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A golden rule of public finance or a fixed deficit regime? Growth and welfare effects of budget rules

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ABSTRACT

In this paper, we compare growth and welfare effects of various budget rules within an endogenous growth model with productive public capital, utility enhancing public consumption and public debt. We find that introducing a fixed deficit regime does not affect the long run growth rate compared to a balanced budget while establishing a golden rule results in higher growth. Simulations of welfare effects indicate that a golden rule leads to highest welfare followed by a balanced budget and a fixed deficit regime. A maximum fraction of deficit financed public investment is derived. Varying the intertemporal elasticity of substitution shows that economies populated by households who have a strong tendency to smooth consumption should adhere to a balanced budget from a welfare point of view.

1. Introduction

The macroeconomic effects of budget rules have been studied recently in a number of papers using growth models along the line of Futagami et al. (1993). In this framework endogenous growth stems from investment in a public capital stock, which also raises the private incentive to invest. Greiner and Semmler (2000) incorporate the so-called golden rule of public finance into this framework. This budget rule allows the government only to run deficits if those deficits are used to finance investments in the public capital stock. Greiner and Semmler (2000) find negative long run growth effects of higher deficits in a strict golden rule while in a more flexible regime that additionally allows interest payments to be financed by deficits, positive growth effects can be attained. Ghosh and Mourmouras (2004) compare long run welfare implications of the golden rule with the standard intertemporal budget constraint and show welfare improvements by introducing a golden rule. An interesting contribution is that of Minea and Villieu (2005) who study a fixed deficit budgetary regime and find, contrary to Greiner and Semmler (2000), that a balanced budget always leads to higher long run growth than a fixed deficit.[1] They solve the model numerically and study welfare effects in comparison to a balanced budget during transitional dynamics.[2]

A shortcoming of this line of research is that the effect of different budget rules on the composition of government expenditures is not taken into account. Budget rules like the golden rule favor public investment whereas in a fixed deficit the government might use deficits to spend on public consumption. Through this channel budget rules differently affect growth and welfare of the economy.

Another line of research studies optimal composition of government spending in the same endogenous growth setting, e.g. Lee (1992) and Turnovsky and Fisher (1995).[3] Here, the government can either invest in productive public capital which is an input in the production function or pay for public consumption goods which increase the utility of private households. These studies analyze optimal composition between the two outlays but taxes are the only revenues of the public sector so budget rules are not analyzed.

This paper synthesizes these two streams of literature by focusing on the impact of budget rules on the composition of government expenditures. Instead of finding optimal composition of government expenditure, growth and welfare effects of budget rules are analyzed and optimal policy parameters within a given budget rule are derived.

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[1] Throughout this paper a balanced budget is considered to be a budget rule that does not allow any structural deficits.

[2] Other notable contributions in that line of research are Ghosh and Nolan (2007), Greiner (2007), Futagami et al. (2008), and Minea and Villieu (2009).

[3] See also Devarajan et al. (1998), Turnovsky (2000), Park and Philippopoulos (2004), and Park (2006).

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We compare a golden rule and a fixed deficit regime in an endogenous growth setting with productive government expenditure and utility enhancing public consumption. The particular rules are chosen because they crucially differ in their impact on the composition of government spending.[4] The golden rule stipulates that deficits can only be used to finance public investments whereas a fixed deficit rule does not prescribe a specific usage for the deficits. We find that higher deficits in a fixed deficit regime have no long run growth impact, while with a golden rule higher deficits have positive growth effects in the long run. This is due to the assumption that unlike the golden rule in a fixed deficits regime government borrowing is only used for public consumption. Additionally, we assume that interest payments on government debt are adjusted by public consumption rather than productive government expenditure in the long run. Simulations of welfare effects indicate that a golden rule leads to the highest welfare followed by a balanced budget and a fixed deficit regime. Within a golden rule a welfare maximizing fraction of deficit financed public investment exists. A sensitivity analysis reveals that the intertemporal elasticity of substitution is a crucial parameter determining the size and even the sign of the welfare effect. We show that economies populated by households who have a strong tendency to smooth consumption should adhere to a balanced budget rather than a golden rule or a fixed deficit from a welfare point of view.

The paper is structured as follows: Section 2 presents a short description of the budget rules under consideration. In Section 3 we lay out the basic model and derive the decentralized equilibrium. Section 4 studies growth effects of the fixed deficit regime and the golden rule analytically. In Section 5, the transitional dynamics of a regime switch from a balanced budget to a fixed deficit rule and to a golden rule is simulated. Section 6 analyzes welfare effects and seeks to find optimal fiscal policy with given budget rules and Section 7 concludes.

2. Budget rules in theory and practice

For the purpose of this paper a budget rule is defined as a permanent constraint on fiscal policy, typically defined in terms of an indicator of overall fiscal performance.[5] Restrictions on fiscal policy are mainly justified in conjunction with political economic considerations.[6] Positive deficits within a range should be allowed in order to react to cyclical fluctuations and to help achieve macroeconomic stability.

Budget rules can be classified as deficit-assignment (asset-related) rules and macroeconomic rules which restrict a certain fiscal indicator such as the deficit ratio. The golden rule of public finance is a deficit-assignment rule that only allows deficits in order to finance public investments. This rule intends to foster intergenerational equity by equally dividing the burdens and benefits of public investments from one generation to the next.[7] Moreover, the golden rule sets incentives for public investments which are especially important when it comes to short-sighted politicians.[8] In practice, the golden rule has a long tradition in Germany. Great Britain implemented a golden rule in 1997.[9]

Significant examples of rules that fix certain fiscal indicators are the Maastricht Criteria of the European Union and the Stability and Growth Pact for the members of the European Monetary Union which set a deficit ceiling of 3% of GDP and require the total government debt to not exceed 60% of GDP.[10]

The most important rule of the Stability and Growth Pact appears to be the 3% deficit target because it is regulated on a yearly basis. The other regulations, e.g. the debt target or the requirement to achieve a budget "close to balance or in surplus", are mid-term targets. For this reason we concentrate on a fixed deficit ratio as the most well-known restricted fiscal indicator and compare this to the golden rule of public finance. The next section presents the basic model through which the rules will be analyzed.

3. The model

Before studying the effect of budget rules it is necessary to derive the decentralized equilibrium in the economy without any budgetary regime. The model includes public consumption and public debt in the Futagami et al. (1993) framework. The representative infinitely lived agent maximizes the discounted sum of utility in the form of:[11]

$$U = \int_0^\infty u(c, c^s) e^{-\rho t} dt, \tag{1}$$

where ρ is the subjective discount rate. Instantaneous utility $u(c, c^s)$ in any period is defined as:[12]

$$u(c, c^s) = \begin{cases} \dfrac{(c^\eta \cdot (c^s)^{1-\eta})^{1-\sigma} - 1}{1-\sigma}, & \text{for } \sigma \neq 1 \\ \eta \log c + (1-\eta) \log c^s, & \text{for } \sigma = 1. \end{cases} \tag{2}$$

We denote c and c^s as private and public consumption in period t respectively. The parameter η is the weight factor of private consumption and σ is the inverse of the intertemporal elasticity of substitution $S = \frac{1}{\sigma}$. For $S \to 0$ consumption today and tomorrow become perfect complements so households try to perfectly smooth their consumption whereas for $S \to \infty$ the opposite occurs. The representative household flow budget constraint is given in:

$$\dot{k} + \dot{b} = rb + (1-\tau)y - c - \delta^k k. \tag{3}$$

The household uses after tax income $(1-\tau)y$ to consume c and invest $\dot{k} + \delta^k k$, where δ^k is the rate of private capital depreciation. The household can also buy government bonds b which yield the return of rb. It is assumed that it is not allowed to run Ponzi-games:[13]

$$\lim_{t \to \infty} \left[\exp\left[-\int_0^t r_s ds \right] (k + b) \right] = 0. \tag{4}$$

The production function of the representative producer exhibits constant returns to scale with diminishing returns with respect to each factor:

$$y = k^{1-\alpha} g^\alpha. \tag{5}$$

The output y is produced with private capital k and the public capital stock g where $0 < \alpha < 1$ is the elasticity of output to public capital. Population is normalized to unity.

The government can use tax revenues τy and deficits $\dot{b}$ to finance gross public investment $\dot{g} + \delta^g g$, public consumption c^s, and to serve debt obligations rb. As in Futagami et al. (1993), the tax rate is

[4] For empirical findings see Poterba (1995).
[5] See Kopits and Symansky (1998), p. 2.
[6] See, for example, Schuknecht (2004), for an overview.
[7] For a discussion, see Mintz and Smart (2006).
[8] See Dur et al. (1997) for a formal treatment.
[9] See Kell (2001).

[10] The deficit ceiling can be breached in exceptional cases, see Amtenbrink et al. (1997) for a detailed description. For an assessment of the rules see Buti et al. (2003). The latest reform is described by Buti (2006).
[11] All variables are functions of time. For convenience the time index is omitted.
[12] This form of utility function is also used in Lee (1992), p. 425.
[13] The no-Ponzi condition corresponds to the transversality condition resulting from the decentralized optimization problem of the households.