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Budget deficits, public debt and the Ricardian Equivalence

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Abstract

The paper criticizes the so-called Ricardian equivalence (RE) and its implications for the analysis of the problem of the public debt. It is argued that the validity of the RE hinges on an unsatisfactory view of the economic role of the state as a mere ‘parasite’ and on an unwarranted extension of the micro-economic analysis of debts to the macro-economic level. When dealing with the problem of the ratio of the public debt to GDP, the acceptance of the RE translates into the assumption that the economy’s rate of growth is independent of public spending, taxes and debt.

On the grounds of the critique of the RE, the paper presents a different approach, based on the idea that an adequate composition of public spending can ensure a stable public debt ratio even though the government runs a primary deficit. According to such approach, public outlays should be mostly devoted to *productive expenditures*, i.e. those which affect the equilibrium rate of growth thanks to their positive impact on overall productivity.

JEL Classification: E21; E62; E60; H30; H54; H60

1 Introduction

Following the Covid-19 crisis and the fiscal policies adopted to contrast it, all major economies are experiencing rising government budget deficits and a significant increase of the ratio of their public debt to GDP. It is then not difficult to expect that the problem of the public and adequate policies to ensure its reduction and/or stabilization will be at the center of the economic debate in the near future, when the initial phase of the current crisis is over.

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This paper intends to contribute to the debate on the public debt by focusing on two issues.

- A critical discussion of the economic rationale behind most macroeconomic analyses of the public debt problem, that is to say the explicitly or implicit acceptance of the so-called Ricardian equivalence.
- The suggestion of viable fiscal policies to reduce or stabilize the ratio of the public debt to GDP, different from those deriving from the Ricardian equivalence.

Mainstream contemporary approaches to the public debt are characterized by being based, explicitly or implicitly, upon the acceptance of the so-called Ricardian equivalence (RE from now on) (Barro, 1974; Buchanan, 1976). The paper argues that a more fruitful approach to the problem requires a critical reconsideration of the RE.

The RE has been already debated and subjected to several criticisms. The paper, rather than returning to discuss those criticisms, concentrates on some aspects that have not received due attention so far:

- the view of the economic role of the state underlying the RE;
- the theoretical and analytical difficulties that the RE encounters when dealing with the problem of debt at the aggregate level;
- the theoretical and analytical relation between the RE and the standard analysis of the public debt dynamics, based on the so-called dynamic budget constraint.

On the grounds of the critical consideration of the issues indicated above, the paper puts forward an approach to the problem of public debt which emphasizes the possibility for public spending and deficits to stimulate growth without implying a growing unsustainable ratio of the public debt to the GDP, but also without necessarily implying the government's attempt to realize significant primary surpluses.

The basic idea of this approach is that the stabilization or reduction of the public debt ratio can be achieved through adequate changes of the composition of public spending. Such changes should favor 'productive' public expenditures, that is to say those public outlays which have a direct positive impact on the economy's equilibrium rate of growth.

The paper is organized as follows. Section 2 briefly illustrates the basic aspects of the RE and the dynamic budget constraint. Section 3 presents a number of critical considerations concerning the RE and the problem of the public debt. Section 4 outlines a different approach to the stabilization of the public debt ratio. Section 5 concludes.

2 The Ricardian equivalence and the government budget constraint

2.1 A simple exposition of the RE

Barro (1974) revived the problem originally raised by Ricardo in the 19th century, that is to say the idea that government spending, in whatever way it is financed, does not produce permanent effects on the economy.¹ Here, we expound the RE in its simplest version.²

Let us consider a two-period closed economy (period 1 is the present; period 2 is the future). Both households and the government live for the two periods; at the end of period 2 the world ends. Y_1 and Y_2 denote the households' income at periods 1 and 2 respectively, which accrues to them like 'manna from heaven'.

The households' life-time utility function is

$$V = U(C_1) + \frac{1}{(1 + \rho)}U(C_2) \quad (1)$$

C_1, C_2 denote consumption at 1, 2 respectively.

At 1, households own an amount of assets, A_0 , from which they obtain an interest rA_0 (r is the real interest rate). Therefore, their budget constraints at 1 and 2 respectively are:

$$A_1 = (1 + r)A_0 + (1 - t_1)Y_1 - C_1 \quad (2)$$

$$A_2 = (1 + r)A_1 + (1 - t_2)Y_2 - C_2 = 0 \quad (3)$$

(t_1, t_2 are the tax rates at 1,2).

If households can either lend or borrow at the interest rate r , A_1 can be positive, negative or null. A_2 , however, must be equal to zero because at 2, the world ends and it is senseless to leave a positive amount of assets ($A_2 > 0$) and, on the other hand, it is not possible to 'die' indebted ($A_2 < 0$).

(2) and (3) can be consolidated into the households' life-time budget constraint,

$$C_1 + \frac{C_2}{(1 + r)} = (1 + r)A_0 + (1 - t_1)Y_1 + \frac{(1 - t_2)Y_2}{(1 + r)} \quad (4)$$

The present value of consumption in 1 and 2 must equal total wealth.

As for the government, in the two periods it buys goods for its own consumption (G_1, G_2), which are financed either by taxes or debt. The government's budget

¹Buchanan (1976) first used the term 'Ricardian Equivalence theorem'.

²As presented, for example, by Heijdra (2017, pp. 192-195). For a more advanced exposition of the RE see, for example, Barro (1974) and Seater (1993).

constraints at 1 and 2 are

$$D_1 = rB_0 + G_1 - t_1Y_1 = B_1 - B_0 \quad (5)$$

$$D_2 = rB_1 + G_2 - t_2Y_2 = B_2 - B_1 = -B_1 \quad (6)$$

where D_i and B_i respectively denote the government deficit and debt at $i = 1, 2$. (6) follows from the assumption that the world ends at $i = 2$ and by then the government debt must be extinguished for the same reasons that apply to households.

By consolidating (5) and (6), we obtain

$$(1+r)B_0 = t_1Y_1 + \frac{t_2Y_2}{(1+r)} - G_1 - \frac{G_2}{(1+r)} \quad (7)$$

because in this simple economy the only financial asset that households can hold is government bonds and, hence, it is $A_i = B_i$ ($i = 1, 2$) and $A_2 = B_2 = 0$.

If (7) is substituted into the consolidated households budget constraint 4 we obtain

$$C_1 + \frac{C_2}{(1+r)} = Y_1 - G_1 + \frac{(Y_2 - G_2)}{(1+r)} \equiv \Omega \quad (8)$$

From the maximization of the utility function 1,³ we obtain that it must be

$$\frac{C_2}{C_1} = \frac{(1+r)}{(1+\rho)}$$

and that, at equilibrium, it is

$$C_1 = \frac{(1+\rho)}{(2+\rho)}\Omega \quad (9)$$

$$C_2 = \frac{(1+r)}{(2+\rho)}\Omega \quad (10)$$

Consumption in both periods does not depend on the tax rates t_1, t_2 . In other words, the households' consumption does not depend on how the government finances its expenditures.

Saving, instead, depends on taxation. Saving at 1 is $S_1 = A_1 - A_0 = B_1 - B_0$ and, hence,

$$S_1 = rB_0 + (1-t_1)Y_1 - C_1 = rB_0 + (1-t_1)Y_1 - \frac{(1+\rho)}{(2+\rho)}\Omega \quad (11)$$

Suppose now that, at 1, the government reduces the tax rate t_1 ($dt_1 < 0$), whereas G_1, G_2 remain constant. From (11), we have

$$dS_1 = -Y_1 dt_1$$

³Under the hypothesis that $U(C_t) = \log C_t$.

as $d\Omega = 0$ by assumption.

However, constraint 7 implies that taxes at 2 must increase:

$$dt_1 Y_1 + \frac{dt_2 Y_2}{(1+r)} = 0$$

and hence

$$dt_2 = - \left[\frac{(1+r)Y_1}{Y_2} \right] dt_1 > 0 \quad (12)$$

Since taxes at period 2 must increase, households must increase their saving to be able to pay them. The government fiscal decisions do not affect the economy in any permanent way. Households simply re-adjust their saving decisions in response to the government decisions.

Burda and Wyplosz (1997, p. 57) express the meaning and implications of the RE in clear terms: ‘It is as if the government simply confiscates the resources corresponding to its expenditures, and the private sector takes the remainder. Given public spending decisions, taxes can be levied today or tomorrow: the time profile of taxation has no effect on private wealth.’

The picture does not change when the analysis is extended to consider infinite horizons. Now the world is assumed to end at $t = \infty$ and the idea that at ‘doomsday’ there must not be either private or public positive credits and debts is expressed by imposing the No-Ponzi-Condition (NPC) (at infinite, there cannot exist positive credits and debts) on both the households’ and the government’s inter-temporal budget constraints.⁴

The condition for the households and the government respectively is

$$\lim_{n \rightarrow \infty} \frac{A_{t+n}}{(1+r)^{n+1}} = 0 \quad (13)$$

$$\lim_{n \rightarrow \infty} \frac{D_{t+n}}{(1+r)^{n+1}} = 0 \quad (14)$$

The consolidated inter-temporal budget constraint becomes

$$\sum_{t=1}^{\infty} \frac{C_t}{(1+r)^{t-1}} = \sum_{t=1}^{\infty} \frac{(Y_t - G_t)}{(1+r)^{t-1}} \equiv \Omega \quad (15)$$

2.2 The dynamic budget constraint and the RE

The so-called government dynamic government budget constraint is derived from the accounting identity

$$B_t - B_{t-1} = (G_t - T_t) + iB_{t-1} \quad (16)$$

⁴For a detailed exposition of the NPC see Blanchard and Fischer (1989, pp. 48-58) and Burda and Wyplosz (1997, pp. 71-72) for a simplified version.

(B is the public debt; $G - T$ is the primary government deficit (surplus); i is the nominal interest rate on B .) The variation of the public debt from $t - 1$ to t is equal to the primary deficit (surplus) $G - T$ plus the payment of interest on the outstanding debt at $t-1$, (iB_{t-1}).⁵

With a few simple transformations, (16) can be expressed in terms of ratios to the GDP (Y) and the real interest rate on the debt (r) and the economy's rate of growth (g) are introduced:

$$b_t = (\gamma_t - \tau_t) + b_{t-1}(1 + r - g) \quad (17)$$

with $b = \frac{B}{Y}$, $\gamma = \frac{G}{Y}$, $\tau = \frac{T}{Y}$. r and g are taken as given and independent of b, γ, τ .⁶

If (17) is used to simply look at the dynamics of the debt ratio from $(t - 1)$ to t , it is immediate to see that, if $r > g$, the debt ratio can be stabilized or reduced ($b_t \leq b_{t-1}$) only if the government runs a primary surplus, i.e. if $\gamma_t - \tau_t < 0$.

Analogous results are derived if (17) is interpreted as a first-order difference equation and it is used to study the dynamics of b over time. By assuming that the ratios of public spending and taxes to the GDP are constant over time ($\gamma_0, \gamma_1, \dots, \gamma_t, \dots = \gamma$; $\tau_0, \tau_1, \dots, \tau_t, \dots = \tau$), the solution for (17) is

$$b_t = \frac{(\tau - \gamma)[-1 + (1 - r - g)^t]}{(g - r)} \quad (18)$$

under the hypothesis that $b_0 = 0$.

The solution for b depends on the signs of $(\gamma - \tau)$ and $(g - r)$. Here we concentrate on cases in which the government runs primary deficits, $(\gamma - \tau) > 0$.⁷ It is easy to see that, if $r > g$, the ratio of the public debt to GDP, b , follows an explosive path ($b \rightarrow \infty$ for $t \rightarrow \infty$). If instead, it is $r < g$, b tends to a constant

⁵A more thorough analysis should also contemplate the possibility for the government to finance part of all of its deficits through the creation of additional money; i.e. the possibility for the central bank to purchase part of all of the new issued government liabilities. Here we do not consider the possibility of debt monetization.

⁶In (17) public spending is considered at the aggregate level; if public spending is divided into public consumption and public investment and it is assumed that the return on public investment is positive, the budget constraint becomes $b_t = \gamma_{1,t} + \gamma_{2,t}(1 - r_g) - \tau_t + (1 + r - g)b_{t-1}$, where γ_1 is the ratio of public consumption to Y , γ_2 is the ratio of public investment to Y and r_g is its rate of return. Heijdra (2017, pp. 213-219) considers a model with public investment distinct from public consumption and shows that public investment that attains the market rate of return (r) can be debudgeted because it does not generate a net liability. The general results and conclusions of the analysis, however, do not change. The disaggregation of public spending into consumption and investment does not imply that the relation between r and g is affected and g remains independent of γ_1 or γ_2 .

⁷For a graphic illustration of all the four possible cases see, e.g., Carlin and Soskice (2006, pp. 181-186).

value,

$$\bar{b} = \frac{(\gamma - \tau)}{(g - r)} \quad (19)$$

Even though the government runs primary deficits, the ratio of its debt to the GDP tends to stabilize at a finite value. The smaller is the primary deficit and the larger is the difference between g and r , the smaller is \bar{b} , the equilibrium public debt ratio.

Mainstream analyses are mainly concerned with cases in which $(\gamma - \tau) > 0$ and $r > g$.⁸ As already pointed out, g is taken as exogenously given and independent of the public budget and debt. Under these assumptions the ratio of the debt ratio can be stabilized only if the government turns to running adequate primary surpluses.

The reasons why standard analyses focus on the hypothesis that $r > g$ is partly justified on empirical grounds. Blanchard et al. (1990, p. 15) observe that, since the 1990s, the interest rate on the public debt has been higher than the growth rate in most OECD countries.⁹ There are, however, more essential theoretical reasons that induce to assume that $r > g$ and, even more forcefully, that g is independent of deficits and debts. Such reasons relate to the RE.

In dealing with the dynamic budget constraint the RE is sometimes looked at with a certain degree of skepticism and regarded as an extreme case. This sort of attitude is well expressed, for example, by Blanchard and Johnson (2013, pp. 501-502). For them, the idea that government deficits and debt do not have any effect on the economy (the RE hypothesis) is an extreme view which should not be taken too seriously.¹⁰

It seems, however, that, despite the skepticism, the formal analysis of the public debt ratio is carried out by taking the RE very seriously. The assumption that $r > g$ is the normal case seems to derive from the imposition of the NPC. Blanchard and Fischer (1989, p. 49), to exclude the possibility that households keep on borrowing indefinitely impose the condition that their debt does not increase asymptotically faster than the interest rate.¹¹ The NPC is then imposed on the government as well.

⁸Blanchard et al. (2010, p. 444) call the case $r > g$ ‘normal’ and the case $r < g$ ‘exotic’.

⁹See similar and more updated considerations in Blanchard (2002, pp. 556-7). See also Carlin and Soskice (2006, p. 187) and Greiner and Fincke (2009, p. 7). In recent years, as well known, the empirical support to the hypothesis has vanished as most economies have been experiencing situations characterized by low interest rates next to zero. Blanchard (2019) acknowledges this and develops the analysis of the public debt in the current context of low interest rates.

¹⁰‘How seriously should we take the Ricardian equivalence proposition? Most economists would answer: ‘Seriously, but surely not seriously enough to think that deficits and debt are irrelevant.’

¹¹This amounts to impose that $\lim_{t \rightarrow \infty} a_t [-\int_0^\infty (r_v - n)dv] \geq 0$, where a is the households’ wealth, r is the interest rate and n is the growth rate.

As for the hypothesis that g is exogenously given and independent of the public budget, it amounts to accepting the RE: whatever are the government decisions about spending and levying taxes, the economy's dynamics is not affected.

3 Criticisms of the RE

The RE has been subjected to several criticisms, most of which are based on the introduction of some forms of imperfection, uncertainty or limits to the individuals' rationality.¹² This section does not return to consider these criticisms; it concentrates on some aspects which have received little attention so far.

These aspects are: i) the view of the economic role of the state underlying the RE; ii) the way in which the time dimension and the related problem of the 'end of the world' are dealt with. After having expounded these general criticisms of the RE, the section turns to consider how they bear on the macroeconomic treatment of the public debt, the dynamic budget constraint and its fiscal policy implications.

3.1 Why does the state exist?

In a 'Ricardian' world, the government does not play any significant economic role; its activities (spending, taxing and borrowing) do not have any significant impact on the rest of the economy other than inducing households to vary their time allocation of savings. It seems that the state spends, levies taxes and borrows merely for the sake of its own benefit.

Barro demonstrates the RE in an analytical context in which the government does not play any significant economic role. Barro (1974, p. 1099) assumes that 'the government neither demands commodities nor provides public services.' It is as if the government borrows from households just to pay its civil servants who do not produce any useful goods and/or services for the economy. For others, like for example Greiner and Fincke (2009, p. 74), public spending is a 'mere waste of resources that is neither productive nor yields utility for the household.' Also in the model expounded in section 2, the government is exclusively concerned with its own survival, even though it now buys goods and/or services (presumably consumed by its civil servants), while the households' income is manna from heaven.

The government does not contribute in any way to the production of resources. It does not borrow to use the resources so acquired to produce additional goods and/or services. In other words, the state is assimilated to a single household which borrows to finance its consumption. This special household does not contribute

¹²See, for example, Tobin (1980); Bernheim (1987, 1989); Yellen (1989); Eisner (1989); Barro (1989); Seater (1993); Akerlof (2007); Heijdra (2017).

directly or indirectly to the production of resources.¹³

In this framework, the RE amounts to little more than a tautology. If it is assumed that the government's decisions concerning spending, taxing and borrowing have no effects on the total amount of available resources, it is obviously true that the government can reimburse its debt, and pay an interest on it, only if it raises taxes sometime in the future. As a consequence, rational households immediately adjust (reduce) their consumption decisions in order to be able to pay the expected increased future taxes.

If government activities, or at least part of them, were assimilated to those of productive firms, the picture and the analytical conclusions would be different. When households lend to firms the answer to the question whether the households' lending to firms determines an increase of their net wealth is: 'Yes, if firms, thanks to their borrowing, are able to produce an amount of value added that is sufficient to repay their debt plus interests.' The problem of government bonds, public debt and private wealth should be tackled from the same perspective.

One key issue in dealing with the validity of the RE is, therefore, whether the government's economic activities, its spending in particular, are such as to have an impact on the economy by determining an increase of its level of production and its growth over time. It is necessary to take into consideration the possible direct impact of the government on the production of aggregate output as well as its impact on the agents' decision concerning production. Doing so can easily imply the rejection of the RE.¹⁴

Tobin (1980, pp. 49-72), who criticizes the RE from several viewpoints, points out in particular that, when there are unused resources because of an insufficient aggregate demand, the fiscal-policy neutrality can be rejected even if households expect that they must eventually service the increased public debt through taxes. It is so because the use of the unemployment resources due to expansionary fiscal policies gives rise to a higher actual and expected households' income.¹⁵ In section 4, Tobin's position is extended by considering cases in which the economy is growing at its normal rate rather than being in an underemployment condition due to insufficient demand.

¹³Differently from ordinary households which offer the services of their factors of production (labor and capital) to firms, which employ them to produce goods and services.

¹⁴Heijdra (2017, pp. 200-203), for example, considers a case in which taxes affect (endogenous) labor supply decisions and, thus, alter the macroeconomic equilibrium rather than simply affecting the agents' allocation of consumption and saving over time.

¹⁵'If resources are unemployed for lack of demand, their re-employment will augment the stream of actual and expected household incomes. The present value of the stream will be raised *even* if households expect eventually to service the additional debt from taxes on their incomes' (Tobin, 1980, p. 61). See also Modigliani (1961).

3.2 The time dimension of the RE

When the NPC is applied to a single agent, its rationale is clear and obvious: debts must be repaid at their maturity and it is sound to assume that agents cannot keep on borrowing indefinitely just to service their previous liabilities. When the analysis is extended to consider the economy as a whole, the imposition of the condition encounters some conceptual difficulties.¹⁶

Also at the aggregate level it is sound to assume that all debts must be repaid at maturity,¹⁷ but for the *aggregate* debt the determination of its maturity is problematic unless it is assumed that the world ends at a future date which all know with certainty. At that date the aggregate debt must be extinguished.

In a simplified two-period world, the ‘end of the world’ is at $t = 2$ and then all debts must be repaid. If there is no certainty that private as well public debts will be repaid at $t = 2$, potential lenders would not be willing to lend at $t = 1$; therefore, borrowers at $t = 1$ must make it sure that, in the next period, they have the required resources to honor their liabilities. The reasoning can naturally be extended to more periods, so that $t = 2$ is no longer the ‘doomsday’ and borrowers can borrow again at $t = 2, 3, \dots$. Doomsday can be assumed to be as far as one wishes, say at $t = \Gamma$, but it will certainly come and nobody can end up as a net debtor or creditor.

Whatever is the length of the world’s life, it is crucial that all agents in the economy know with certainty when the doomsday comes. If this were not the case, borrowers and lenders could always extend their commitments (lending and borrowing) as they can always expect, with a certain probability, that there will be a day $\Gamma + 1, \Gamma + 2, \dots$.¹⁸ In an uncertain world the idea that the public and/or private *aggregate* debt must vanish at a definite date is not supported by a solid rationale.

But the rejection of the idea of the ‘end of debt’ does not even require the introduction of uncertainty when the date of doomsday is set at infinity.¹⁹ In such a case, $\Gamma = \infty$ is interpreted as assuming that the end of the world will certainly come but in the very far future.²⁰ But this intuitive way to deal with the notion of

¹⁶Also Piketty (2014, p. 135) criticizes the RE for its relying on representative agent models, but he is interested in the inequality of distribution of income, wealth and taxes and in that large part of the public debt is owned by a minority of the population.

¹⁷Unless, of course, the analytical concern is with the possibility of defaults and their implications.

¹⁸The fact that day $\Gamma + i$ is expected to come with probability $0 < p < 1$ would presumably affect the interest rates as the risk of loans would be an inverse function of p , but we can ignore this aspect here.

¹⁹It is well known that to consider an infinite horizon does not require to assume households with an infinite life-time; it is sufficient to introduce overlapping generations.

²⁰Burda and Wyplosz (1997, pp. 71-72) are explicit about this: ‘As n goes to infinity, one

infinity has no rigorous mathematical basis. From a mathematical point of view, infinity cannot be regarded as a very large number, or a point in time very far away.

A sort of Hilbert’s Grand-Hotel-Paradox applies: even though the world has reached time $\Gamma = \infty$, it is always possible to add one more period to its life, so that at Γ it would be still possible to extend lending and borrowing for one more period. When $\Gamma + 1$ arrives, a period $\Gamma + 2$ can be added and lending/borrowing can be extended again and so on forever.²¹

We must conclude, therefore, that, *unless perfect certainty about the coming of doomsday at a definite time* ($\Gamma \neq \infty$) *is assumed*, the NPC cannot hold for the aggregate debt. Conditions 13 and 14 above are not necessarily fulfilled.

Hicks (1989, pp. 53-54), looking at the problem of the public debt from a logical-historical viewpoint, asks a question similar to the one asked by the RE, but he gives a different answer. Potential lenders to the government ask how can it find the money to repay its debt at maturity if it cannot get money now and is forced to borrow. Lenders can assume that when the debt maturity comes, the government will borrow again, but then their trouble ‘will start all over again.’ The way out can be found if the problem is faced at the beginning, i.e. if lenders engage themselves to re-lend. In this case the borrower’s promise is ‘more credible, since it should be easier for the borrower to repay in the form of a moderate, though continuing, interest payment, than to repay the capital sum all at once.’²²

In Hicks’s framework there is no ‘end of the world’; the government can keep on borrowing indefinitely, provided that there exist a class of lenders ready to meet its recurrent demand for loans at a certain price.

3.3 Aggregate public debt and national accounting

The view that the public debt can remain positive for an indefinite time finds support also in the logic of national accounting.

At any time t , in so far as it is

$$(S_t - I_t) + (M_t - X_t) > 0 \tag{20}$$

would expect that the households would have to repay its debt—to transfer resources equal in present value to its initial debt. (Households cannot repay their debt by borrowing forever.) ... At the same time, it makes little sense to go to the “end” with unspent wealth; this would imply forgone consumptions possibilities. ... The same reasoning applies to the government as to households.’

²¹A hotel completely full but with an infinite number of rooms is still able to accommodate any number of additional guests. The last coming guest can be accommodated in room 1, which has been freed by moving its guest to room 2, freed by moving its guest to room 3 and so on. See Ewald and Sieg (2013).

²²Hicks considers also the role that the central bank can play to tackle the public debt problem. Here we do not look at this aspect.

(with M and X denoting imports and exports respectively) it must necessarily be

$$T_t - G_t < 0 \quad (21)$$

and such that

$$(S_t - I_t) + (M_t - X_t) + (T_t - G_t) \equiv 0 \quad (22)$$

In other words, in so far as (20) is true, the government must run a primary deficit and keep on borrowing.

If (22) is interpreted as an equilibrium condition rather than an identity, it is associated with a certain equilibrium level of output Y_t . Let us suppose that Y_t is the ‘normal’ level of output, i.e. the output associated with the economy’s ‘natural’ rate of unemployment,

$$Y_t = Y_N$$

In this case, if there are no forces at work that make $(S - I)$ and/or $(M - X)$ change so that $(S - I) + (M - X) \leq 0$, equilibrium at $Y = Y_N$ requires the persistence of public deficits and debt. In so far as, at Y_N , it is $(S_t - I_t) + (M_t - X_t) > 0$, there must exist a ‘normal’, or equilibrium, level of public debt.

If we look at the problem from a dynamic point of view, in order that the ‘equilibrium public debt’ does not imply also a growing debt ratio over time, it is necessary that the economy’s normal rate of growth, g_N , is higher than the normal rate on the public debt. This brings us to re-considering the dynamic budget constraint.

3.4 The budget constraint, and the exogeneity of the rate of growth

The results and policy implications deriving from the standard interpretation of the budget constraint 17 depend on the assumption that the economy rate of growth g and the rate of interest r are given and independent of γ, τ, b . In particular, any change in γ and/or τ , to realize a government primary surplus finalized to the stabilization or reduction of the debt ratio, leaves g unaffected.

As Blanchard and Johnson (2013) point out, it is hard to accept that changes in the government primary balance—in particular, passing from a primary deficit to a primary surplus—leave the economy’s rate of growth unaffected. Thus, a possible way to justify the independence of g of the fiscal variables is to assume that the economy is on its normal growth path, i.e. that $g_t = g_N$ where g_N denotes the natural rate of growth.

Fiscal policy is unable to modify the natural rate of growth, even though it can affect the government budget. More in particular, a restrictive fiscal policy would cause a temporary reduction of the actual rate of growth, but the economy,

in the medium/long period will return to grow at the rate g_N , now associated with a smaller government deficit or, possibly, with a government surplus.

If the government manages to implement such a policy, the effect on the public debt and its dynamics is obvious. The realized primary surplus allows the debt ratio to fall or remain constant even if it is $g_N < r$. This means that the restrictive policy is such that (20) transforms into

$$(S_t - I_t) + (M_t - X_t) \leq 0$$

so that it can be $T - G \geq 0$. In other words, the restrictive policy must be such as to determine either an increase in private investment I or an external surplus, or both.

Should such a policy, which in any case implies significant economic and social costs due to the temporary loss of output and employment, fail to affect (20), the economy would find itself into a sort of ‘debt trap’. The economy is growing at a normal rate which is not sufficient to ensure a stable public debt ratio. It would seem that the only possible way to bring about the reduction of the debt ratio resides in implementing a monetary policy to reduce the interest rate and bring it below the rate of growth g_N .²³

The next section presents an alternative way to tackle the problem, which is based on the idea that adequate fiscal policies can positively affect the normal rate of growth.

4 A ‘non-Ricardian’ approach to the public debt and its stabilization

4.1 A different view of the economic role of the state

The RE hypothesis hinges on the assumption that the government activities, in particular public spending, do not produce any economic effect. In dynamic terms, changes in the public budget do not have any impact on the economy’s rate of growth or, at least on its long-run equilibrium rate of growth (the normal rate).

Even though there exist positions according to which public spending, public investment in particular, can have a positive impact on growth,²⁴ this literature

²³We are assuming that the central bank is able to affect the interest rate on the public debt, which presumably is a medium/long-term rate.

²⁴Barro himself has devoted attention to the relation between public spending and growth (Barro, 1990; Barro and Sala-i-Martin, 1990). Devarajan et al. (1996), in a seminal contribution, establish a direct relationship between productive components of public expenditure and growth. For a more extensive survey of this literature, see Bhatt and Sardonì (2016).

does not seem to have a significant impact on the way in which the analysis of public deficits and debt is carried out.

This section tries to integrate the acknowledgment that public spending can have a positive impact on growth and the analysis of the public debt sustainability carried out by recourse to the dynamic budget constraint. More precisely, we look at the possible impact of public spending on the economy's normal rate of growth and, hence, at the dynamics of the public debt ratio.

To do so, public outlays are divided into productive and unproductive expenditures, a distinction that was first introduced by Domar in dealing with public expenditure, growth and the public debt.²⁵ The main objective of Domar's pioneering article on the 'burden' of the public debt (Domar, 1944) was to contrast the opinion that deficit spending leads to an ever-growing public debt. The possibility to stabilize or reduce the public debt ratio lies in the ability to make income grow rather than try to reduce the debt through restrictive fiscal policies without taking account of their negative effect on income and its growth (Domar, 1944, pp. 815-6).²⁶

In this respect, Domar emphasized the importance of productive expenditures which, although not entirely, can be identified with public investment. Productive public expenditures are those which have a positive direct impact on the economy's rate of growth.²⁷ The government can contribute to increasing the economy's growth rate by converting part of the private income that it absorbs through taxation into 'productive expenditures'.

Following Domar and recalling that we are concerned with the normal rate of growth, productive and unproductive public expenditures are here defined as follows.

Productive public expenditures are all those expenditures that affect the economy's long-run equilibrium growth rate (the normal rate of growth) through their effects on the economy's productivity.²⁸

²⁵Analyses of the impact of public spending on growth and public debt have already been carried out by Sardoni and Palazzi (2000); Sardoni (2011); Hakhu Bhatt and Sardoni (2020), but without an explicit consideration of the normal rate of growth.

²⁶For a more detailed exposition of Domar's approach to public spending, growth and public debt, see Hakhu Bhatt and Sardoni (2020) and also Pasinetti (1997).

²⁷Domar is careful to point out that the distinction between investment and current expenditure may be misleading: 'As a matter of fact, the term "investment expenditures" may be misleading, because it is too closely associated with steel and concrete. If healthier people are more productive, expenditures on public health satisfy these requirements. The same holds true for expenditures on education, research, flood control, resource development and so on' (Domar, 1944, p. 820).

²⁸If the economy were growing at a rate below the normal, the government could raise the rate of growth also by raising its investment, while productivity remains constant. See Hakhu Bhatt and Sardoni (2020).

Unproductive public expenditures are all the other government expenditures.

4.2 A simple model of debt stabilization

Let us consider a close economy that, at a certain time t , has the following characteristics.

1. The economy is growing at its normal rate $g_N = n + a$ (n is the rate of growth of the working force and a is the rate of growth of productivity).
2. Consequently both the ratios of taxes and public expenditure to GDP (τ and γ respectively) are constant and at their ‘normal level’.
3. The real interest rate r on the public debt, which is also given and constant, is higher than the growth rate g_N . The economy, therefore, is experiencing a growing ratio of the public debt to the GDP.
4. The possibility of debt monetization is assumed away.
5. Total public expenditure is divided into unproductive and productive, with the latter affecting the rate of growth through its positive impact on overall productivity.

If the possibility to affect the normal growth rate through public spending is admitted, the stabilization of the debt ratio can be achieved even though the government keeps on running a primary deficit. The stabilization of the debt ratio can be obtained through changes in the composition of the public expenditure, while the ratio of total public spending to GDP (and the ratio of taxes to GDP) remains unvaried.

A change of composition of the public expenditure in favor of productive expenditures makes the stabilization of debt ratio possible because it makes the economy’s normal growth rate rise to a level higher than the interest rate. The economy can thus move from a growth path characterized by a debt ratio increasing over time to a higher equilibrium growth path characterized by a stable debt ratio. In other words, it can exit from the ‘debt trap’.

Let us write the ratio of public spending to GDP as

$$\gamma = \gamma_1 + \gamma_2$$

where γ_1 denotes the ratio of unproductive public spending to GDP and γ_2 denotes the ratio of productive public spending to GDP. Let us also assume that unproductive public expenditures cannot be reduced to zero.²⁹

²⁹The general role played by the state in a modern society implies that it must make also expenditures that do not have measurable economic effects in terms of productivity.

The normal rate of growth is assumed to be an increasing function of the γ_2 :

$$g_N(\gamma_2) = h\gamma_2^{1/2} \text{ with } h > 0 \quad (23)$$

g_N increases with the ratio of the productive public spending to the GDP, γ_2 , but less than proportionally.

Recalling (17) and (18), we know that government primary deficits can be associated with a stable ratio of the public debt to GDP if the rate of growth is higher than the rate of interest. Under the assumption that the normal rate of growth is increasing in productive public spending, it is possible to find a value of γ_2 such that $g_N(\gamma_2) > r$. However, the possible increase of γ_2 is subject to two constraints: i) the total primary deficit γ must remain constant; ii) γ_1 must remain positive.

For simplicity sake, we limit our analysis to the determination of a new normal rate of growth, deriving from an increase in γ_2 , that allows the public debt ratio at t to remain constant with respect to the previous period ($t - 1$); that is to say it must be

$$\begin{aligned} 0 = \dot{b} = b_t - b_{t-1} &= [(\gamma_1 + \gamma_2) - \tau] + (r - h\gamma_2^{1/2}) \\ \text{s. t. } \gamma_1 + \gamma_2 &= \gamma > \tau \\ \text{and } 0 < \gamma_1 < \gamma \end{aligned} \quad (24)$$

The solution for (24) above is

$$\begin{aligned} \bar{\gamma}_2 &= \frac{(\gamma + br - \tau)^2}{(bh)^2} \\ \bar{\gamma}_1 &= \gamma - \frac{(\gamma + br - \tau)^2}{(bh)^2} \end{aligned} \quad (25)$$

$\bar{\gamma}_2$ is increasing in the total public deficit and decreasing in b , the initial debt ratio.³⁰ This solution exists only for

$$r < h\gamma^{1/2} + \frac{\tau - \gamma}{b} \quad (26)$$

The ratio of productive expenditures to GDP cannot increase indefinitely as it must be $\gamma_2 < \gamma$. This means that also the growth rate is constrained and cannot increase indefinitely. Therefore, we can obtain a growth rate higher than the interest rate only if this is sufficiently low.³¹

³⁰In fact, the larger is b , the larger is the impact on \dot{b} of being $r < g$.

³¹(26) above shows that the binding value of r is increasing in h , which expresses the sensitivity of the growth rate to productive public expenditures.

If (26) is fulfilled,³² the economy's debt ratio converges to

$$\bar{b} = \frac{(\bar{\gamma}_1 + \bar{\gamma}_2 - \tau)}{(g_N(\bar{\gamma}_2) - r)} \quad (27)$$

The analysis and the results above hinge on the assumption that the state can play a positive economic role by contributing to growth; an idea that is different from the view underlying the RE and its policy implications. The idea that the state can play a positive economic role thanks to a more efficient (productive) spending does not imply, however, that the public expenditures' share of GDP should expand. In fact, the above analysis of the public debt ratio has been carried out under the constraint that the ratio of public spending to GDP remains constant.

There are, moreover, reasons to argue that a more productive public spending can be an incentive to private investment, so that the gap $S - I$ declines and, consequently, the required deficit $G - T$ declines as well, with obvious positive effects on the 'normal' public debt ratio.

Also this consideration is inspired by Domar's work. In the 1940s, Domar (1946, 1947) argued that the very announcement of an expansionary fiscal policy, if trusted by firms, can induce an increase in private investment without implying an increasing government deficit.³³ Domar's idea can be translated in terms of our present analytical context by arguing that the government's engagement to raise the rate of growth through productivity increases can induce private firms to invest more and, hence, make it possible to reduce the equilibrium ratios of the public deficit and debt to GDP.

5 Conclusion

The public debt and its dynamics over time are serious and relevant problems. It is more so in the aftermath of historical phases, like the current one, in which most economies have experienced significant increases of their public debt ratios that can hardly be regarded as sustainable for a long period of time. The need for viable policies to ensure the reduction, or at least the stabilization, of the ratio of the public debt to GDP is evident.

Past attempts, inspired by the RE, to tackle the problem of high and growing public debt ratios through fiscal consolidation, like in Europe in 2011-12, have

³²This essentially amounts to assume that r is not excessively high and the economy's growth rate is sufficiently responsive to increases in public productive expenditures.

³³'... a mere guarantee of a rise in income (if taken seriously by investors) will actually generate enough investment without necessarily resorting to a government deficit' (Domar, 1946, p. 146). For a thorough analysis of Domar's ideas about the role of expectations in policy making, see Boianovsky (2020).

proved to be largely ineffective and costly from a social and political point of view. This paper suggests a possible approach to the problem of the public debt which is different from those based on the acceptance of the RE.

The RE—explicitly, implicitly, or ambiguously—is at the heart of the standard macroeconomic analysis of the public debt and its dynamics; but the RE can hardly be regarded as a satisfactory and solid foundation for such a task. First, the RE acceptance of the idea of the total ineffectiveness of public budgets on the economy is based on a view of the economic role of the state according to which the government is a merely parasitic agent. It drains resources from the private sector and use them with no positive effect on the economy as a whole.

Second, while the idea that all debts must be repaid at a certain future date and that no agent can keep on borrowing indefinitely is valid at the micro-economic individual level, it cannot be mechanically transferred to the aggregate level. The micro and macro levels can be regarded as analogous only under specific and highly restrictive conditions concerning the maturity of the aggregate public debt and by ignoring the rationale of national accounting.

On the grounds of these criticisms of the RE, the paper puts forward a different approach to the solution of the problem of the public debt ratio stabilization. Such approach is based on the rejection of the view of the state as a mere ‘parasite’ and the acknowledgment that it can have a positive economic impact on the economy and its performance over time, namely on the economy’s overall productivity. The historical experience of many market economies shows that the state plays a role far from parasitic in their processes of growth.

Coherently with the idea that the government can play a productive role through its borrowing and spending, the problem to solve is set not in terms of the extinction of the public debt at a certain date in the future, like the logic of the RE would require, but in terms of how the public debt ratio can be stabilized, or reduced, at a viable level thanks to the choice of an adequate composition of public spending that allows the economy to grow at an equilibrium rate higher than the rate of interest.

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