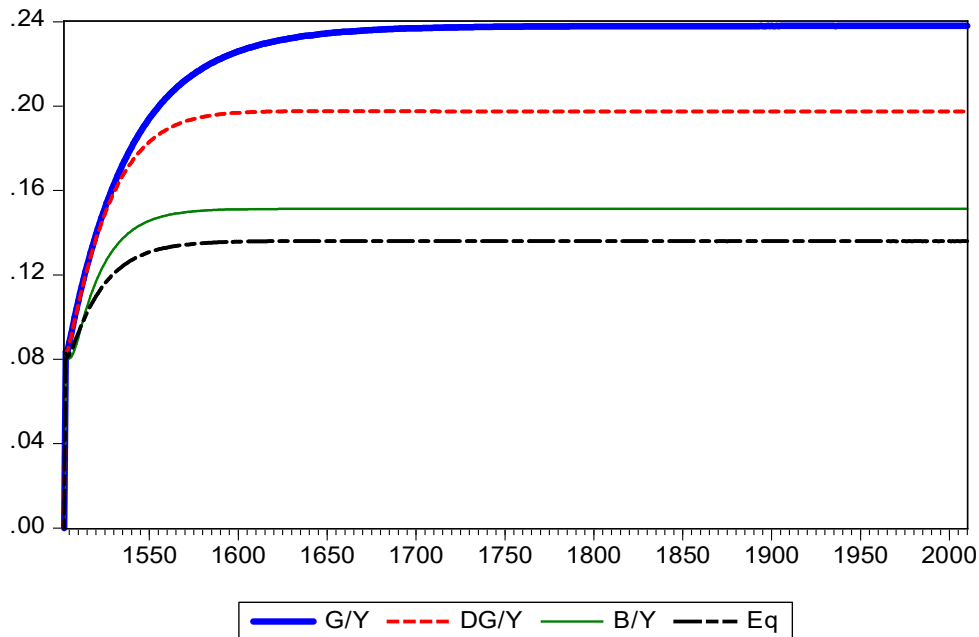
The sources of investment finance are also correlated with economic activity. The higher is the growth rate of the economy, the higher are the profits, and hence the retained profits, which reduces firms' demand for bank loans. But the latter fall under the four fiscal rules.

Figure 14 – Share of investment financed with retained earnings under the four fiscal rules



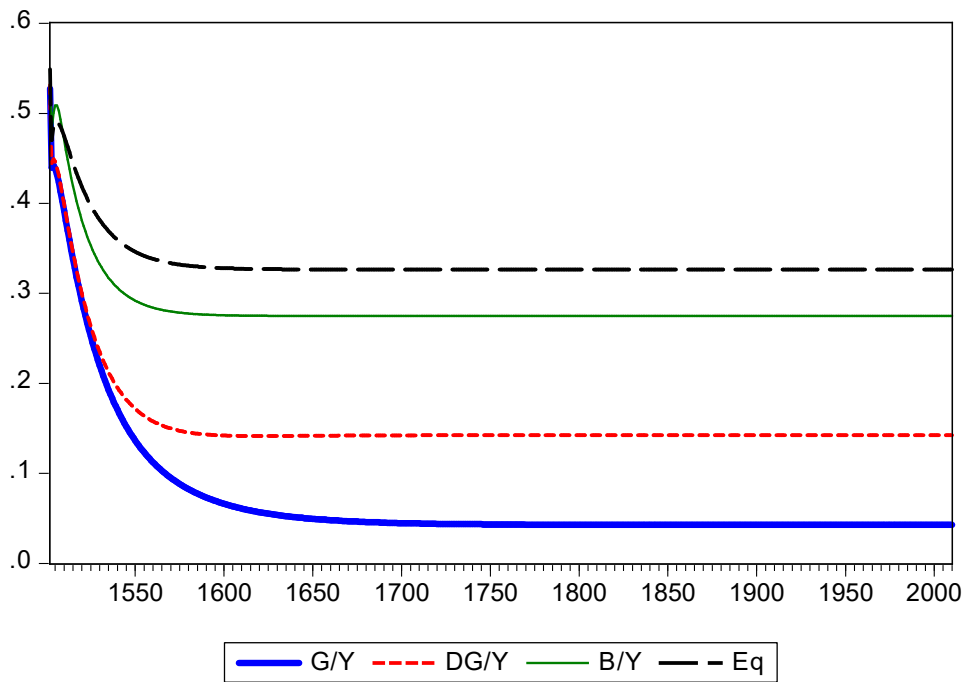
Source: Elaborated by the authors.

Figure 15 – Share of investment financed with equities under the four fiscal rules



Source: Elaborated by the authors.

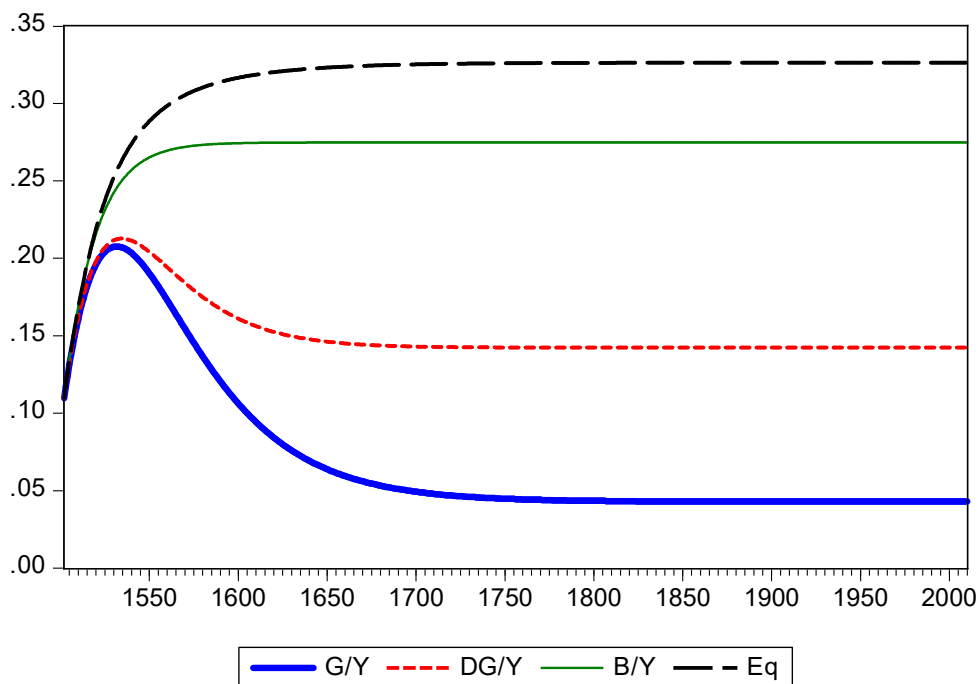
Figure 16 – Share of investment financed with loans under the four fiscal rules



Source: Elaborated by the authors.

The differences in the share of investment financed by bank loans are reflected in the firms' loans to capital ratio (leverage): the G/Y rule, after pushing the leverage to 0.2 in the medium-run, has the lowest steady-state value (0.04), whereas the balanced budget rule has the highest one (0.32).

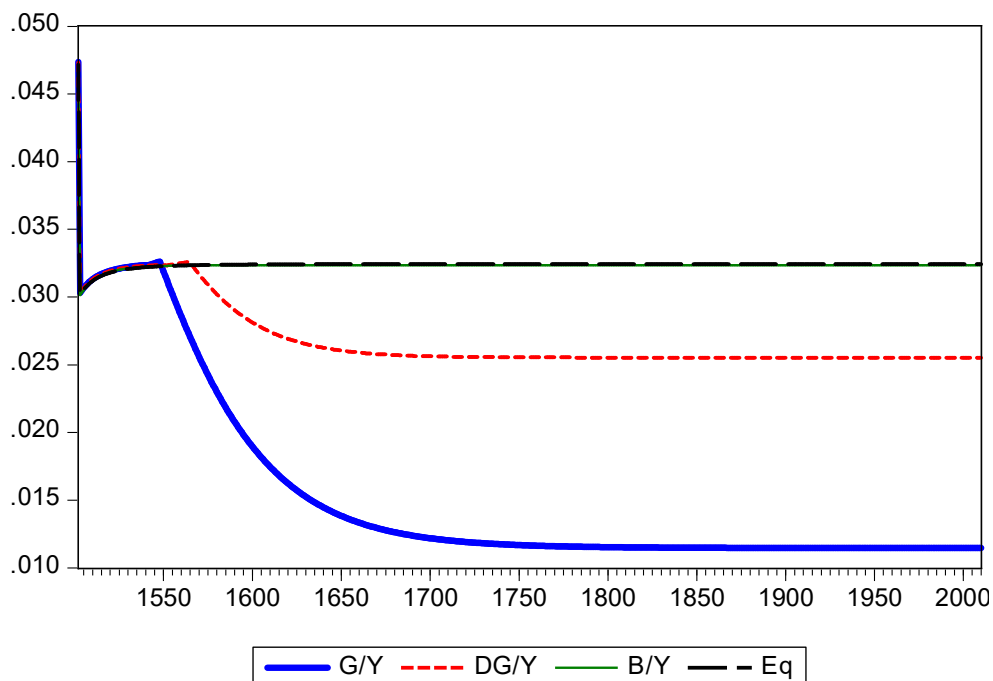
Figure 17 – Firms' debt relative to the stock of capital under the four fiscal rules



Source: Elaborated by the authors.

Firms' indebtedness impacts banks' profitability. The fiscal rules that generate lower indebtedness levels also generate lower profitability for banks, here defined as the ratio between profits and asset holdings (government bonds, high powered money, and loans) or return on assets (ROA).

Figure 18 – Banks' profits relative to the value of its assets (ROA) under the four fiscal rules



Source: Elaborated by the authors.

Finally, we can summarize all the relationships analyzed above. The first fiscal rule, in which the government seeks to maintain a fixed proportion of spending relative to GDP, is the one that generates the highest growth rate and, consequently, the highest capacity utilization rate and firms' profitability. The behavior of the latter results in a lower loan to capital ratio, since firms generate more internal resources to finance their investment orders. A lower firm indebtedness (leverage) reduces banks' profitability. A consequence of the maintenance of government expenditures as a constant share of output regardless of any deficit or debt size considerations is the relatively bigger size of its debt, which is the highest among the four fiscal rules. Since government debt is private wealth, this higher debt level has its counterpart in a higher ratio of financial wealth to the stock of capital.

The opposite happens under the balanced budget rule. Lower government consumption causes a lower growth rate. This is reflected in lower capacity utilization and meager firms' profits, which reduces their internal resources, forcing them to use more loans as a mean to finance investment expenditures. The consequence of this is a higher profitability for banks. Since the government budget is balanced, it does not generate deficits and new debts. Households' wealth to capital ratio is the lowest one under this rule.

6 Concluding Remarks

In this paper, a simple SFC model was developed in order to analyze the macroeconomic impacts of four different fiscal policy rules. Some of the main conclusions can be summarized as follows: the more expansionist (or less contractionist) rules present higher output growth rates; there is an inverse relationship between government debt and private debt, with government debt reaching the highest steady-state plateau under the G/Y rule, and the lowest under the balanced budget rule, the opposite happening in the case of private debt. Analyzing profitability, we conclude that the best scenario for firms is the one under the G/Y rule, and, for the banking sector, not surprisingly, it is the balanced budget rule.

If this evaluation is correct, then the new fiscal austerity policies in Brazil are likely to deliver poor results. They are likely to reduce long-period growth rates, increase idle capacity, boost consumption to the detriment of investment, and beef up banks' profits. The model, however, has many shortcomings that may hinder these results. It ignores inflation, households' indebtedness, inventories accumulation, and supply side constraints. It also presents very simplified portfolio choices and a naïve wage bargaining process. The calibration of the model also is problematic, since it was not intended to simulate a specific economy, and it lacks econometric support. A consequence of all these shortcomings is some unrealistic results of the model, such as the very low capacity utilization rates and low investment rates. These problems must be dealt with in future works.

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