Does Stability and Growth Pact Provide an Adequate and Consistent Fiscal Rule?

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ABSTRACT

This paper examines the adequacy and the consistency of the fiscal rule set by the Treaty of Maastricht and the Stability and Growth Pact. First, it shows that the functional fiscal rule is adequate in ensuring the final goal of public debt sustainability. Second, it points out that the draw of an arbitrary numerical value is indifferent to reach the final goal even if produces different intergenerational distribution of public debt burden. Finally, it shows that the updated numerical fiscal rule of Stability and Growth Pact removes the inconsistency of the previous numerical fiscal rule – arising for a given set of value of GDP – embodied in the Treaty of Maastricht but at the same time it implies that in the long period public debt has to be retired entirely and consequently imposes a heavy burden on generations living at the time of fiscal adjustment.

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1. Introduction

The first significant slowdown in the economic activity during the 2001-2003 period, and the consequent budget balance difficulties arisen in the EU area after the launch in 1997, have put the *Fiscal Policy Framework* of the European Union (FPF-EU) – which crops up by the Treaty of Maastricht (TM) and the Stability and Growth Pact (SGP) joined together – through the hoops and have revived the economic and political debate on its strengths and weaknesses.

In close succession the European Commission recommended the European Council to initiate the excessive deficit procedure for several countries: for Portugal (on 5 November 2002), for Germany (on 21 January 2003) and finally for France (on 3 June). On the one hand with respect to Portugal, the excessive deficit procedure was terminated by the Commission on 7 April 2004 in front of the Portuguese effective budgetary consolidation measures. On the other hand in the early November 2003 the Commission recommended the Council to impose financial sanctions on Germany and France whose deficits result above the 3 per cent limit for the third consecutive years. Notwithstanding the Commission advice the ECOFIN on 25 November 2003 took a decision in favour France and Germany which both was breaking their targets and therefore did not implement the Commission recommendation. Actually the ECOFIN simply recommended to Germany and France to correct their deficits outside the framework of the SGP so as to drastically and substantially undermine the credibility of the entire FPF-EU.

The FPF-EU has taken form by the spread of a long two-phases process. In 1992 the TM has prescribed the *entry requirements* for EU membership: the Treaty qualified European country for EU membership as long as it had satisfied four criteria and, among them, it had ensured the sustainability of its finance position. Actually the TM does not expressly define the meaning of sustainability but simply required the country by 1997 to meet two numerical fiscal reference values. The first one represented the numerical fiscal rule regulating the government's interventions: the total public budget balance GDP ratio has not to exceed the reference value of -3%. The second one was the numerical final goal: the public debt GDP ratio had not to exceed the reference

value of 60%.

In 1997 the SGP refined upon the architecture of the FPF-EU laying down the *consolidation requirements* for EU member to retain a solid and lasting balanced budgetary positions and, therefore, to keep public debt sustainable. According to the further requirements, EU countries have to achieve in the medium-term *structural* budgets that are close to balance or in surplus. Furthermore the SGP allows the *actual* public budget balance to overrun the reference value of 0% on the left hand side up to the safeguard limit of 3% behind which, unless there happens an annual decline in real output of more than 2%, public budget balances become excessive and therefore the country is subject to financial penalties and public approbation. Indeed SGP marked a significant tightening of requirements for ensuring public debt sustainability because of the shift of the reference value from -3% to 0% towards which countries have to converge.

In conclusion, the FPF-EU is defined by three basic elements: i) a *numerical fiscal rule* which imposes countries to converge in the mid-term towards a structural public budget balance equal to 0%; ii) an element of flexibility in the management of fiscal policy represented by the safeguard ceiling of -3% that marks off inferiorly the *fluctuation interval* within which the actual total budget balance is constricted and, finally, iii) the fixing of a *final goal,* defined by an interval, according to which the public debt should converge or not exceed the limit of 60%.

The aim of this paper consists firstly in coming out the theoretical support of two basic features of the fiscal rules embodied in the FPF-EU *i.e.,* its adequacy and consistency with respect to the final goal represented by the sustainability of public debt and, subsequently, in highlighting the social costs deriving from their application. In section 2 we briefly sketch the survey of recent literature on three aspects of the FPF-EU: its rationale, the scope of fiscal policy, and finally the fiscal rules embodied in the SGP. In section 3, after reminding the standard definition of public debt sustainability we contrast three alternative variables for defining fiscal rules: public debt, primary budget balance and total budget balance. By contrasting the three alternatives we conclude that the functional fiscal rule based on a constant total budget balance is more

adequate than others choices. Of course, the draw of the numerical value from the functional fiscal rule inevitably is an arbitrary operation. In section 4 we examine the social cost of choosing one value rather an other one where the social cost is measured in term of public debt burden borne by generations. Actually if on the one hand the numerical fiscal rule which is drawn from the functional fiscal rule is indifferent with respect to the public debt sustainability on the other hand it produces different effects with respect to the intergenerational redistribution of public debt burden. Finally in section 5 we examines the issue of the consistency of the numerical fiscal rule of FPF-EU on the total budget balance with the numerical final goal on the public debt.

2. The survey on recent SGP research

In this section we report the recent research relatively to three aspects of the FPF-EU: the underlying rationale, the specific scope of fiscal policy and finally the meaning and the role of the fiscal rule established by the FPF-EU[1].

2.1. The rationale

With respect to the constitutive *rationale* behind the FPF-EU there is a broad agreement that the latter has been reckoned to be a system of political and economic effective regulations for disciplining public budget balance and, therefore, achieving the *final goal* of preventing public debt unsustainability. Indeed the avoidance of the excessive accumulation of public debt is corroborated by both the historical experience in Europe during the seventies and the eighties, and recent and remote theoretical findings. On the one hand the high and increasing public deficits pursued by some shortsighted and opportunist European government from the early 70's up to the early 90's, set public debt going over the psychological 100% mark. On the other hand the fiscal theory of the price level (Woodford, 1994, 1995) – that lays down its roots in the seminal work of Sargent and Wallace (1981) – reaffirms that the current and

[1] For an extensive discussion on the rationale, the *modus operandi* and the procedural aspects of the SGP see Brunila, Buti and Franco (2001), Artis (2003), Buti, Eijffinger and Franco (2003), Giudice and Montanino (2003).

intertemporal public budget constraints produce an indissoluble interdependence between fiscal and monetary policies which, in the long-run, could produce unpleasant repercussions on price stability. A fiscal loosening generating a divergent dynamic of public debt could entail, soon or later, the monetization of public debt and, consequently, the loss of control of money aggregate and the abandonment of the price stability by Central Bank. Indeed if public debt unsustainability had occurred, it have had undermined the underpinnings of independence of European Central Bank (ECB) in preserving price stability.

2.2. The role of fiscal policy

With respect to the *role for fiscal policy,* springing from the FPF-EU, recent research has pointed out the new tasks, compared with the old ones, of the fiscal policies.

Firstly, the FPF-EU rebalances and reassigns the duties between discretionary fiscal policy and automatic stabilizers. Indeed the FPF-EU implies a sharp share-out of tasks between them. The realization of the mid term target of balance or surplus of structural budget should be dominated by the former, while the cyclical stabilization is entrusted exclusively with the working of the latter[2]. The capacity of automatic stabilizer for smoothing out business cycle depends crucially on the nature of the shock hitting the economy. Brunila, Buti and in't Veld (2002, 2003) show that with respect of demand shocks, automatic stabilizers reacts with different strength according to the fact the economy is stricken by a shock to consumption or, differently, by shocks to investment and export: the automatic stabilizer are more powerful in the former circumstances than in the latter ones. Contrariwise, in presence of supply side shocks, automatic stabilizers show their weaknesses since they are ineffective in cushioning the adverse shock.

The capacity of automatic stabilizers to restrain budget balance from overcome the safeguard limit of -3% depends on both the measure of the derivative of total

[2] Recently an increasing research has tackled the issue of mainfold causes for restricting the role of discretional fiscal policy for stabilization purposes: i) inefficient budgetary decision-making process (long decision lags, reining political nature of fiscal decisions; shortsighted governments); ii) destabilizing effects on economic activity since discretionary fiscal policy increase in GDP volatiltiy; discretionary fiscal policy lives up to other goals apart stabilization i.e., income distribution and resource allocation (Fatas and Mihov, 2003°, 2003b; Kopits, 2001; Taylor, 2000).

budget balance with respect to GDP – which in average in EU is equal to 0,5 (European Commission, 2002) – and the starting point of budget balance. Actually assuming that the potential GDP growth rate is equal to 3% and that a structural budget balance equal to 0% corresponds to it, whether the actual GDP growth rate was equal to -2% it follows that the total budget balance should be equal to -2% *i.e.,* greater than the safeguard value of -3%.

Artis and Buti (2000) try to sketch a policy guideline in order to quantify the correct dimension of the structural budget balance in order to automatic stabilizers work fully without infringing the ceiling of -3% and conclude that the FPF-EU target is "roughly right" with respect to their role of stabilization. Leeftink (2000) maintains a more favourable attitude towards the reallocation of goals between discretionary fiscal policy and automatic stabilizers. He shows that in presence of uncertainty on fiscal sustainability the stringent fiscal rules required by FPF-EU generates a synergy between discretionary fiscal policy and automatic stabilizers: the former removing the risk of public debt unsustainability allows the latter to exert its full strenght in stabilizing output.

Secondly, the FPF-EU revises the well-established and extensively shared procedure for financing the capital account of public budget deficits by public bonds. Actually the mid-term provision of close to balance or in surplus implies that the capital expenditures has to be financed by an equivalent decrease in primary budget balance. Nevertheless especially in front of a slowdown of economic activity which makes more stringent the need of complying with the FPF-EU requirement on public budget balance, governments could be discouraged from carrying out public investments which necessarily will be next generations benefit (de Haan, Sturm and Sikken, 1996; Balassonone and Franco, 2000).

Thirdly, the FPF-EU within the class of discretionary fiscal policy puts strong emphasis on structural reform in order to achieve the medium-run target of (structural) balanced budget whereas it cautions governments about extemporary measures such as creative accounting and extraordinary actions. Nevertheless, even in this case, the more close the budget balances are to the limit of -3% the more difficult is for government to

undertake structural reforms – such as pension reform – which could produce a significant worsening of fiscal position in the short-run and, contrariwise, it could deferred the budget balance improvements to the medium and long-term (Razin and Sadka, 2003).

2.3. The fiscal rule

With respect to the *fiscal rules* established by FPF-EU doubts and scepticism have risen to the extent of inducing some scholars to drastic conclusions and harshing label such as minor nuisance (Eichengreen and Wyplosz, 1998), an albatross (Canzoneri and Diba, 1999) or – relatively to the ceiling of 3% on public deficit/GDP ratio – a myth and, more brutally, a folly (Pasinetti, 1998). The debate on this issue stretches for different routes.

First, some authors draw up a list of general desirable criteria which concur to pick out an ideal fiscal rule and, at the same time, can be used as a benchmark for evaluating the fiscal rules of FPF-EU. Kopits and Symansky (1998) have singled out an accurate selection of basic and ideal features of fiscal rules: well-defined, transparent, simple, flexible, adequate relative to final goal, enforceable and consistent. By comparison of fiscal rules of FPF-EU to the above set of criteria, Buti, Eijffinger and Franco (2003) reach the conclusion that the former perform, on the whole, quite well.

A second field of research goes in for finding out alternative fiscal rules which could replace or implement the FPF-EU ones. Buiter (2003) summarizes and contrasts the EU fiscal rules with the most significant alternative fiscal rules that have been proposed in the literature and/or that actually are applied in some countries: namely the "*Permanent Balance Rule*" – proposed by Buiter and Grafe (2003) – that basically is a tax-smoothing rule where taxes are a constant share of GDP and the "*Golden Rule*" that allows governments to borrow only to accumulate public capital and not to finance current public expenditures. Indeed Buiter (2003), after having written down the "ten commandments" for fiscal rules – following closely Kopits and Symansky's (1998) footsteps –, concludes that the Golden Rule and the Permanent Balance Rule are more satisfactory than the FPF-EU fiscal rule since the former keep a large numbers of

commandments with respect to the latter. Thirdly, another area of enquiry has investigated whether the fiscal rules of FPF-EU are adequate in fulfilling its constitutive objective *i.e.,* public debt sustainability. In other words, it has wondered about what intermediate fiscal variable – among those under government's control *i.e.,* public debt, primary budget balance or total budget balance – is more suitable for ensuring the attainment of the final goal.

Pasinetti (1998, 2000) affirms that the definition of public debt unsustainability has to be shaped on the public debt dynamic. By maintaining that debt sustainability requires public debt to reduce or to remain constant he reaches a quite paradoxical result *i.e.,* during the nineties while Italy and Belgium have achieved a sustainable fiscal position other countries such as Germany and France have shown a unsustainable one.

Canzoneri, Cumby and Diba (2001a, 2001b, 2002) after stressing the difficulty in identifying theoretically an adequate and, at the same time, simple fiscal discipline that ensures public debt sustainability (in their language the presence of a Ricardian regime), nevertheless, are able to obtain from the intertemporal budget constraint a general criterium for evaluating fiscal rules. Indeed they first deduce a government's reaction function based on the adjustment of primary budget balance to public debt change that ensures intertemporal budget constraint to be satisfied. Then they show that as long as the coefficient measuring the degree of reaction of primary budget balance to public debt is positive infinitely often than the fiscal policy guarantees public debt sustainability. Finally they conclude that the numerical fiscal rule imposed by FPF-EU indeed satisfies their criterium so that it turns out to be a sufficient condition for sustainability of fiscal position.

Fiorito (2002) suggests an alternative fiscal rule that should give a higher flexibility to the SGP and, furthermore, should integrate the goal on public debt. According to Fiorito's proposal the maximum reference value of public budget balance for a given country should be obtained inversely to the level of public debt: the lower the public debt is, the higher the reference value should be.

Kopitz (2001) keeps an intermediate position between Pasinetti and Canzoneri *et al.*. Starting from a strong definition of public debt sustainability grounded on a

reduction of public debt to a predetermined level, Kopitz determines the level of primary budget balance that in each period allows to guarantee the fulfil of the final goal.

In conclusion, in the literature there is no a broad agreement on effectiveness and adequacy of the fiscal rule but, instead, a negative attitude. Even the more favourable conclusion of Canzoneri *et.al.* – which prove that the reference value of 3% is sufficient condition for public debt sustainability – leaves the open question if there exist other simple and adequate fiscal rules that could fulfil the same final goal without generating negative effects. On the other hand the alternative fiscal rules that are proposed are not persuasive – such us that relying on the dynamic of public debt proposed from several scholars – not easy to apply and therefore to verify – such us the Permanent Balance Rule – or not fundamentally alternative to those of FPF-EU such as the Golden Rule.

3. Adequate Fiscal Rule for Public Debt Sustainability

In this section we first trace a simple theoretical framework for examining the adequacy of the numerical fiscal rule defined by the FPF-EU and, accordingly, we develop a simple diagrammatical instrument to carry out our analysis. Of course, the adequacy of a policy rule has to be assessed with respect to the realization of the final goal that commands the adoption of the policy rule itself. Therefore, the first step in working out the analytical framework consists in finding a definition which approximate more closely the definition of sustainability of public finance position since FPF-EU has not really provide one. We can safely presume that sustainability of public finance position means simply public debt sustainability.

3.1 The Definition of Public Debt Sustainability

In the literature the definition of public debt sustainability is actually a well-established topic (Blanchard e Fischer, 1989; Blanchard, Chouraqui, Hagemann e Sartor, 1990; Hamilton e Flavin 1986).

Let us first consider the current or flow government public budget constraint at time t:

$$s_t^g = s_t^p - \left(\frac{i}{1+\gamma}\right) d_{t-1} = -(d_t - d_{t-1}) - \left(\frac{\gamma}{1+\gamma}\right) d_{t-1} \qquad (1)$$

where s_t^g is the total budget balance/GDP ratio equal to the primary budget balance (defined as difference between revenues and expenditures), s_t^p, minus the interest payments, $(i/(1+\gamma))d_{t-1}$, d_t is the public debt/GDP ratio, γ is the nominal rate of growth of GDP and finally i is the nominal rate of interest[3]. Equation (1) says that the total budget balance has to be financed by a change in the stock of public bonds and/or by *growth dividend* on public debt.

Note that for simplifying the analysis we make three hypotheses. Firstly, government and Central Bank are consolidated so that we do not consider explicitly the money financing and therefore we do not discuss as public debt unsustainability reflect in the long-run on the level of price. Secondly, we do not break down the primary budget balance between the capital budget balance and the current budget balance. Thirdly, the primary budget balance is not decomposed in the two functional components *i.e.,* the discretionary fiscal policy and the automatic stabilizer. Actually by removing the above assumptions, one would obtain a more general version of the current government budget balance, expressly:

$$s_t^k + \left[s_0^c + \alpha(\gamma_t - \gamma^*)\right] - \frac{i}{1+\gamma} d_{t-1} = -(d_t - d_{t-1}) - \frac{\gamma}{1+\gamma} d_{t-1} + \frac{\theta m_{t-1}}{1+\gamma} \qquad (2)$$

where s_t^k is the capital budget balance; the current budget balance, s_t^c, is broken down in the discretionary fiscal policy component, s_0^c, and the automatic fiscal stabilizer that depends, according to a given reaction coefficient α on the gap between the actual and the potential GDP growth rate, γ^*; θ is the growth rate of the stock of money determined by the Central Bank exogenously and m_{t-1} is the stock of money.

3 From now on, the variables s_t^g, s_t^p and d_t have to be considered as ratios to GDP growth rate even if, to make exposition lighter, we do not specify that.

Hence by assuming the above assumptions (1) can be rewritten as

$$s_t^p = \left(\frac{1+i}{1+\gamma}\right) d_{t-1} - d_t \qquad (3)$$

The intertemporal budget constraint in the interval $(0,N)$ can be derived from (3) – calculated at time $t = N$ – by backward substitution:

$$d_N = \left(\frac{1+i}{1+\gamma}\right)^N d_0 - \sum_{j=1}^{N} \left(\frac{1+i}{1+\gamma}\right)^{N-j} s_j^p \qquad (4)$$

Assuming that $i > \gamma$, so that the intertemporal budget constraint is binding, from (4) it follows

Definition 1. *The public debt is sustainable if the public debt grows for* $N \to \infty$ *at a ratio less than that of the discount factor i.e., as long as*

$$\lim_{N \to +\infty} \frac{d_N}{\left(\frac{1+i}{1+\gamma}\right)^N} = 0 \qquad \text{or} \qquad d_0 = \sum_{j=1}^{+\infty} \left(\frac{1+\gamma}{1+i}\right)^j s_j^p \qquad (5)$$

Hence the public debt sustainability requires that the present value of d_N has to be equal to zero for $N \to \infty$ or, equally, that the stock of public debt at time $t = 0$ has to be equal to the sum of the discounted primary budget balance.

3.2 Fiscal Rule Built on Public Debt Dynamic

Given the high abstractness of definition and its scarce immediate applicability one could wish to look for a simple fiscal rule which, in addition to satisfy (5), owns the property to be clear and immediate. Of course, there are not many fiscal variables standing for fitting this purpose: public debt, total budget balance and primary budget balance.

First, let us verify whether by observing the dynamic of public debt or by computing its limit it is possible to find out the proper and adequate solution of the above issue[4]. Definition 1 implies that public debt is sustainable as long as one of the

4 Pasinetti (1998, 2000) and Harck (2000) discuss the issue of the significance of reference values of the Treaty of Maastricht assuming as a starting point a narrow definition of public debt sustainability i.e., public debt

following conditions occurs: i) public debt diverges to infinity at a growth rate less than that of the discount rate; ii) public debt converges to a finite value.

The convergence of public debt to a finite value is compatible with the existence of a finite limit less or greater than the initial stock of public debt: in other words the convergence is compatible both with an increase and with a decrease in the public debt. From the two general cases which single out sustainable growth patterns of public debt it follows

Corollary 1. *If* $\Delta b \lessgtr 0$ *then public debt can be sustainable or unsustainable.*

Corollary 2. *If* $\Delta b = 0$ *then public debt is sustainable.*

Corollary 1 asserts that public debt sustainability can be supported by a public debt diverging to $+\infty$. This claim although points out an interesting theoretical outcome – since it is not a result so evident – on a normative ground it could proved to be quite dangerous and costly. Indeed it could expose policy makers to temptation in running permanent and increasing public deficits and, consequently, it could feed policy makers' hopes that public sector have *free lunch* at its disposal. On the other hand, it points out that, on a theoretical ground, the decrease in public debt is neither necessary nor sufficient condition for sustainability: indeed as long as the public debt decreases at a growth rate greater than that of the discount factor, in absolute value, the condition (5) is never satisfied. Corollary 2 shows that a constant public debt is a sufficient condition for public debt sustainability although it is not necessary since according to Corollary 1 the public debt theoretically speaking could run to infinity.

Altogether Corollaries 1-2 show that the attempt to identify powerful necessary and sufficient conditions for the sustainability of fiscal position in terms of public debt dynamic is unsuccessful. Specifically, in presence of an increase in public debt they are not able to conclude whether the fiscal position is sustainable or unsustainable. Indeed they allow to isolate a sufficient condition seen as intrinsically weakly discriminating: as long as the public debt is constant or the limit value of public debt is finite, than the financial fiscal position is certainly sustainable.

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has to reduce or remain constant, and, consequently, they identify a narrow class of fiscal policies that support public debt sustainability.

3.3 Fiscal Rule Built on Constant Total Budget Balance

An other opportunity in finding simple indicators for the sustainability of fiscal position is given by examining the specific fiscal discipline chosen by policy makers which lead to adoption of a *fiscal rule* in defining economic policy plans. The fiscal rule in this simple context necessarily involves the way how the two intermediate fiscal variables *i.e.,* total and primary budget balance, which are policy makers' disposal are ruled by them. The fiscal rules among the manifold features have to be *simple*, *adequacy* and *consistent*.

A first element that concur to make simple a fiscal rule is the temporal interval on which it has to apply for guaranteeing public debt sustainability that is it can be uniperiodal or pluriperiodal. Of course a fiscal rule which applies to at every period is better of one that requires the verifiability on an extended temporal interval and therefore it could involve complex computations as, for instance, the requirement (5) claims. Another element that contributes to simplicity regard with the functional nature of fiscal rule: in other words the fiscal rule can be a function or, on the other hand, can be represented simply by a number that it must be satisfied each period as the fiscal rule of FPF-EU does.

Proposition 1. *A constant total budget balance is a sufficient condition for public debt sustainability.*

Let us suppose that the Government chooses a fiscal rule which maintains the total budget balance constant at the level s_0^g for every t that is:

$$s_t^g = s_t^p - \left(\frac{i}{1+\gamma}\right) d_{t-1} = s_0^g \tag{6}$$

Given the fiscal rule (6), the current budget constraint (3) can be rewritten in the following way:

$$d_t = \left(\frac{1}{1+\gamma}\right) d_{t-1} - s_0^g \tag{7}$$

From (7), it follows straightforward that condition (5) – ensuring public debt

sustainability – is satisfied[5]. Indeed the fiscal rule based on a constant total budget balance implies an adjustment of primary budget balance in each period according to the following *primary budget balance adjustment function*[6]

$$s_t^p = s_0^g + \left(\frac{i}{1+\gamma}\right) d_{t-1} \tag{8}$$

Therefore according to Woodford's (1995) terminology the fiscal rule based on a constant total budget balance defines a *non-Ricardian* regime or, equivalently, in Canzoneri *et. al.*'s (2001a, 2001b) terminology a *fiscal dominant* regime: primary budget balance are adjusted continuously in order to sustain the fiscal rule and, consequently, the public debt sustainability.

Let us now consider the long-run implications of the above fiscal rule in terms of public debt and primary budget balance. From the general solution of the finite differential equation (7) one obtains the limit values of public debt:

$$d = -\left(\frac{1+\gamma}{\gamma}\right) s_0^g = d_0 \tag{9}$$

and primary balance budget:

$$s^p = \left(\frac{i-\gamma}{1+\gamma}\right) d_0 = -\left(\frac{i-\gamma}{\gamma}\right) s_0^g = s_0^p \tag{10}$$

Equations (9) and (10) say that: i) the limits of public debt and primary budget balance rely exclusively on the exogenous variables *i.e.,* the constant level on which the total budget balanced is fixed and the GDP growth rate; ii) given the GDP growth rate, once one fixes the total budget balance on a constant value, therefore, the limits of public

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5 Under this fiscal rule it follows that $d_n\left(\frac{1+\gamma}{1+i}\right)^N = \left(\frac{1}{1+i}\right)^N + s_0^g\left(\frac{1+\gamma}{1+i}\right)^N \sum_{j=0}^{N-1}\left(\frac{1}{1+j}\right)^j$ from which it follows that for $N \to +\infty$ the condition (5) is satisfied.

6 Indeed in the discussion on the "old" fiscal theory of the price level stated by Sargent and Wallace (1981) the role of the fiscal rules satisfying the intertemporal budget constraint and therefore the public debt sustainability has been already examined by McCallum (1984).

debt and primary budget balance are necessarily obtained by (9) and (10) respectively; iii) from equation (10) it follows that the less GDP growth rate and greater interest rate are, the greater primary balance budget has to be in order to ensure the stabilization of public debt on the selected value.

Let us now put on the above analysis diagrammatically in FIG. 1. Equation (9) identifies the *TD* schedule given by all combinations of public debt and total budget balance allowing public debt to remain constant. The slope of *TD* is equal to $-\gamma/(1+\gamma)$, which is a measure of *growth dividend*: the rate of growth of GDP represents an implicit tax since it reduces, given the stock of public debt, the ratio of public debt. Equation (10) identifies the *PD* schedule given by all combinations of public debt and primary budget balance which make public debt constant. The slope of *PD* is equal to $(i-\gamma)/(1+\gamma)$ and represents the *interest payments on public debt net of growth dividend*. Finally the angle formed by the schedules *PD* and *TD* is equal to $i/(1+\gamma)$, so that in correspondence of a given level of public debt, the distance between the two schedules represents the *interest payments* on public debt.

[FIGURE 1]

Let us assume that at time $t=0$ the public debt is d_0^A, the total balance budget is s_0^g, and the primary balance budget is equal to $s_0^{p/A}$, so it cannot cover fully interest payments. Hence the public debt has to increase. Moreover let us assume that at $t=1$ policy makers decide to adopt a fiscal rule that fixes the total budget balance permanently at the level of period $t=0$. In the following periods, the increase in interest payment, consequent upon the increase in public debt, implies an increase in the primary budget balance along the schedule *SP*, which represents the primary budget balance adjustment function (8), in order to keep the total budget balance constant at the level fixed in advance. The public debt increases as far as the primary budget balance starting from point *B* reaches finally the point *E* and the public debt stabilizes at d_0. When public debt reaches the limit value, the sum of the growth dividend, equal to

the segment $\overline{Gd_0}$ plus the primary budget balance, equal to the segment $\overline{Ed_0}$, are fitted for covering exactly the interest payments, equal to the segment $\overline{EG}$.

On the other hand let us assume that at time $t=0$ the public debt is d_0^B while the primary balance budget is, $s_0^{p/B}$, and let us suppose that the government at $t=1$ forces itself to follow a fiscal rule requiring a constant total budget balance at the previous level, s_0^g. In these circumstances, the initial level of primary budget balance leads to a decrease in the public debt which, given the constant total budget balance, implies a decrease in interest payment which, in turn, produces in the following period a decrease in primary budget balance along the *SP* schedule in order the total budget balance to remain constant. Finally the public debt approaches at the limit d_0 where it stops to decrease since the primary budget balance offsets exactly the sum of the interest payments net of growth dividend. The two above examples imply

Corollary 3. *The public debt sustainability supported by a fiscal discipline resting on a constant total budget balance is consistent with both an increasing and decreasing public debt.*

Corollary 4. *A fiscal discipline resting on a constant total budget balance implies that there exist infinite combinations* (d, s^g) *which ensure public debt stationarity.*

Therefore Corollary 3 reminds that from observing the dynamic of public debt we cannot infer anything about the public debt sustainability. Corollary 4 says that all combinations (d, s^g) on the *TD* schedule guarantee the stationarity of public debt. Given the stationarity of total budget balance, whatever the starting point (d, s^g) is, the public debt converges necessarily to a finite value.

3.4 Fiscal Rule Built on Constant Primary Budget Balance

The third and last intermediate fiscal variable, that could be chosen as reference variable in determining the fiscal rule, is represented by the primary budget balance. As we have seen previously Canzoneri *et. al.* (1999, 2001a) have shown that it is possible to identify the basic requirement for obtaining a broad class of fiscal policies that support a

Ricardian regime: the coefficient which measures the reaction of primary budget balance has to be "positive infinitely often".

The intuition behind the finding is quite immediate: in order to avoid unsustainable public debt patterns governments have to retire public debt so as to avoid the occurrence of a divergent growth of public debt. Nevertheless as Canzoneri *et. al.* say "the response might be every other year, every decade, or every century". Of course, this, in turn, reveals the weakness of the proposed fiscal rule. Opportunistic governments could postpone the adjustment of primary budget balance in following period and maybe in the next century! Actually, the requirement for public debt sustainability found out by Canzoneri *et. al.* (1999, 2001a) seems to be a criterium for evaluating fiscal rules rather than a fiscal rule itself.

Let now check briefly if a fiscal rule based on a constant primary budget balance bring about public debt sustainability.

Proposition 2. *A constant primary budget balance is not a sufficient condition for public debt sustainability as long as it is fixed on a value* s_0^p *such that*

$$s^p \neq \left(\frac{i-g}{1+g}\right) d_0 \tag{11}$$

Actually Proposition 2 shows that there exists an unique value, among the infinite ones, on which the primary budget balance can be fixed for ensuring public debt sustainability *i.e.*, the value given by (10): the primary budget balanced is fixed exactly on that value that allows to finance the interest payment net of growth dividend. Hence with the exception of this value all the other values are not able to support the sustainability of public debt.

Using Woodford's (1995) terminology the fiscal rule based on a constant primary budget balance defines a *non-Ricardian* regime or, equivalently, in Canzoneri *et. al.*'s (2001a) terminology a *monetary dominant* regime: primary budget balance are not adjusted every period so that public debt is unsustainable and consequently soon or later Central Bank has to adjust the stock of money for guaranteeing the fiscal solvency.

4. The Social Burden for Supporting the Fiscal Rule

SEC. 3 has shown that a simple and adequacy functional fiscal rule for ensuring an immediate or gradual stabilization of public debt lays in fixing a constant total budget balance. The arithmetic of the budget balance constraint, nevertheless, on the one hand supplies a simple guidelines for conducting fiscal policy while, on the other hand, leaves a large degree of irresoluteness since it cannot provide a criterium for choosing the correct and fair value on which the fiscal rule has to be fixed. Indeed as we have seen there exist infinite values of total budget balance that satisfy the condition (5) and therefore are equivalent for ensuring public debt sustainability.

At the same time, SEC. 3 has pointed out that the stabilization of public debt implies necessarily a continuous adjustment of the primary budget balance along the convergence process. In turn, the size and the sign of the primary budget balance reveals the degree of public debt burden carried on by the current generations where the public debt burden has two components *i.e.,* taxes required for interest payments and taxes required for retiring the stock of public debt.

Firstly, in the presence of a primary budget deficit the current generations finance both interest payments and part of the current expenditures by public bonds and therefore both shift entirely the burden of public debt – in terms of interest payments – to next generations and furthermore make the burden even heavier since the public debt has increased further. Secondly, when there is a surplus of the primary budget two circumstances can happen. On the one hand, if the primary budget balance is positive – but less than the interest payments – the public debt has necessarily to increase. Therefore the actual public debt burden falls partially on the current generations and partially is shifted forward to the next generations. On the other hand if the primary budget surplus is greater than the interest payments it means that public debt is reducing and therefore the current generations sustains a public debt burden constituted by two elements: the interest payments and the retirement of the stock of public debt. The effort of the present generation is of benefit of future generations. Indeed the next generations because of the reduction of public debt will carry a smaller burden than the previous ones. Thirdly, if the primary budget surplus is exactly equal to

interest payments than the public debt remains constant and the burden of public debt remain constant and equal intergenerationally.

In order to clarify the relation between the fiscal rule and public debt burden consequent to its adoption, let us consider two countries that lie on different point of the *TD* schedule in FIG. 2. For instance let be country A in point $A = (d_A^*, s_A^g)$, while let be country B in point $C = (d_B^*, s_B^g)$ – where $d_A^* < d_B^*$ – and let us assume that in the two countries the GDP growth rates and interest rates are equal and, furthermore, that the total budget balance is kept constant on different values, $s_A^g > s_B^g$. Now let us suppose that the two countries are requested to converge to an identical value, for instance, d_0^*, where by assumption $d_A^* < d_0^* < d_B^*$ so that they have to adopt the same numerical fiscal rule so as to keep constant the total budget balance at s_0^g from then on where $s_A^g < s_0^g < s_B^g$. Therefore, the country A – bears a public debt burden – equal to the segment Md_A^* – less than that of country B – equal to the segment Sd_B^* – since its public debt is less than that of country *B*.

[Figure 2]

Let us see how the burden for supporting the fiscal rule changes along the convergence process of public debt to d_0^*. On the one hand, since $d_A^* < d_0^*$ and $s_A^g > s_0^g$ the country A in the first period achieves a decrease in the primary budget balance and, consequently, in public debt burden. In FIG. 2 this results in shifting primary budget balance from point *M* to *N*, and, accordingly, in shifting the total budget balance from point *A* to *B*. Subsequently, because of the decrease in total budget balance, public debt increases. This, in turn, implies that in the following periods the primary budget balance has to increase in order to ensure the financing of the interest payments since the total budget balance has to be kept constant permanently. In these circumstances the public debt burden, afterwards a temporary initial decrease, starts to increase steadily: when public debt reaches the limit $d_A^* = d_0^*$, the public debt burden is greater than the initial one.

On the other hand, since $d_B^* > d_0^*$ and $s_B^g > s_0^*$, the country *B* has to produce in the first period an increase in the primary budget balance and consequently in the public debt burden. Graphically this means that firstly the primary budget balance increases passing from point *S* to point *R* so as to satisfy the constraint imposed on the total budget balance that shifts from point *C* to point *D*. Secondly, the decrease in total budget balance entails the reduction of public debt and, consequently, the reduction of interest payment. This in turn produces the decrease of primary budget balance along the schedule *SP* from point *R* to the limit value *E*. Finally when the limit value of public debt is reached, the public debt burden results less than that of the initial period.

By comparing the two convergence processes of public debt of two countries it follows that the fiscal adjustment requiring an identical limit value of public debt in country *A* implies an increase in public debt and, consequently, an increase in the public debt burden while in country *B* it produces a decrease in public debt and consequently in the public debt burden. Nevertheless during the entire period of adjustment towards the new public debt limit the public debt burden in country *A* is always less than that of country *B*.

In conclusion, the adoption of a fiscal rule based on a constant total budget balance and the consequent fiscal adjustment imply necessarily an intergenerational redistribution of the burden of public debt. The direction and the size of the redistribution crucially depend on two basic elements: the specific value on which the total budget balance is fixed and the gap between the actual public debt and the limit public debt coherent with the prefixed numerical fiscal rule which it could be both positive and negative. The smaller the required level of total budget balance and the larger the positive gap between actual and limit public debt are, the bigger is the increase in public debt burden on current generations and the smaller the public debt burden on future generations are.

5. The Consistency of Fiscal Rules of FPF-EU

This section deals with the issue of the consistency of the fiscal rules on total budget balance with the final goal on public debt established by FPF-EU. As we have seen the

Stability Pact has tightened the fiscal rule on the total budget balance provided by the Treaty of Maastricht since there is a shift both of the reference value from -3% to 0% and of the reference variable from the current to the structural total budget balance. On the other hand the final goal on the public debt has remained unchanged *i.e.,* public debt has to be equal or less than the critical value of 60%.

Let first examine the consistency between the fiscal rule of $s_t^g \geq -3\%$ and the final goal of $d \leq 60\%$ that the Treaty of Maastricht provided for membership to EU.

[Table1]

TAB. 1 calculates the limit of public debt in correspondence of different values on which total budget balance is kept constant and different GDP growth rates. Actually each column of TAB. 1 is the numerical expression of the schedule *TD* considered in SEC. 2 and therefore it confirms, in another way, that there exist infinite combinations of total balance budget and GDP growth rate to each of those corresponds a finite limit value of public debt. Therefore it reasserts the *arbitrariness* of the reference values selected by MT in order to ensure the sustainability of public finance position of members of EMU. Actually the theoretical findings do not provide definitive indications that a total budget balance less or equal to -3 is better than one equal to -2 or -4 for assuring the sustainability of public finance position; analogously it does not say anything whether a public debt equal to 60% is better of one equal to 40% or 80%. In other words the reference values established by MT is a sufficient but not *necessary* condition for ensuring the sustainability of public finance stance.

The *arbitrariness* of the reference values of -3% fixed from MT does not represent a real shortcoming. In other words, given the right functional fiscal rule *i.e.,* the constancy of total budget balance, whatever numerical reference value the MT had have chosen it had been arbitrary. Actually TAB. 1 points out the real weakness of the MT. Actually, it shows that assuming $s \leq -3\%$ the reference value on public debt $d \leq 60\%$ can be achieved simultaneously only if $g \geq 5{,}3$. This comes out directly from observing equation (11) which identify the limit of public debt: since three variables appear in (11) *i.e.,* s^g, d and g it is straightforward that it is not possible to

predetermine two variables at a given value *e.g.*, (s^g, d), without bearing in mind that a third variable has necessarily obtained from (11). As a consequence the MT suffers of an *inconsistency* between the fiscal rule regulated on the total budget balance and the reference value on public debt on the interval $g \leq 5{,}3$ For instance, assuming that $g = 3$, the policy makers even if fulfil in each period the target $s = -3$, will be never able to achieve the reference value on the public debt since in these circumstance the limit value of public debt/GDP ratio is equal to 100%.

The SGP has modified the numerical fiscal rule by entailing countries to reach medium-term budget close to balance or in surplus, that is $s^g \geq 0\%$ where s^g in this case represents the structural total budget balance while, on the background, there still remains the final goal on public debt *i.e.,* $d \leq 60\%$. TAB. 1 says that the SGP overcomes the shortcoming undermining the MT, that is the inconsistency between fiscal rule and final goal within a given interval of GDP the growth rate: as long as the total (structural) budget balance is constant on $s^g = 0\%$ therefore the limit of public debt is $d = 0$. In other words by tightening fiscal rule SGP makes the limit of public debt independent by the GDP the growth rate. At the same time it shows that indeed the underlying final goal of the FPF-EU is represented by a single value rather than by an interval as the MT has stated previously and the SGP has reaffirmed implicitly. In conclusion the overcoming of inconsistency of the MT with regard to this point implies a very strong result in the long-run: government has to retire public debt completely.

6. Conclusions

In this paper we have focussed on a single aspect of the fiscal policy framework deriving by the combination of the fiscal requirements of MT with those of the SGP which has been under attack recently: the fiscal rules. Specifically we attempt to verify the soundness of the fiscal rule with respect to its two basic features: the adequacy and consistency relatively to the final goal of the sustainability of fiscal position. The main results are the following ones.

First it points out that as long as the definition of public debt sustainability is

derived from the intertemporal budget constraint the theoretical findings point out that a simple functional fiscal rule ensuring the final goal consists in keeping constant the total public budget balance. Therefore the numerical fiscal rule of FPF-EU indeed can be seen as specific drawn from the correct functional fiscal rule and therefore it represents a simple and adequate fiscal rule for fulfilling the final goal. Furthermore it is necessarily arbitrary since on the theoretical ground it is not possible to discriminate which specific value is more adequate or better for public debt sustainability: therefore there exist infinite values on which the total budget balance can be fixed for ensuring the sustainability of public debt.

Second, although the numerical fiscal rule of FPF-EU which is obtained from the functional fiscal rule is indifferent for fulfilling the final goal, the other hand, it produces alternative effects on the redistributions of public debt burden. Actually the paper shows that the direction and the size of redistribution rely on two basic factors: the peculiar value on which the total budget balance is maintained constant and the gap between the actual and the limit of public debt. The smaller the required level of the total budget balance and the larger the positive gap are, the bigger is the increase in public debt burden on the current generations and the smaller that falling on the next generations.

Thirdly, it points out that the fiscal rule based on the reference value of 3% required by the Treaty of Maastricht is inconsistent for a given set of values of GDP growth rate with the final goal which imposes the public debt to be less than the 60%. Finally it shows that the further refinement carried out by Growth and Stability Pact – imposing structural total budget balance to be equal to 0% – indeed removes the above inconsistency as long as the interval of the final goal shrinks to a single point *i.e.*, zero, so that in the long period the public debt has to be retired entirely.

Finally, the analysis shows that the fiscal rule provided by the FPF-EU is indeed adequate and consistent for fulfilling the public debt sustainability. Indeed it points out that the calibration of the fiscal rule on total budget balance rather than public debt is the best choice in defining a fiscal discipline coherent with public debt sustainability. As a consequence some recent reform suggestions of FPF-EU proposing

shifting the emphasis from total budget balance to public debt dynamic are not strongly grounded on theoretical findings. On the other hand the analysis shows that a significant shortcoming of the fiscal rule – that in the literature has been scarcely stressed – concerns the size and the timing of intergenerational redistribution of public debt rising from satisfying it. Actually the requirements that impose in the medium term structural budget to be close to balance and in the short term the actual budget does not to overcome the limit of -3% could entail a public debt burden too heavy on the current generations that, in turn, could generate a rejection of the FPF-EU by European countries especially if the structural budget and/or public debt are far form the respective goals. Actually to be too *impatient* in reaching the sustainability of public finance position could turn out to be a dangerous *boomerang* and could produce a complete and problematic rejection of the FPF-EU. As a consequence an improvement of the FPF-EU relatively to the fiscal rule could consist in fixing both the priority between the constraints on the structural and the actual budget balance and the period within which they should be satisfied. At first, countries should be required to fulfill the goal on the structural budget – so that countries should not be pushed in adopting *creative* policy measures – and only subsequently the limit of -3% should become operative. The spread of the requirements on budget balance in two phases and in a given predefined period (such as the Treaty of Maastricht did with reference to the convergence criteria) would own two advantages: firstly it could distribute the public debt burden on a larger number of generations and, secondly, it could ensure the respect of the ceiling on the actual budget balance of -3% by relying on the fiscal stabilizers rather than on the discretional fiscal policy how it could be happen whether the structural budget balance is too far from the zero.

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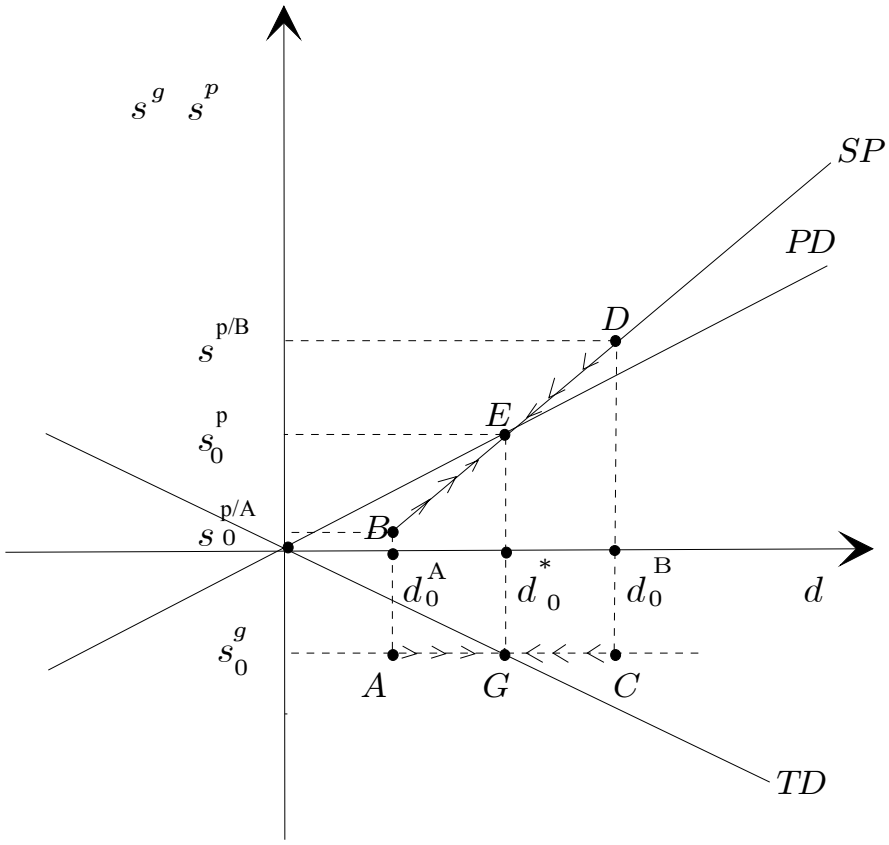

FIGURE 1. The Adoption of a fiscal rule based on a constant total budget balance

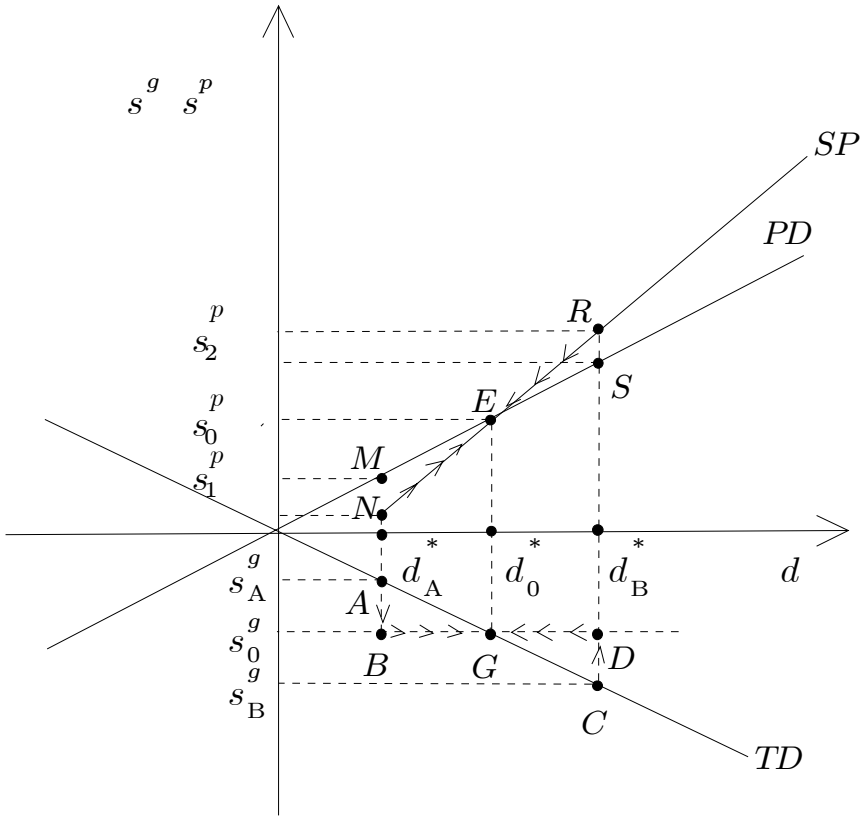

Figure 2. The social cost for supporting the fiscal rule

GDP Growth Rate	0,5	1,7	3	3,5	4	5	5,3	6	7	7,1	8	9	9,1	10
Total Budget Balance														
-11	2211	658	378	325	286	231	220	194	168	165	149	133	132	121
-10	2010	598	343	296	260	210	200	177	153	150	135	121	120	110
-9	1809	538	309	266	234	189	180	159	138	135	122	109	108	99
-8	1608	479	275	237	208	168	160	141	122	120	108	97	96	88
-7	1407	419	240	207	182	147	14	124	107	105	95	85	84	77
-6	1206	359	206	177	156	126	120	106	92	90	81	73	72	66
-5	1005	299	172	148	130	105	100	88	76	75	68	61	**60**	**55**
-4	804	239	137	118	104	84	80	71	61	**60**	**54**	**48**	**48**	**44**
-3	603	179	103	89	78	63	**60**	**53**	**46**	**45**	**41**	**36**	**36**	**33**
-2	402	120	69	**59**	**52**	**42**	**40**	**35**	**31**	**30**	**27**	**24**	**24**	**22**
-1	**201**	**60**	**34**	**30**	**26**	**21**	**20**	**18**	**15**	**15**	**14**	**12**	**12**	**11**
0	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Table 1. Limit Values of Public Debt