

## Sustainable Public Debt: How To Achieve It?

"The Keynesian Approach" dominated the politico-economic principles after World War II in particular during the 1970s where governments must play an active role in stabilizing market economies. In the other hand the public expenditures can raise the aggregate demand with the spending being financed by public deficits. With low aggregate demand and high unemployment the government must become active in order to restore the full employment equilibrium which then allows to reduce outstanding public debt. The public debt does not pose a problem if the government runs into debt in the home country because no resources are lost and public deficits just imply a relocation of resources from taxpayers to bondholders.

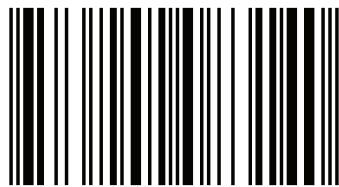


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## **Sustainable Public Debt: How To Achieve It?**

Hamilton and Flavin are started the research on sustainability of debt policies that applies statistical tests and analyzing the public debt in USA. The main question is the debt policies can be considered sustainable? “The debt policies cannot be considered as sustainable if governments should undertake corrective actions”. We remember that an important role is the “interest rate”, where the intertemporal budget constraint of the government requires that the present value of public debt becomes immediately defined.

## **Debt and Growth: A Basic Endogenous Model As Available Solution**

In the part one I analyzed the sustainability of public debt in developed and developing countries and I defined the reaction of the primary surplus (GDP) for quantify the variation of public debt. There is an empirical evidence about that the primary surplus is a positive function of public debt for a lot of developed countries and less for developing countries. I start to define the concept of Endogenous growth models defined for the first time in the papers by Romer (1986, 1990) and Aghion and Howitt (1992). The long-run growth rate of countries is no longer an exogenous variable but is



an endogenous variables that depends on parameters. In fact governments cannot only influence the levels of economic variables in the long run but also their growth rates through fiscal policies. Thus the Government can affect the dynamics of an economy of a State actuating its debt and fiscal policy. In particular the government can affect the dynamics of economies by its debt and deficit policy. In fact authors as Schmitt-Grohè and Uribe (1997) demonstrate that a balanced government budget may lead to multiple equilibria if the distortion income tax rate is used to balance the government budget for a given public expenditures. This outcome is the product of a negative relation between aggregate activity and the income tax rate. Economic agents expect that after-tax return rises and they will increase their supply of production factors leading to a rise in the tax revenue. In fact if public spending is fixed a balanced government budget provides lower tax rate such that the initial expectations are fulfilled. As consequences exists a multiple equilibria implying that the steady state is indeterminate. The paper by Schmitt-Grohè and Uribe is interesting because it illustrates how self-fulfilling expectations can lead to multiple equilibria. In particular a stock outstanding public debt raises the question of how relevant their result is for real world economies where as I said all countries right now are faced with the problem of public debt. Guo and Harrison (2004) show that the result derived by Schmitt-Grohè and Uribe (1997) does not hold any longer when the tax rate is fixed and public spending is adjusted so that the budget of the government is balanced at each point in time and the equilibrium is unique and saddle point stable. Thus the Government budget is not balanced but rather the adjustment through variations in the income tax rate that generates the outcomes of Schmitt-Grohè and Uribe (1997). Also the contribution of Guo and Harrison is important because one accepts the tax smoothing rule derived from Barro (1979), the question arises why the government should balance its budget through adjustments in the tax rate when a non-constant tax rate leads to an excess burden that can be avoided. In the part two of my thesis I want to extend this line of research in different ways (Greiner 2007). First I describe what it is the “endogenous growth” by assuming that there are positive externalities of investment which prevent the marginal product of capital from converging to zero as capital is accumulated. The economy in this case is characterized by ongoing growth a fact in growth economics this extension is justified. In fact in the most industrialized countries government have public debt where government bonds are included in the account analysed in our endogenous model. The public debt plays and

important role in real world economies. In my endogenous model I study three policies rules the first rule that I consider is the balanced budget rule implies that level of public debt is constant over time leading to a zero debt to GDP ratio in the long-run. The second rule is defined by the government runs public deficits that are such that public debt grows but less than all other endogenous variables as GDP and capital stock and it leads to zero debt (as the first rule) to GDO ratio in the long-run. The third rule is simply the intertemporale budget constraint where the present value of future surpluses must equal the current stock of public debt. The positive surplus of the government is a positive linear function of public debt: it can raise taxes, it can reduce public spending or the public debt is repaid of a high GDP growth rate leading to large tax revenues. This endogenous model is extended in several directions: one is that I integrate a monetary sector and I analyze how the interaction between fiscal and monetary policies affects the economy and second I study how the wage rigidities with a persistent unemployment affects public deficit and debt policies.

In conclusion the goal of my contribution is how these budgetary rules affect stability and the growth rate of economies as well as welfare. Since the public deficit and public debt play an important role in the euro area (as I described in the part one) my analyses is not only a theoretical interest but also is related to practical consequences for policy makers. In the next section I start to describe the structure of the model.

## *The Growth Model*

The structure of the Growth model is basically an economy that consists in three sectors: a “households sector which receives labor income and income from its saving, a “productive sector” and the “government.

### *The Household Sector, The Productive Sector, The Government*

**The Household sector.** The household sector is represented by one household which maximizes the level of utility arised by consumption  $C(t)$  and from Leisure  $L^m - L(t)$  over a infinite time horizon subject to its budget constraint, taking factor prices as given.  $L^m$  defines the maximum available amount of time and  $L(t)$  is the actual labour input. The Maximization problem of the household is written as:

$$2.1.2.1: \text{Max}_{C,L} \int_0^{\infty} e^{-\rho t} [ \ln(C C P_p^k) - L^{1+\gamma} ] / (1 + \gamma) dt$$

$$2.1.2.1.a: \text{Subject to } (1-\tau)(wL+rK+r_b B+\pi_p)=W+C+\delta K$$

$C_p$  is the public spending that is welfare enhancing. The parameter  $\rho \in (0,1)$  is the household’s rate of time preference,  $\gamma \geq 0$  is the inverse of the elasticity of labor supply and  $\delta \in (0,1)$  is the depreatiation of rate of capital. The intertemporal elasticity of substitution of consumption is set equal to one so that the utility of household is given by the natural logarithm of consumption. The wage rate is denoted by  $w$  and  $r$  is the return to capital and  $r_b$  is the interest rate of government bonds. The wealth of the household is given by  $W=B+K$  which is equal to public debt,  $B$ , and capital,  $K$  and  $\pi_p$  gives possible profits of the productive sector, the household takes as given in solving its optimization problem. In the end  $\tau \in (0,1)$  is the costant income tax rate. I can say that a non-arbitrage condition requires that the return to capital equals the return to government bonds yielding  $r_b=r-\delta/(1-\tau)$ , thus the budget constraint of the household can be written as

$$2.1.2.2: W = (1-\tau)(wL + rW + \pi_p) - \delta W - C$$

The current-value Hamiltonian for this optimization problem is written as

$$2.1.2.3: \mathcal{H} = \ln(CCP_p^k) - L^{1+\gamma} / (1+\gamma) + \lambda((1-\tau)(wL + rW + \pi_p) - \theta W - C)$$

Where  $\lambda$  is the co-state variable or the shadow price of wealth. The necessary optimality conditions are given by

$$2.1.2.4: C = w((1-\tau)L^\gamma)$$

$$2.1.2.5: C = C(1-\tau)r - C(\rho + \delta)$$

The transversality condition  $\lim_{t \rightarrow \infty} e^{-\rho t} W / C = 0$  holds, which is fulfilled for a time path on which assets grow at the same rate as consumption.

**The Productive sector.** The productive sector is represented by one firm which behaves competitively and which maximizes static profits. The production function of the firm is given by

$$2.1.2.6: Y = AK^{1-\alpha} K^\varepsilon L^\beta$$

With  $(1-\alpha) \in (0,1)$  the capital share,  $\beta \in (0,1)$  the labour share and  $(1-\alpha) + \beta \leq 1$  and  $A$  is a technology coefficient that is set equal to one,  $A=1$ . The variable  $Y$  is output and  $K$  represent the level of capital and we assume constant returns to capital in the economy that is  $(1-\alpha) + \varepsilon = 1$ . Thus profit maximization is defined as:

$$2.1.2.7: r = (1-\alpha) L^{\alpha\beta}$$

$$2.1.2.8: w = \beta L^{\beta-1} K$$

**The Government.** The Government receives tax revenues from income taxation and has revenues from issuing government bonds. Public spending is used to finance public goods that raise the utility of the household and the government sets the primary surplus such that it is a positive linear function

of public debt which guarantees that public debt is sustainable. In fact the accounting identity describing the accumulation of public debt in continuous time is given by:

$$2.1.2.9: \dot{B} = r_b B(1 - \tau) - S$$

Where S is the Government surplus exclusive of net interest payments and the intertemporal budget constraint of the Government is defined by

$$2.1.2.10: \lim_{t \rightarrow \infty} e^{-\int_0^t (1 - t) r_b(u) du} B(t) = 0$$

(no-Ponzi game condition)

Now assume that the ratio of the primary surplus to GDP is a positive linear function of the debt to GDP ratio and of a constant. The primary surplus ratio it can be written as

$$2.1.2.11: S/Y = \phi + \psi B/Y$$

Where  $\phi \in \mathbb{R}$ ,  $\psi \in \mathbb{R}_{++}$  are constants. The parameter  $\psi$  determines how strongly the primary surplus reacts to changes in public debt and  $\phi$  determines whether the level of the primary surplus rises or falls with an increase of GDP. Using 2.1.2.11 The differential equation describing the evolution of public debt can be written as

$$2.1.2.12: \dot{B} + (r_b(1 - \tau) - \psi)B - \phi Y$$

The positive linear dependence of the primary surplus to GDP ratio on the debt ratio on average that is  $\psi > 0$ , guarantees that the intertemporal budget constraint of the government is met. Public debt could be negative implying that the government is creditor and I assume that it is positive. In the equation 1 there is the following rule “the economic agents have to run primary surpluses in the future, when they run deficit today in order to avoid playing a Ponzi game as the the Government sector”. Public debt is the only determinant of the primary surplus would be too short-sighted because the government has some discretionary scope and because other variables such as the surplus of social insurance. In conclusion the primary surplus also depends on the level of GDP in a country that determines the total tax

revenue and temporary government spending and the sustainability of public debt is independent of how GDP affects the primary surplus as long as the primary surplus is a positive linear function of public debt.

### *Analysis of the Model Structure*

Before I analyze the model I give the definition of an equilibrium and of a balanced growth path. An equilibrium allocation allocation is defined as

**Definition 1.** An equilibrium is a sequence of variable  $\{C(t), K(t), B(t)\}_{t=0}^{\infty}$ , and a sequence of price  $\{w(t), r(t)\}_{t=0}^{\infty}$ , such that, given prices and fiscal rules, the firm maximizes profits, the households solves 2.1.2.1 subject to 2.1.2.1.a and the budget constraint of the government 2.1.2.9 is fulfilled with the primary surplus set according 2.1.2.11. and in the Definition 2 we define a balanced growth path

**Definition 2.** A balanced growth path (BGP) is a path such that the economy is in equilibrium and such that consumption and capital growth at the same strictly positive constant growth rate, that is  $C^1/C=K^1/K=g, g \geq 0, g = \text{constant}$  and either:

$$\begin{aligned} 2.1.3.1: B^1 &= 0 \\ 2.1.3.2: B^1/B &= C^1/C = K^1/K = g \end{aligned}$$

Definition 2 defined that I consider three different budgetary rules. Scenario (i) gives the balanced budget rule which implies that the debt to GDP ratio converges to zero in the long-run. Of course such a situation is sustainable and we can even speak of strong sustainability in this case since the government balances its budget. It should be noted that the debt to GDP ratio asymptotically converges to zero in this scenario. In scenario (ii), the government runs permanent deficits and public debt grows over time. In fact the deficits are defined as “Public Debt grows less than capital and GDP such that the debt to GDP ratio asymptotically converges to zero too. This situation may be called quasi strong sustainability because it is less strict than the balanced budget rule and the Debt to GDP ratio also converges to zero in the long run. I call this scenario the asymptotically zero debt ratio scenario. In conclusion scenario (iii) describes a situation in which is characterized by public deficits where the government debt grows at the

same rate as all other according to the equation 2.1.2.11 and it does not play a Ponzi game in this case but public debt grows at the same rate as GDP in the long run. Thus in equilibrium the model in the economy is completely described by the following differential equations:

$$\begin{aligned}
 2.1.3.3: & \dot{C}^1/C = (1-t)(1-\alpha)w(C/K)^{-\beta/(1-\beta+y)} - (\rho+\theta), C(0) \geq 0 \\
 2.1.3.4: & \dot{K}^1/K = W(C/K)^{-\beta/(1-\beta+y)} (1-t+\phi) - (\theta+\psi(B/K)), K(0) \geq 0 \\
 2.1.3.5: & \dot{B}^1/B = (1-t)(1-\alpha)w(C/K)^{-\beta/(1-\beta+y)} - \phi w(C/K)^{-\beta/(1-\beta+y)} (K/B) - \theta + \psi, B \geq 0
 \end{aligned}$$

With  $w = (\beta(1-t))^{-\beta/(1-\beta+y)}$  and where I use  $r_b = r - \theta/(1-t)$ , the initial condition with respect to capital and public debt are assumed to be given while consumptions can be chosen by household at time  $t=0$ . To analyze our economy around a BGP we define the new variable  $c := C/K$  and  $b := B/K$ . Differentiating these variables with respect to time leads to a two dimensional system of differential equation given by

$$\begin{aligned}
 2.1.3.5: & \dot{b}^1 = c(c - c^1)^{-\beta/(1-\beta+y)} w((1-t)\alpha + \phi) - \rho - \psi b \\
 2.1.3.6: & \dot{c}^1 = c(c - c^1)^{-\beta/(1-\beta+y)} w((1-t)\alpha + \phi) - \phi w c^{-\beta/(1-\beta+y)} b^{-1} - b(\psi + \psi b)
 \end{aligned}$$

A solution of  $\dot{c}^1 = \dot{b}^1 = 0$  with respect to  $c, b$  gives a BPG for our model and corresponding ratios  $b^*, c^*$  on the BGP. In the next point I study the model where the government runs permanent deficits but sticks to the rule as defined in equation 2.1.2.11 so that the intertemporal budget constraint is fulfilled.

**Permanent Deficit and the Intertemporal Budget Constraint.** When permanent deficit are allowed I can distinguish between a purely discretionary policy where the primary surplus does not depend on the outstanding public debt, on the one hand and on the other hand a rule based policy where the primary surplus is a positive function of the debt to GDP ratio. The first is modelled by setting  $\psi=0$  such that the primary surplus only depends on the parameter  $\phi$  that is chosen arbitrarily. In fact this policy implies that the government violates its intertemporal budget constraint and I can show that in an endogenous growth framework that a discretionary policy in general violates the intertemporal budget constraint along a balanced growth path because the present value of public debt converges to

a positive or negative finite value or to plus or minus infinity depending on the initial debt to GDP ratio and depending on the primary surplus policy of the government. Therefore we limit our analysis to the case  $\psi \geq 0$ . We should also like to recall that the rule based policy given by the equation 2.1.2.11 with  $\psi \geq 0$  nevertheless gives the government some discretionary scope this is defined by the equation 2.1.2.11 public spending relative to GDP,  $C_p/Y$  that is given by

$$2.3.1.7: C_p/Y = (t - \phi) - \psi B/Y.$$

The equation 2.3.1. shows that, given fiscal parameters  $t$ ,  $\phi$ ,  $\psi$  public spending relative to GDP is an endogenous variable depending on the public debt ratio. The Government can control  $C_p/Y$  to certain degree by the choice of  $\phi$ . In my proposition 4 I gives results as concerns existence, uniqueness and stability of a balanced growth path for our economy where the government runs deficit but sticks to the intertemporal budget constraint.

**Proposition 4.** *I assume that household's time preference and the depreciation rate are sufficient small. Then there exists a unique BGP if the government runs permanent deficits but obeys the intertemporal budget constraint . For  $\psi \geq \rho$  the BGP is saddle point stable for  $\psi < \rho$  BGP is unstable.*

The requirement that the rate of time preference and the depreciation rate must not to be to large for aBGP to exist can be seen from the equation 2.1.3.3. From an economic point of view it just states that after-tax return to capital must be sufficiently large for ongoing growth. Thus the economy is characterized by a unique BGP which is a saddle point if the reaction of the government to variations in public debt is sufficiently large, that is for  $\psi \geq \rho$ . This conditions states that the primary surplus must rise sufficiently as public debt increases. In the opposite case for  $\psi < \rho$  the economy is unstable and the reaction of the primary surplus to increases in public debt is not large enough to stabilize the economy. Thus the debt policy of the government is decisive as to wheather the economy is stable ou unstable.

The condition for stability of the BGP in proposition 4 makes sense from an economic point of view. Nothing that  $p = r(1-t) - g$  holds on the BGP, I can define that if and only if the reaction coefficient exceed the difference between the net interest rate and the balanced growth rate. In fact a rise of a



public debt relative to GDP or relative to capital by one unit implies that the public deficit ratio increases by  $(1-t)r$  that is by the net return to public debt per unit. This tends to make the debt process of debt accumulation and the net return to public debt equals to one to capital and exceed the balanced growth rate the debt ratio tends to become explosive unless the reaction coefficient is larger than that difference so that the debt ratio becomes a mean-reverting process. Proposition 4 also implies that the both global and local indeterminacy are excluded where the global indeterminacy refers to the balanced growth rate that is obtained in the long run and states that the initial value of consumption which can be chosen freely by society crucially determines to which BGP the economy converges in the long run balanced growth rate. I remember that the consumption is not a predetermined variable at time  $t=0$  in contrast to the initial stock of physical capital. Local indeterminacy means to the same BGP in the long run crucially depend on the choice of initial consumption  $C(0)$  but not the long run growth rate which is the same. Now I analyzed the balanced budget rule.

### **The Balanced Budget Rule and the Rule with an Asymptotically Zero Debt Ratio.**

To define the balanced budget rule, we set  $\phi=0$  and  $\psi=(1-t)r - \theta$ . From equation 2.1.2.11 implies  $B^1=0$  that is a balanced budget and thus a constant level of public debt. Rule (ii) is obtained by setting  $\phi=0$  and  $\psi$  such that  $p < \psi < (1-t)r - \theta$  holds for all  $t \in (0, \text{Infinite})$ . With this two rules the ratio of public spending to GDP,  $C_p/Y$  is again a variable that depends on the interest rate and on the debt ratio on the transition path. In the long run in fact the debt ratio equals zero and the spending ratio equals the income tax rate, that is  $C_p/Y=t$  holds on the BGP. The proposition 5 gives result about the economy assuming a balanced government budget or the asymptotically zero debt ratio rule.

**Proposition 5.** *Assume that the household's time preference and the depreciation rate are sufficiently small. Then there exists a unique saddle point stable BGP if the government runs a balanced budget or if it runs public deficits such that the debt to GDP ratio asymptotically converges to zero.*

Proposition 5 states that the balanced budget rule and the rule with asymptotically zero debt ratio both yield a unique and saddle point stable BGP in contrast to the case with permanent public deficits where the economy turned out to be unstable if the reaction of the primary surplus to higher public debt was not sufficient large. As in this case I can say that the Government runs deficit but sticks to the intertemporal budget constraint global and local indeterminacy are again excluded. Furthermore the economy is always in the saddle point stable with a balanced government budget or an asymptotically zero debt budget scenario.

In conclusion I can say the stability is the aim of the government that it wants the stabilization where the balanced budget rule and the asymptotically zero debt ratio scenario always yield a saddle point stable BGP while the model with permanent public deficit is stable only if the reaction of the government to higher debt is sufficiently strong. Now I comparing the long run growth rate of the scenario with permanent deficit to that on the balanced budget rule and with that where the public debt grows but less than GDP. The following proposition defined this concept.

**Proposition 6.** *The long run growth rate in the economy under the balanced budget rule is equal to that under the asymptotically zero debt ratio scenario, where the public debt grows but less than GDP. The long run growth rate in the economy with the balanced budget rule exceeds the long run growth rate of the economy with permanent deficits.*

The balanced budget rule and the asymptotically zero debt ratio scenario give the same balanced growth rate is simply due to the fact that the long run debt to GDP ratio equals zero under both budgetary rules. In the proposition 6 the economy where the government runs a balanced budget gives a higher growth rate in the long run than a economy where the government runs deficits. The economic reason for that outcome is that a positive public debt ratio leads to crowding out of investment which does not occur with the balanced budget rule where the debt to GDP ratio asymptotically equals zero. In fact the higher public debt implies that public spending automatically declines because the government sticks to the primary surplus rule as in the equation 2.1.2.11. the public spending is not distortionary and has no productive effects anyway the negative growth effect of a positive debt ratio is not clear. Further from a technical point of

view that outcome is not obvious either because the growth rate of private capital in the economy-wide resource constraint as in the equation 2.1.2.13 does not depend negatively on the debt ratio so that there is no direct crowding out of aggregate private investment by positive public debt ratio. In conclusion what generates the crowding out a positive debt ratio implies that a certain part of aggregate savings is used for a non-productive purpose in terms of the debt service. This reduces the shadow price of a private wealth and leads to a lower supply of labor and consequently the incentive to save and invest the balanced growth rate decline. Finally the public debt affects the allocation of resources in the long run.

**Integrating Public Transfers.** I assumed that the Public Spending is used to finance public goods that raise the utility of the households in the economy. Now I want to define that public spending is divided between spending for public goods that are welfare enhancing and spending for lump-sum public transfers to household sector and avoiding depreciation of capital setting  $\theta=0$  the budget constraint of the representative household changes to

$$2.3.1.8: W^1 = (1-t)(wL + rW + \pi_p) - C + T_p$$

With  $T_p$  denoting lump-sum public transfers and the period budget constraint of the government is now given by:

$$2.3.1.9: B^1 = r_b B(1-t) - S = r_b B(1-t) - (tY - c_p Y - t_p Y)$$

With  $C_p = c_p Y$  and  $T_p = t_p Y$ ,  $c_p + t_p < 1$ ,  $0 < c_p$ ,  $t_p < 1$ . The government sets its primary surplus such that it is a positive function of public debt so that intertemporal budget constraint is fulfilled with the following condition

$$2.3.1.10: S/Y = \phi + \psi B/Y$$

Where  $\phi$  included in  $R$ ,  $\psi$  included in  $R_{++}$  are constants. With a fixed income tax rate the government can now adjust either public consumption or transfer payments as public debt rises. In the first case public spending is given by  $C_p = (t - t_p - \phi)Y - \psi B$  and the economy wide resource constraint is obtained as

$$2.3.1.11: K^1/K = w(C/K)^{-\beta/(1-\beta+\gamma)}(1-t+\phi+t_p)-(C/K)+\psi(B/K), K_0 \geq 0$$

This is equivalent to 2.1.3.4 for  $t_p=0$ . In the following case public transfers are  $T_p=(t-c_p-\phi)Y-\psi B$  and the economy wide resource constraint then becomes

$$2.3.1.12: K^1/K = w(C/K)^{-\beta/(1-\beta+\gamma)}(1-c_p)-(C/K), K_0 < 0$$

The equation describing the evolution of private consumption and of public debt given by the equation 2.1.2.12 and by 2.1.2.14. Taking into account that the economy wide resource constraint is given by 2.3.12 when public consumption is adjusted one immediately realizes that the model structure is the same as above implying that there exist a unique BGP are slightly different and obtained as

$$2.3.1.13: c^1 = c(c-c^{-\beta/(1-\beta+\gamma)})w(t-c_p+(1-t)\alpha)-\rho$$

$$2.3.1.14: b^1 = b(c-c^{-\beta/(1-\beta+\gamma)})w(t-c_p+(1-t)\alpha)-\phi w c^{-\beta/(1-\beta+\gamma)}b^{-1}-\psi$$

Note that  $t-c_p+(1-t)\alpha \geq 0$  we have

$$\lim_{c \rightarrow 0} (c^1/c) = -\infty, \lim_{c \rightarrow \infty} (c^1/c) = +\infty, \theta(c^1/c) / \theta c \geq 0$$

Showing that there exist a unique  $c^1$  that solves  $c^1=0$  so that there is a unique BGP. As concerns stability we note that  $c^1$  is independent of  $b$  and there are no transition dynamics of  $c$  since  $c$  is set to its BGP value at  $t=0$  such that  $c^1=0$  holds for all  $t \in (0, \infty)$ . For  $b$  to converge to a finite value, we must have  $\theta(b^1/b) / \theta b < 0$ . The equation  $b^1/b$  is written as

$$2.3.1.15: b^1 = b(1-t)r - \psi b - \phi - b(K^1/K)$$

With  $K^1/K$  given by equation 2.3.1.11 nothing that  $K^1/K$  does not depend on  $b$ , differentiating  $b$  with respect to  $b$  leads to

$$\Theta b^1 / \Theta b = (1-t)r - \psi - g < 0 \leftrightarrow \psi \geq (1-t)r - g$$

this shows that the model is again stable, the in the case of permanent public deficits, if the government puts a sufficiently high weight on stabilizing public debt that is if the reaction coefficient exceeds the difference between

the net interest rate and the balanced growth rate. Now I analyze how the balanced growth rate depends on the debt policy when the government adjusts public consumption and when it adjusts public transfers respectively. In fact I resumed this results in the proposition 7.

**Proposition 7.** *If the government adjusts public spending to meet its intertemporal budget constraint the balanced growth rate is higher the smaller the public debt ratio. If the government adjusts transfers the balanced growth rate is independent of the debt ratio.*

Proposition 7 demonstrates that the public debt ratio has a negative impact on the balanced growth rate if the government adjusts the public spending ratio, meaning that public debt crowds out of government spending. Since public spending is not distortionary and has no productive effects, the negative growth effects of a higher debt ratio is not obvious. In fact from a technical point of view this outcome is not obvious either because the growth rate of private capital in the economy wide resource constraint given in the equation 2.3.1.11 does not depend negatively on the debt ratio so that there is no direct crowding out of aggregate private investment by public debt. My results define that the shadow price of wealth is smaller if the government runs deficits because it implies that less of the household's savings can be used for the formation of a productive private capital. That gives a return to capital  $r$ , that is the lower the higher the debt to GDP ratio is. Consequently the share of consumption relative to GDP is larger and the investment share is smaller leading to a lower balanced growth rate in the long run as a result of a higher debt to GDP ratio. If the government adjusts transfer payments this effect does not occur. The reason is that in this case public debt does not appear in the economy wide resource constraint which is now given by equation 2.3.1.12 because the reduction of lump-sum transfers is used to meet the higher debt service. The shadow price of the capital and the labor supply remain unchanged so that a higher debt ratio does not lead to a reallocation of resources between saving and investment on the one hand and consumption on the other hand. Thus the long run growth rate remains unaffected. It should be noted that the reduction in lump-sum transfer can be seen as a sort of lump sum tax that is used to meet the higher debt service requiring higher primary surpluses. My analysis has shown under which conditions a higher debt to capital ratio with higher debt to GDP ratio reduce the long run balanced growth rate. It must be pointed out

that the debt ratio is an endogenous variable which is larger the less strict the fiscal policy of a country is. In my framework the fiscal policy of a country is determined by the income tax rate. By the transfer share and by the share of public consumption relative to GDP. When the government adjust public consumption to fulfill its intertemporal budget constraint the government can set the transfer share and the income tax rate. It is easily seen that an increase in the income tax rate  $t$  raises the debt ratio implying a lower long run growth rate. It is true that a higher tax rate leads to a higher tax revenue but it also reduces capital accumulation such that the ratio of a public debt to capital raises. On the other hand a higher transfer share  $t_p$  reduces the debt ratio because a rise in the transfer share goes along with a decrease in public consumption relative to GDP since public consumption adjusts to meet the intertemporal budget constraint. Since lump sum transfers do not affect growth this policy leads to higher growth and to a smaller debt ratio. When public transfers are adjusted a rise in the public consumption share  $c_p$  raises (reduces) the public debt ratio for  $\phi < 0$  ( $\phi \geq 0$ ) where the parameter  $\phi$  determines whether the level of the primary surplus declines (for  $\phi < 0$ ) or rises (for  $\phi \geq 0$ ) with a higher GDP. Consequently an increase in the share of public consumption relative to GDP goes along with a decline (rise) in the primary surplus to GDP ratio in the case of  $\phi < 0$  ( $\phi \geq 0$ ) such that the debt ratio rises (declines). In the paragraph I study welfare effect of different debt policies.

## *Welfare Effects or Debt Policy?*

The growth and welfare maximization may be different goals when transition dynamics occur. I analyze in this chapter how the different budgetary rules affect welfare in our model economy where I refuse public transfer when  $t_p=0$ . Welfare is given by the expression:

$$2.1.4.1: \int_0^{\infty} e^{-pt} \left( \ln(C C_p^k) - \frac{L^{1+y}}{1+y} \right) dt$$

For studying welfare effects on the budgetary rules we resort to simulations since it is not possible to get results for the analytical model. In fact I compute the time path of the variables  $c(t)$  and  $b(t)$  for the linearized version of the system for the equations 2.3.1.13 and 2.3.1.14 for a given initial debt to capital ratio taking into account transition dynamics. Given the time path of  $c(t)$  and  $b(t)$  I numerically solve the differential equation system of the equations 2.3.1.11 and 2.3.1.12 with the values for  $C(t)$ ,  $K(t)$  and  $B(t)$  as well as for labor supply  $L(t)$ . With these values we can compute the integral in the equation 2.1.4.1. where I set  $K(0)=c(0)$  and  $B(0)=b(0)$  hold. I set the capital share to  $1-\alpha=0.25$  and the labor share  $\beta=0,80$ . The labor share is higher but it is inside of the range of EU15-Countries. In the mid 2000s the average labor income share in the EU15-countries measured as percentage of gross national income with 70% with the highest value about 80% in Sweden and in the UK and the lowest values of roughly 55 and 30% in Ireland and Greece respectively. The depreciation rate of physical capital is 7.5% i.e.  $\theta=0.075$ . The income tax rate is  $t=0.25$  and the rate when the time preference is defined as  $p=0.05$ . In merit of the parameter  $y$  I consider two different values,  $y=0.15$  and  $y=0.3$  that I can consider them a plausible values. The value of  $y=0.25$  is considered realistic and I take this value as benchmark. I can consider also another values for that parameter in the interval between 0 and 0.3, since higher and lower elasticities of labour supply cannot be excluded. The parameter  $k$ , is set as  $k=0.25$  implying the marginal rate of substitution between private and publicly goods is 0.25 ( $C/C_p$ ).

In merit of the budgetary rule (iii) I have to specify the parameter values  $\phi$  and  $\psi$  with  $\phi=-0.00305$  and  $\psi=0.1$ . related to the empirical observation of

Euro countries. In fact empirical estimations for the reaction coefficient  $\theta$  gave values between 0.077 and 0.199 for countries of the euro area. On the other hand the parameter  $\phi$  estimation have been performed in Italy and Germany and different values for  $\psi$  lead to different values for the debt to GDP ratio with higher values of  $\psi$  going along with lower debt ratio, with ceteris paribus conditions affecting long run growth and welfare. With these parameters values the long run growth rate for the balanced budget rule and for the rule with asymptotically zero debt ratio is  $g=0.052$  for  $y=0.15$  and  $g=0.053$  for  $y=0.15$ , and  $g=0.053$  for  $y=0.0.3$ . The balanced growth rate in the case of permanent deficit is  $g=0.045$  for  $y=0.15$  and  $g=0.047$  for  $y=0.3$  with a debt to GDP ratio of about 70% in this case. In table 2.1.4.1 I report the values obtained for the welfare functional of the equation 2.1.4.1 where the initial condition with respect to  $b(0)$  is set to  $b(0)=0.32$ . This table demonstrates that the rule where public debt grows in the long run at the same rate as all economics other economic variables where the rule (iii) denoted by positive debt ratio with lowest welfare. The reason for this aoutcome is that this rule yields a lower growth rate than the other two rules and higher debt ratio that negatively affect public spending and thus welfare. I compare the balanced budget rule (i) with the rule where public debt grows less than all other economic variables (rule(ii)) with asympt zero debt ratio as in the table 1 and it shows that the balanced budget rule give lowest welfare.

**Table 1** *Welfare F for the different budgetary rules with  $k=0.25$  and  $b(0)=0.32$*

	y=0.15	y=0.15	y=0.15
	Balanced budget	Asympt. debt ratio	Zero Positive debt ratio
F	-9.283	-9.257	-9.951
F	y=0.3	y=0.3	y=0.3
	Balanced budget	Asympt. debt ratio	Zero Positive debt ratio
F	-6.434	-6.392	-7.107

The economic reason behind this result is that public spending on the transition path under the balanced budget rule is smaller than under the rule where public debt grows but less than other all economic variables. This can be seen by setting  $k=0$  implying that public spending is not welfare



enancing. Then the outcome changes and the balanced budget rule yields higher welfare than the rule where public debt grows but less than all other economic variables. The balanced budget rule leads to lower welfare than the rule where public debt grows but less than all other economic variables in case of welfare enhancing public spending must be due to the lower level of public spending on the transition path under the balanced budget rule. The lower level of public spending with a balanced budget results from the fact that the parameter  $\psi$  which determines how strong the debt to capital ratio reduces public spending on the transition path is higher under the balanced budget rule compared to the rule where public debt grows but less than all other economic variables. Public spending gives lower welfare under the balanced budget rule compared to the rule where debt grows but less than GDP there is a critical value for  $k$  which determines utility from public spending is sufficiently welfare enhancing a deficit policy with a slightly growing level of public debt can perform better than the balanced budget rule. Under the rule where debt grows less than GDP (private and public) consumption is higher and capital accumulation is lower along the transition path compared to the balanced budget rule. In my numerical example with  $b(0)=0.32$  the balanced budget rule performs still worse than the rule where public debt grows but less than GDP for  $k=0.1$  with  $y=0.3$ . setting  $y=0.15$  and leaving all other parameter values unchanged the outcome changes and now the balanced budget rule yields higher welfare than the rule where debt grows but less than GDP, independent of the value of  $y$ . In my simulation rule (iii) where public debt grows at the same rate as all other variables always performs worse than the other two rules, rule (i) and rule (ii), for the parameter values we considered. The reason is that rule (i) and rule (ii) yield the same growth rate in the long run. In conclusion private and public goods grow at a smaller rate under rule (iii) in the long run compared to the rule (i) and (ii) giving higher welfare under the latter two rules.

## *Arconet: Accounting Harmonization Of Local Authorities*

I want to introduce my period of research in the Ministry of Economics and Finance under the Department of General State Account that is a beautiful experience for improving my research method and include more information in my thesis of PhD.

I start to explain what is Arconet defined as the Accounting Armonization of Local territories in Italy. Arconet is a process of reform of “Public Accounting Rules” with the aim to homogeneize the balance sheets of Public Administrations in merit to:

1. Provide the control of Public Account Balance defined the in the protection of National Public Finance.
2. Verify the responds of public account to the conditions of the article 104 of Eu Treaty.
3. Provide the attuation of Fiscal reform

The harmonization of the accounting systems and of balance sheets of Public Administration constitute the necessary condition of the Public Account reform (Italian Law n.196/2009) and the fiscal reform defined in the Italian Law n.42/2009.

Boths these laws delegated the Italian Government to adapts legislative actuation following the principles of the “Public Harmonization of Accounting”. In the end for local territories the delegation it was adopted by the legislative actuation of 23 June 2011 n.118 in terms of “Disposition of Harmonization of accounting systems and balance sheets of local territories and their organisms following the articles 1 and 2 of the law 5 May 2009 n.42.

Arconet Commission is the entity that manages the process of harmonization of the public account balance sheets, and it is regulated by the article 3-bis of actuative law 23 June 2011 n.118 corrected and integrated by actuative law of 10 August 2014 n.126 that has created under the Italian Ministry of Economics and Finance the Commission for the harmonization of local territories with the aims to facilitate the harmonization of the accountant systems and balance sheets of local

territories with the exclusion of the national sanitary entities financed by the national funds for sanitary purposes and to modify the allegates of the first part of the Italian actuaive law n.118 of 2011 in relation of the evolution process of the national law and to the monitorage of Public account balcance consolidation in merit of the delepment of the public account in respect to the European Accounting System. We define that the process of operation of Arconet Commission are regulated by Italian Ministry actuaive law of 4 Sempember 2017 and by the Italian Ministry actuaive law of 16 Dicember 2014 coordinated with the law of 4 Sempember 2017 while the component of Arconet Commission are regulated by the Italian Ministry actuaive law of 12 May 2016.

## ***Introduction Of The New Accounting Principles (Italian Dlgs 118/2011)***

Legislative decree 118/2011 on the harmonization of financial statements is divided into five separate Securities.

Title I on the general accounting principles applied for the Regions, the Provinces

autonomous organizations and local authorities, and their instrumental bodies and bodies (excluding health bodies), defines the structure of accounting instruments in order to ensure the economic unity of the Country. In particular, to ensure the unified detection of management events under the various profiles financial, economic and equity, the decree promotes the use of a homogeneous system of economic-patrimonial accounting. The general accounting principles to be respected are the Regions, local authorities and their instrumental bodies are summarized in Annex 1 al

decree which is an integral part of the provision. Other accounting standards applied (introduced by the legislative decree of 10 August 2014, n ° 126) concern the programming, the financial accounting, income statement and balance sheet and consolidated financial statements. The integrated chart of accounts in addition to being a strategic tool for consolidation and monitoring of public accounts, also guarantees a better connection of the accounts of the public administrations with the European System of National Accounts. The programming, the forecasting and accounting reporting are left to the budget system. Finally the municipalities financial, economic and equity balance sheets, consolidated with one unitary methodology of classification of expenditure and revenue are aimed at supporting the transparency and a simplified comparison of budget data. Further supplementary provisions e corrective with respect to the provisions of Legislative Decree 118/2011 were introduced by Legislative Decree no. 126/2014. The provisions of Title I apply from 2015. Title II of Legislative Decree 118/2011 concerns accounting principles for the health sector. In order to ensure uniformity of the health accounts of the bodies involved in the management of the expenditure financed by the resources allocated to the national health service, the provisions under consideration are aimed at immediate comparison of income and expenditure related to the financing of the health serviceregional and the verification of the additional resources

available to the Regions. In addition to indications concerning the breakdown of income and expenses in the preparation of the budgets, the identification of the responsibility center appointed to safeguard the process of harmonization of accounting systems in every region and every health institution, the legislator has the opening of health-related accounts in order to promote greater transparency in the management of cash flows. Other regulations also concern accounting records – books accounting, the budget and the financial statements (with indications also relating to documents which accompany the financial statements, at the time and methods of adoption and approval) - the criteria of evaluation and allocation of specific budget items, and consolidation of the budgets of the Health Management Regions centralized by the Region and the health bodies.

***The provisions of the Title II apply from 2012.***

The new Title III, introduced by Legislative Decree 126/2014, regulates the legal system financial and accounting of the Regions. It is hardly necessary to note the importance of the novella in question, port that regional finance competes with state and local finance at pursuing the goals of convergence and stability deriving from belonging of Italy to the European Union. To this end, the Regions comply with the accounting standards referred to in d. lgs. 118/2011 and are called to respect the related documentary obligations including the Document of regional economy and finance (DEFR) and the regional stability law which contains the framework of financial reference for the period included in the forecast budget. The budget system is articulated in the financial forecast budget, in the technical Accompanying Document of the budget and in the management budget. Further accounting records are the Indicator Plan and the expected results of the budget to facilitate the comparison of the balance sheets, the General Report of the Region and that of the instrumental bodies and the consolidated financial statements of the "Group of the Region". The provisions of Title III apply from 2015.

Title IV regulates the adaptation of the provisions concerning regional and local finance and the

Title V contains the final and transitional provisions, regulating, in particular, the phase of experimentation and the provisions for the Regions

with special status and the autonomous provinces. The provisions of Titles IV and V apply from 2015.1. General accounting principles applied to the Regions, the Autonomous Provinces and the Local societies

Title I of Legislative Decree 118/2011 establishes the criteria for the Regions, local authorities and their bodies and bodies instrumental (excluding health agencies) aimed at ensuring the economic unity of the Republic.

To guarantee the unified disclosure of operating events under financial profiles and

economic-patrimonial the legislator foresees that the financial accounting system adopted by the Regions, by the local authorities, and by some instrumental bodies, is flanked by a system of economic-patrimonial accounting, while the instrumental bodies in the civil accounting system prepare an economic budget and reclassify their accounting data according to uniform rules to those of institutions in financial accounting. In addition, special companies, institutions and others instrumental bodies of the Regions and local authorities are required to adopt the same accounting system of the administration to which they belong. The same entities in financial accounting are bound to comply with general accounting principles envisaged in Attachment 1 of the Decree and the principles applied introduced by Legislative Decree 126/2014, while the instrumental entities in an economic-patrimonial accounting system conform their management to general accounting principles of Attachment 1 and the principles of the Civil Code. The integrated chart of accounts is a strategic instrument for consolidation and monitoring of public accounts, and improvement of the connectability of the accounts of the public administrations in financial accounting with the European System of National Accounts. The definition of the plan was renewed with the entry into force of the legislative decree 126/2014. The budget system is aimed at safeguarding the planning, forecasting and management process and reporting. In particular, the financial, annual and long-term budgets are drafted, as well as the common budget and bill formats.

***The New Limits Of The Public Finance (art.9 of Decreto Legislativo 23 June 2011 n.118)***

The new limits of the art. 9 of Decreto Legislativo 23 June 2011 n.118 is defined by integrations and modifications. I start to remember that the Decreto Legislativo 23 June 2011 n.118 defined as “Dispositions account systems and balance sheets harmonization of local and regional entities in respect of art.1, 2 and 5 of Law 5<sup>th</sup> May 2009 n.42.

## ***Macroeconomics, fiscal policy and public debt: conflating myth and reality***

In a well-received and widely cited pamphlet, Leonard Read (1946) elaborated on the simple recognition that no person has the ability to list in detail all of the instructions someone would have to follow from start to finish to produce a pencil. Yet pencils are universally available, and we take for granted our ability to obtain a pencil whenever we wish. It is impossible for anyone truly to describe all of the myriad actions scattered over decades and even centuries that must fit together for pencils to be produced. The production of pencils is a *systemic quality* of particular patterns of interaction among people planting trees, harvesting and milling wood, mining graphite, manufacturing glue and building ships, among countless other activities that are necessary for pencils to appear in retail stores. What enables all of those activities distributed over centuries is what economists denote as a market system of economic interaction.

By *market system*, economists do not mean some kind of inanimate object that operates in clockwork fashion. Rather, they mean that human interactions are governed by some system of institutionally governed rules that tend to promote coordination among the economizing activities of individuals scattered across time and place. Primacy among those rules belong to private property and freedom of contract. For instance, someone might plant land with oak trees that will mature in 50 years, intending to harvest those trees upon their reaching maturity. Before those trees reach maturity, the person contracts a fatal disease. Without private property and freedom of contract, a person in that condition might be tempted to harvest those trees prematurely to make some use of the wealth represented by those trees. In the presence of private property and freedom of contract, however, the owner can improve his situation by selling the trees to someone else. Hence, the institution we know as private property can promote coordination over a duration of time that extends beyond the lifetime of people who initiated the particular action in question.

So economics is the study of how locally initiated economic activities can generate global networks of economic interaction when those interactions



are governed by the institutional arrangements we characterize as private property and freedom of contract. To be sure, not all property is held privately and freedom of contract is incomplete. Still, those institutions have predominate standing within contemporary economic life, and the central task of economic theory has always been to understand how these institutions operate to promote and secure complex patterns of economic interaction that are well beyond the scope of any intentional action. Yes, someone can intend to mine graphite. Someone else can intentionally plant trees and later harvest them. And someone else can intentionally construct a lumber mill with the capacity to cut wood into various configurations. But it is beyond human ability truly to plan the production of a pencil from start to finish. True, individual intentionally goes into the production of pencils. But that person would proceed by buying the inputs from the producers of other ingredients who, in turn, do the same things in their productive activities. In other words, a system of productive relationships is an emergent product of interaction among people within a nexus of market interactions that themselves are governed by an institutional framework grounded in private property and freedom of contract. This idea describes what economists mean when they describe a market economy as denoting a spontaneously ordered network of generally coordinated economic activity.

What accounts for the generally coordinated quality of economic activity is also the institutional framework of private property and freedom of contract. Someone who establishes a lumber mill, for instance, will want to design it so as to produce the kinds of products that people will want to buy. Otherwise, the owner of the mill will lose money and go out of business. What results from this system governed by profit and loss is that commercial success is governed by the ability efficiently to serve the desires of customers. In the days of Soviet economic planning, it was often noted that a steel mill that was given a quota to produce 100 tons of nails would produce bolts for fastening railroad tracks but would not produce finishing nails for carpentry. This would not happen when governance was provided through private ordering rather than communist-style public ordering. The theory of economic coordination within a market economy comprises the subject matter of what economists now describe as microeconomics. The idea of a separate field of macroeconomics did not enter the theoretical imagery of economists until after publication of John Maynard Keynes's (1936) *General Theory of Employment, Interest and Money*.

## MACROECONOMICS AND ECONOMIC COORDINATION

Only after Keynes did the notion of a separate object of inquiry known as macroeconomics come into play. In the fifth edition of his *Economic Theory in Retrospect*, the eminent historian of economic theory, Mark Blaug, described what became known as the Keynesian Revolution as:

one of the most remarkable episodes in the entire history of economic thought; never before had the economics profession been won over so rapidly and so massively to a new economic theory, and nor has it been since. (1996, p. 642)

This winning over took place within a decade. The 1936 publication of the *General Theory* was greeted by unfavorable reviews by many of the premier economic theorists of the time. Yet by 1946, the Keynesian Revolution had captured even the American federal government, as illustrated by the creation of the Employment Act of 1946 wherein the Council of Economic Advisers was established to bring economic expertise to bear on the task of maintaining full employment.

By 1946, the Keynesian vision of macroeconomic theory had pretty much conquered the academy. Prior to the Keynesian conquest, most economists had thought of governments as pretty much ordinary participants within the societal division of labor. While Leonard Read's story of a pencil's production did not include governmental activity, it could have been amended to do so. In that revised story, governments would have been construed as acting in much the same fashion as private citizens and enterprises. Wise conduct for a government was much the same as wise conduct for an individual. Hence, frugality was generally superior to profligacy. This led to governments operating generally with modest budget surpluses, with those surpluses being used to reduce public debt that had been acquired during depressions or to fight wars, as Buchanan and Wagner (1977) explain. In this respect, economists distinguished between ordinary expenditure and extraordinary expenditure, with times of war and depression calling for extraordinary measures (de Viti de Marco, 1936).

With the Keynesian conquest, the longstanding presumption that governments should balance their budgets during normal times and reserve deficits to time of war and depression had vanished from any significant public presence, and with Richard Salsman (2016) providing a careful review of three centuries of theorizing about public debt. With this change in presumption came a significant elevation in the perception of government by economists. Governments were no longer seen as mostly stagehands in the human drama that is society. They came to be seen as

occupying center stage in that drama because the quality of governmental fiscal policy determined the quality of the economic life of a society. The earlier notion of a self-regulating economy gave way to the presumption that government was responsible for good economic performance at the level of the economic system, as distinct from the individual enterprises within that system.

In this chapter we review the Keynesian inspired claim that governments can and should use their budgets to promote economic balance within the economy as a whole, for with the Keynesian era within which we live budget deficits and public debt are considered by politically dominant groups to be prime tools for managing an economic system (Wagner, 2012a). This Keynesian scheme of thought created two disjunctive theoretical frameworks. One was the micro-theoretic framework of market interaction governed by private property and freedom of contract. Prior to the Keynesian Revolution, this market-based theory of economic coordination was thought to have general validity as reflecting the self-regulating quality of market interaction. Full employment and not general gluts was thought to be the normal tendency of a market economy. Movements away from full employment would set in motion market-generated forces of correction that had been the prime objects of theoretical explanation by economists. Also part of that scheme of theoretical explanation was an examination of the ways in which economic coordination could go awry. Mostly, this concerned some peculiar features regarding money and banking, but the institutional framework of a market economy was thought to operate with a strong tendency to promote full employment.<sup>1</sup>

Within the Keynesian framework, there was no presumption that market economies would operate at full employment. Economic coordination there would be, but it could be the incomplete coordination of underemployment

equilibrium. In the concluding chapter of the *General Theory*, Keynes elaborated this disjunction between micro and macro levels of theorizing by asserting that ‘it is in determining the volume, not the direction of actual employment that the existing system has broken down’ (1936, p.379). Within this scheme of thought, the system of market interaction can be relied upon to determine the pattern of economic activity, but not to establish the volume of activity. To maintain an appropriate volume was the task of macroeconomic theory, and with this theory being put into play through fiscal policy as conveyed through budget deficits and public debt.

## **KEYNESIAN CLAIMS AND FISCAL FABLES**

In pre-Keynesian times, budgets were means by which governments planned their programs and financed them. Just as a provident person or family would live within its means, so would a provident government. Exceptional circumstances can always arise, both for individuals and families as well as for governments. While deficits might be used to work through those circumstances, balanced budgets would resume when normal times returned. The Keynesian Revolution brought into the fore-ground the fiscal policy message that the state of the budget could be a tool of economic management. Rather than passively running a budget deficit when a recession hit, the Keynesian message counseled the government actively to operate with a budget deficit to help the economy escape the recession. Indeed, the arch-Keynesian Abba Lerner (1944) claimed that the only reason for governments to tax was to avoid inflation. Otherwise, governments should finance their activities by printing money. Gone from this Keynesian formulation was any notion that a budget represented some kind of economic transaction whereby people supported some transfer of economically valuable resources from private to public use, and with taxation serving to limit that transfer. Government was now a lord of the manor with responsibility for maintaining that manor in a good state through its fiscal and other policies.

For Lerner’s extension of the Keynesian message, the budget was the central instrument of government’s management of the economic system. No

longer was the budget something to be balanced in normal times. To the contrary, the budget was a type of balance wheel that would be tilted toward deficit or surplus, depending on what was necessary to maintain stability within the entire economy. Should a recession hit, government would offset the fall in private spending by increasing public spending. And should prices start rising, government would lower the excessive private spending by increasing taxation. In any case, the state of a government's budget would now be set according to the general state of the economy, with deficits being created when private spending fell and with surpluses being created when inflation began.

Economic guidance in this Keynesian schema was encapsulated by the income-expenditure theory of aggregate demand. This theory started from the accounting identity between income and expenditure. In any transaction, what is income for one person is expenditure for the other party to the transaction. The Keynesian scheme aggregated all transactions within a national economy and described the resulting magnitude as national income or output. A common rendition of this framework is described by the familiar equation  $Y = C + I + G$ . By this equation,  $Y$  denotes aggregate

income,  $C$  aggregate consumption,  $I$  aggregate investment and  $G$  government spending. A symmetrical treatment could be approached from the side of expenditure. In any case, income is identically equal to expenditure; so one formulation is as useful as the other.<sup>2</sup>

The Keynesian equational framework provided a readily intelligible illustration of how a government could influence aggregate economic performance by manipulating the state of its budget. The terms  $C$  and  $I$  pertain the market-based portion of the aggregate economy. Suppose one posits a sudden decline of private spending through a decline in investment spending on capital goods. This decline would depress aggregate income, though that decline could be offset within the Keynesian framework by a well-timed increase in public spending denoted by  $G$ . Indeed,  $I$  and  $G$  could move in an offsetting manner, thereby keeping aggregate spending unchanged. For this to happen, it would be necessary to finance that added spending by increasing the stock of money in the economy and not by increasing taxes, which would reduce private income and spending.

Long ago, this Keynesian story appeared in the textbooks. It no longer does,

as it has been replaced by more complex formulations. Yet the contemporary formulations do not challenge the central core of the income-expenditure framework. They may obscure the plain core of that framework, but they do not deny it. Nor do they circumvent the stronghold the framework has on popular discussion and controversy. For instance, declines in aggregate economic activity, whether measured by increases in unemployment or by falls in output, invariably fuel proposals for increased public spending. This reflects the income-expenditure theory pure and simple, regardless of how it is articulated in the professional literature. This situation is illustrated nicely by responses to the so-called crisis of 2008. Politicians, central bankers, the financial press and ordinary people automatically think of government acting as a balance wheel that can be used to offset perceived declines in private economic activity. Left almost entirely out of play is any recognition of the possibility that a contemporary decline in private economic activity is a product of preceding governmental actions that injected turbulence into economic relationships. This alternative possibility would open into a different theory of economic activity at the systems level.

We should also note that economists have invented many versions of Keynes since his death in 1946. This situation is easy to understand, as Keynes worked with different frameworks at the same time. Most of the *General Theory* supports an income-expenditure framework. But not all of it does. Some of it gives much attention to uncertainty, as further illustrated by Keynes (1937). In this respect, such economists as Robert Clower and Axel Leijonhufvud (1975) and George Shackle (1974) treat Keynes

as a theorist whose vision of the economic process is grounded in uncertainty. While this vision has much of value, as Wagner (2012b) explains, it is wholly disconnected from any version of an income-expenditure theory. In this respect, Leland Yeager (1973) chides those economists as hiding their own theoretical creativity behind a Keynesian facade. This is a point of contention that we do not pursue here because this book's object of interest is political economy and not macroeconomic theory. We treat macroeconomics only to the extent that it is relevant for our analysis of political economy. Despite such theoretical controversy, it is doubtlessly clear that the preponderant policy response to any reduction in private economic activity is an increase in public activity. To treat political activity as a balance wheel to offset changes in private activity is overwhelmingly

at work in contemporary political economy. The contrary, classical theoretical formulation shows the image of the balance wheel to be mythical and not real, and will concern us here only to the extent it is relevant for our analysis of democratic political economy. In this regard, we do maintain that the image of the balance wheel reflects the hold of myth and not the power of logic and observation.

## **DISTINGUISHING MYTH AND REALITY IN MACRO THINKING**

Most economists deny that macroeconomics reflects more mythical than realistic thinking. It is surely our burden to explain our reversal of this common belief. How do we distinguish mythical from realistic thinking? There is a simple heuristic for doing so which resides in the distinction between postulating a condition and generating it. Standard fiscal policy claims that an increase in political spending will increase aggregate output. Is this claim mythical or real? Within the aggregative framework of the income-expenditure theory it is mythical. What makes it mythical is that the theory contains no explanation grounded in individual action that is able to generate the observed result. Aggregate variables are derivative and not primitive variables. They are derived from other, primitive variables that pertain to micro-level interactions. For a macro theory to reflect reality rather than reflecting myth, it is necessary to be able to generate macro variables from micro interactions.

In some respects, the relationship we have sketched between micro and macro and whether macro claims are mythical or real is related to the research program known as micro foundations for macro, which took shape in 1970. Unfortunately, that program proceeded by replacing one myth with another (Kirman, 1992). It did this by treating economic

observations as pertaining to a single person denoted as a representative agent. In this manner, the only difference between a stylized Robinson Crusoe and a social economy of millions or billions of people is a simple matter of dividing aggregate statistics by the number of people in the economy to create a representative agent. Through this theoretical

reduction, a national economy is reduced to a single individual and with that individual then analyzed in terms of a simple theory of choice rather than a complex theory of institutionally governed interaction.

For a macro theory to be realistic and not mythical, it is necessary that that theory be able to generate macro-level observations from micro-level interactions. In this regard, macro phenomena reflect a higher level of complexity than do micro phenomena. The relationship of micro to macro is one of parts-to-whole (Wagner, 2012b). Macro variables are thus inherently more complex than micro variables. If a billiard table contains a cue ball and an object ball, it is simple to explain the relationship between the cue ball's motion and the subsequent motion of the object ball. One cannot make the same claim about striking a cue ball into a rack of 15 balls because the individual balls will create complex patterns of interaction as they bounce off one another.

Billiard balls are inanimate objects, and so can be modeled according to the principles of physics. Billiard balls do not have minds of their own, but people do. The existence of minds makes a huge difference to bridging the gap between micro and macro levels of action and theory. People can talk back as it were to the actions of political officers, and in doing so inject new information into the social processes that the macro theory envisions as being under political control. To escape mysticism in social theory, it is necessary to model people and the situations they face and actions they take in ways that conform to what we know about human knowledge and capacity. Moving from myth to reality in theoretical formulation can surely be accomplished, but it is necessary to be wary of embracing mythology before this can be done.

Let's consider briefly a few of the pitfalls that lie along the macro path from myth to reality, and do so with reference to the income-expenditure framework. First, in describing how a fall in private spending can be offset by an increase in political spending, the analysis is set in a world of pure algebra. The theorist is given a problem in algebra, and is asked to solve how much  $G$  must be increased to offset a given fall in  $I$  in the income-expenditure equation. This imagined world is pure fantasy. To escape fantasy, it is necessary to explain how reality can reasonably and plausibly be reduced to the income-expenditure framework. Macro theorists have not accomplished that reduction. In this respect, the representative agent



formulation evades the problem rather than resolving it.

Second, the operation of time must be taken into explicit account because all human action occupies time. This moves us out of the realm of simple algebra; however, movement into a realm of subscripted algebra would not represent improvement because the use of subscripts to represent time evades the problems that time creates for economic interaction. To use subscripted variables implies that next year's actions are known today, which is to invoke yet another point of mythology. In reality, next year's actions will not be known until next year when people undertake their chosen actions. Furthermore, those actions will not be entered into aggregate economic observations without allowing for a lapse of time between the action and its entry into the tables of data that become the material of aggregate accounting.

Third, an economy is an ecology of entities and not a single entity. This simple difference between an entity and an ecology of entities means that aggregate economic variables are not reasonably constructed through simple addition over their individual counterparts. Those interactions generate emergent phenomena that pertain to communities of Crusoes but not to individual Crusoes. One thousand islands, each of which has a Robinson Crusoe living there in isolation, will not be a simple scalar multiple of 1,000 people living together on the same island. Individual Robinson Crusoes do not operate with property rights, do not quarrel with one another and do not organize into business firms and governmental bodies. In other words, an isolated Robinson Crusoe exhibits few of the recognizable features of contemporary life. Stated differently, an ecology is not reasonably represented as a parade. A superior image is that of a crowd of spectators leaving a stadium. Both the crowd and the parade are orderly social configurations, but of dramatically different type with different sources of orderliness. We raise these problematics of macro theory here not to address them but to give them some presence in our effort to construct a political economy that has a realistic rather than a mythical orientation. To do this requires that we move analytically in the direction of explaining how macro-level observations emerge out of micro-level interactions, and with those interactions pertaining to pedestrian crowds and not to parades.

## TAXATION, PUBLIC DEBT AND FISCAL POLICY

According to the income-expenditure model, a decline in private spending can be offset by an increase in political spending. This possibility requires that political spending be financed by borrowing in some fashion and not by taxation. If the increased spending were financed by taxation,

the increase in political spending would be offset by a decrease in private spending due to the increased taxation. An expansionary fiscal policy requires a base of public debt to do its work because the purchase of public debt by central banks is the modern method by which the stock of money is increased. The postulated decline in private spending means that private citizens are spending less than previously. This decline means in turn that people have increased their holdings of money. In monetarist language this means an increased demand for money by private citizens.<sup>3</sup> Whichever language is used, the image of government acting as a balance wheel to the private economy is more mythology than a real facet of economic experience.

The mythical quality of fiscal policy becomes apparent once it is realized that time and human action is continuous and not segmented. To illustrate the distinction, suppose we think in terms of a ten-year slice of history, starting today and running forward. One scheme of thought could separate this period into ten annual pieces, and treat each year as independent points of observation. In this instance, the income-expenditure algebra would pertain to ten distinct intervals. This setting pertains, of course, to a world of pure fantasy because people act through time in carrying out their plans. In consequence, a change in taxation today will influence action through a sequence of periods.

In this respect, an increase in public debt today implies increased taxation in future years to amortize the debt. Those projected future tax increases are anticipated by people today, which leads them to modify their present actions. As one instance of such modification, people might reduce their current spending to enable them better to finance the future tax increases that the present increase in public debt entails. In his book from 1817 titled *On the Principles of Political Economy and Taxation*, David Ricardo

articulated his principle of the equivalence of taxation and public debt. In light of this equivalence, the idea of fiscal policy is a myth and not a feature of reality. A government that borrows to increase its spending is thus not increasing the volume of spending within the economy. Rather it is only changing the composition of spending. Politically directed spending rises by virtue of debt finance, but that debt also implies increased taxation in future years. People with some modicum of providence in their conduct will incorporate into their present conduct a belief that taxes will rise in future years. This anticipated increase in future tax burdens will induce people to change their current actions to better accommodate the higher tax regime that is in the offing. For instance, someone who had been planning to pay a child's college tuition starting in five years might increase personal saving starting now to make such tuition payment feasible in light of higher future taxation.

In recent years, Robert Barro (1974, 1979a) has been in the forefront of efforts to make Ricardo's proposition a centerpiece for macroeconomic theorizing, and with Seater (1993) providing a valuable survey. Ricardo stated his equivalence proposition in terms of a representative individual who can choose between paying a tax of \$1,000 now or paying a set of \$100 taxes in perpetuity when the rate of interest is 10 percent. With the interest rate being 10 percent, a perpetual stream of 100 annual payments is equivalent in present value terms to a one-time payment of \$1,000. It is straightforward to imagine that the set of perpetual annual payments represents interest payments on a loan. Rather than paying a tax of \$1,000 now, an individual could borrow \$1,000 that would call for annual interest payments of \$100 in perpetuity. If the relevant rate of interest were 10 percent, this set of perpetual payments would be equivalent to the \$1,000 tax. Among other things, the Ricardian proposition means that public debt does not enable governments to do anything that they could not accomplish through taxation, for public debt is just a particular form of taxation. If this proposition is correct, it means that public debt cannot be used as a tool for economic stabilization, contrary to Keynesian-inspired claims about fiscal policy. For a government that wanted to increase its spending, doing it through taxation would be identical with doing it through borrowing.

It should be noted that Ricardo also advanced some grounds for thinking that an individual in this position might not regard the alternatives as equivalent. To the contrary, Ricardo argued that an individual might regard

the prospect of annual payments extending indefinitely into the future as being less onerous than having to make a single payment now. An individual in this position would not regard taxation and debt as equivalent, and instead would regard borrowing as less burdensome. This possibility is commonly described as ‘debt illusion.’ Claims on behalf of illusion have been controversial among economists because such claims seem to contradict the presumptions about rationality to which most economists subscribe. To the extent debt illusion is present, Ricardo’s equivalence proposition is broken and people will act differently if they can borrow than if they must pay taxes, provided they perceive borrowing as being less costly than taxation.

With public debt treated as a macro magnitude, it would seem as though the ability of a government to use budget deficits and surpluses as tools to promote economic stability depends on the extent to which debt illusion is present within a population. The more fully people exhibit debt illusion, the stronger will be the ability of a government to use fiscal policy to influence the volume of spending within an economy. At this point many economists would seem to face a dilemma. Many of them, probably most of th

believe that economic theories should be based on claims that individuals are rational. Many of them also believe that governments should use its budgetary powers to promote economic stability. Yet one cannot hold both beliefs at the same time. It is possible to theorize about public debt in a manner that debt arises through institutionally governed processes of interaction among individuals. This approach to public debt was sketched by Antonio de Viti de Marco (1936), and we carry that approach forward in this book, though while also incorporating conceptual formulations that were not available when de Viti set forth his approach to collective activity.

## THE ILLUSORY COGENCY OF DEBT-ILLUSION CLAIMS

Within the framework of orthodox macroeconomic theory, to claim that a budget deficit can increase aggregate spending entails the presumption that people are subject to debt illusion. If they are afflicted by debt illusion, people will treat the substitution of borrowing for taxing as an increase in their net worth. What makes this proposition seem sensible, indeed inescapable for macro theorists, is the presumption that a macro economy is an economizing unit in its own right and not simply an aggregation over a set of economizing agents. The fiction of the representative agent seeks to cover over the otherwise embarrassing quality of this analytical construction. Our point is that public debt is not a result of a single transaction made by an economizing agent. To the contrary, it is an emergent quality of interactions among numerous economizing agents. This difference in analytical orientations matters hugely for notions of debt illusion, as well as for aggregate phenomena more generally.

With respect to debt illusion, it is possible to imagine data that would seem to show that some people have debt illusion while others do not. One could imagine an experiment where a set of people are assigned some particular liability and are given the option of discharging it now or over some duration where the amount discharged is of equivalent present value. In this setting it would be plausible to think that some people would choose to discharge the liability now while others chose to discharge it over some interval of time with interest. One could even invoke some rudimentary public choice theory to suggest that the collective outcome in this setting depends on the number of people who exhibit debt illusion relative to the total population. One simple model of majority voting holds that collective outcomes are determined by the preference that is median within the collectivity. In this case, whether a budget deficit increased aggregate spending would depend on whether the median voter possessed debt illusion.

This fuss about debt illusion, however, is a response to an imaginary setting that has nothing to do with reality. It is an illusion that is created by the aggregation of individual data, and with theorists then seeking to develop models to explain that aggregate data without generating that data through interaction among economizing agents. In other words, the substance that

forms the subject of an economic theory depends upon and is not separate from the methods that theorists use to assemble their theories. In this regard, Friedrich Nietzsche made famous the expression of the need to look through multiple analytical windows to acquire a clearer apprehension of complex phenomena. We note simply that the substance that emerges from some line of analysis depends on the method used to analyse that material. Method and substance are interdependent, despite many presumptions that they are independent, in which case there would be one unique method from which truth follows from proper analytical procedure. This most certainly is not the case. In large measure in the social sciences, what one sees depends on the method one uses. There is a well-recited joke about an economist caught looking under a lamppost for his car key. When asked if he was sure that was where he dropped his key, he answered that no it was not, but no light was shining where he dropped it. The joke always brings chuckles at meetings of economists, undoubtedly because it speaks an uneasy truth. A particular analytical technique or data set might be easy to work with even if it has but modest relevance for any questions of interest. To address questions of interest, however, would require construction of a different analytical framework. A model that is easily tractable might generate answers to questions of relatively little interest or value, while addressing questions of high interest or value might require willingness to work with a lower level of tractability.

For instance, the theory of perfect competition is highly tractable and easy to work with. This is the world of universal price-taking where all prices equal their marginal costs of production. All firms earn just normal rates of profit, which is the lowest rate necessary to attract owners of capital to invest in the firm. The law of one price holds everywhere, and it is impossible to inject any change into the economic system without leaving at least one person worse off than before the change. This is a scheme of thought that has proven useful in generating a wide range of observations that fit reasonably well with observations found in real experience.

This theory, however, is an incomplete theory and is thus inadequate as a stand-alone theory. If price-taking is a universal phenomenon, it is impossible for prices ever to change. And yet they change all the time. To explain the continual changing of prices requires that price-taking be only partial and not universal. But if price-taking is only partial, the law of one price cannot hold. Hence, prices cannot universally equal marginal costs, and

it might be possible for there to be changes that make some people better off without leaving other people worse off. To analyse the entrepreneurial injection of economic change into society requires a different analytical schema than the theory of competitive equilibrium (Kirzner, 1973, 1985).

It is the same with public debt. Ricardian equivalence is a close cousin to the theory of competitive equilibrium. In contrast, de Viti's theory of public debt is an analytical cousin to Joseph Schumpeter's (1934) theory of change through entrepreneurial action. De Viti's theoretical orientation proceeds in a bottom-up fashion. It characterizes a macro economy as a parts-to-whole relationship. The individual parts within a social system initiate actions, with those actions eventually resolving into some picture of the whole. The parts are the primitive carriers of action; the whole is derivative from those individual actions and is not reducible to some single action. This difference in theoretical orientations ramifies throughout the material of political economy and public debt.

### ***Conclusion: Foundations of International Public Finance and the Aim of the Project Research***

“The Keynesian Approach” dominated the politico-economic principles after World War II in particular during the 1970s where governments must play an active role in stabilizing market economies. In the other hand the public expenditures can raise the aggregate demand with the spending being financed by public deficits. With low aggregate demand and high unemployment the government must become active in order to restore the full employment equilibrium which then allows to reduce outstanding public debt. The public debt does not pose a problem if the government runs into debt in the home country because no resources are lost and public deficits just imply a relocation of resources from taxpayers to bondholders.

Another way to solve the debt financing is the inter-generational distribution called the golden rule of public finance. According to that rule, governments should finance public investments that are necessary for long-term benefits by public deficits in order to make future generations contribute to the financing. Since the future generation will benefit from today's investment, their contribution to the financing is justified. Otherwise the current generation would have to bear all the costs but benefit only to certain degree which is considered as unfair. In merit of the predominant Keynesian view, public debt rose considerably in the fourth quarter of the last century and what is more the increase in public debt was even larger than the growth rate of the goods domestic product (GDP) as in many European countries where the ratio of public debt to GDP grew. We can say that the countries participating in the European Economic Monetary Union have signed the Maastricht treaty stating that the public deficit and the public debt relative to GDP must not exceed 3 and 60%, respectively, quite a many economies have difficulties with their debt service and the fact that the European Stability Mechanism is made for preventing bankruptcy. We can define the question about which conditions a given path of public debt is sustainable. In fact we can remember that in economics modern empirical research analyzing the sustainability of a time series of public debt has begun with the paper by Hamilton and Flavin (1986) who studied US government debt from the early 1960s to the mid 1980s.

We can say that when public debt rises in an economy, the government must increase future primary surpluses in order to satisfy the intertemporal budget constraint unless it accepts the possibility of a default. This default is not a good choice since a government default is usually accompanied by social problems that can affect the whole political system. Higher primary surpluses can be achieved by raising taxes, reducing public spending or by a rise in GDP, that leads to more tax revenues. Another event that it can appear in a monetary economics context is that the Central Bank raises the money supply and accepts a higher inflation rate when the value of public debt decreases. In fact when the inflation rate exceeds the interest rate on public debt the real interest rate becomes negative leading to a decline in the public debt to GDP ratio. When we talk about a monetary economy we can distinguish Ricardian and Non-Ricardian regimes where the intertemporal budget constraint of the government must hold for some conditions of the price level but not for all in contrast to the budget constraint of the private agents. If the intertemporal budget constraint of the government does not



hold for any path of the price level the government only holds in equilibrium. If the intertemporal budget constraint holds for any price path of the level price the government pursues a Ricardian fiscal policy. Thus in a non-Ricardian regime where the government would not commit itself in the future to completely match new public debt with future primary surpluses because some part of the additional debt is to be financed through money creation. In the other hand with the Ricardian regime the future fiscal revenues are expected to be equal to current public debt where the contributions for fiscal theory of the price level are Leeper (1991), Sims (1994) and Woodford (1994). But the fiscal theory of the price level is controversial and has been criticized by Buiter (2002), and in the paper by McCallum (2003).

This research analyses how public debt affects economies that has had a long tradition. We can say that in the nineteenth Century David Ricardo built the known "Ricardian equivalent Theorem". According to that theorem budget deficit today requires higher taxes in the future when a government cuts taxes without changing present or future public spending. Obviously households looking for their future payment of higher taxes while they pay low taxes currently. As a consequence households will reduce their consumption and increase savings in order to meet the future tax burden. We define that Ricardian equivalence theorem is based on the intertemporal budget constraint of the government and on the permanent income hypothesis. The first principle states that public debt must be sustainable in the sense that outstanding debt today must be equal to the present value of future government primary surpluses. The second principle states that households do not base their consumption on current income but not on permanent income so that they will not raise consumption as long as their income increase only temporarily. In conclusion the Ricardian equivalence theorem is intuitively plausible but it may be difficult to find in real world economies such as the absence of distortionary taxation or the non-consideration of economic growth.

## *The Aim Of Project Research*

The “Goal” of my research is to analyze the effects of public debt and to work out the mechanisms that make public effect the real side of an economy, using modern models of endogenous economic growth theory. My analysis starts with the intertemporal budget constraint of the government to which the government must operate on. The condition when the public debt is sustainable is defined by “public spending” and “public revenues” ignoring the central bank of an economy in the majority of cases. Governments should not rely on central banks to reduce public debt through money creation since central banks are independent and there is no obligation for them to assist government in pursuing sustainable debt policies. I neglect the possibility that a government can use signorage or inflation to reduce the stock of outstanding real public debt.

In my research I start with the main question of “under which condition a given level of public debt is sustainable”. I put evidence on the relation between the primary surplus and the public debt relative to GDP, respectively and on the ratio of public debt to GDP. In merit of my analysis I demonstrate that a permanently rising debt to GDP ratio is not compatible with a sustainable debt policies. The larger part of my thesis is dedicated to the empirical analysis of the sustainability of a given time series of public debt in real economies. I analyse Japan and USA as well as member countries of the Euro Area, where countries as Portugal and Spain are affected their sustainability position due to the financial crisis of 2007. I introduce a basic endogenous model that allows for public debt and I study also growth and welfare effects of different debt policies, I analyse how those debt policies affect the stability of market economies. I start with a basic model assuming that the history of past debt that determines the primary surplus policy of a government. In my thesis I also consider the central bank that can help the government to fulfill its intertemporal budget constraint by money creation analyzing the interrelation between fiscal and monetary policies and how it affect growth and welfare as well as inflation and stability of an economy. In conclusion the structure of this basic model is changed by assuming that the labor market is characterized by real wage rigidities that give rise to permanent unemployment. I analyze growth and welfare effects of different debt policies and I study of how those debt policies affect the stability of market economies. I start with a basic model

and I assuming that it is the history of past debt that determines the primary surplus policy of a government. I consider also the central bank that can help the government to fulfill its intertemporal budget constraint of money creation. In fact I analyze the interaction between fiscal and monetary policies and how it affects growth and welfare as well as inflation and stability of an economy. The structure of this basic model is changed by assuming that the labor market is characterized by real wage rigidities that give rise to a permanent unemployment and the effect of this action in relation to the economic growth and stability of the economy are then analyzed in terms of the model with a perfect labor market. Continuing of my research I assume that the government invests in a productive public capital stock that raises aggregate production possibilities. The government finances its expenditures by a tax revenues and by public deficits and I analyze the effects of a different public debt policies with respect to the stability of the economy. Then I change the tax system and I study how the more realistic assumption of a progressive income tax scheme affect the outcome. I present and I analyze the model of how production is affected by public spending in the particular attention of the unemployment rate with a lock-in effect that it depends of the initial debt to GDP ratio. I assume that the market is not perfect characterized by wage rigidities and unemployment, I present a detailed analysis of that model and I compare it in a perfect labor market.

The role of the human capital in the market is extremely important in my thesis in a context where the governments hires teachers and finances additional teaching material to build up human capital in an economy. The government in fact has access to the credit market and can finance its spending by running a deficit and with a distortionary income tax. I define an appropriate equilibrium conditions and a balanced growth path and we study effects of different public debt policies. That model then is made more elaborate by allowing for a stock of knowledge capital that results as a by-product of production called “learning by doing). However knowledge accumulation is only possible if workers has a certain amount of education so that human capital accumulation is an indispensable precondition for knowledge creation and economic growth.

In conclusion I present empirical estimation analyzing the correlation between economic growth and public debt I introduce panel data estimations including selected European economies and the USA for the time period from 1970 to 2012. I estimate both a pooled regression model and the

random effects model with the GDP growth rate as the dependent variable that is defined in the public debt to GDP ratio at the beginning of the period under initial GDP inflation. I compute the GDP growth rate in 1 year to 3-5 years time interval with the effect of the public debt in the allocation of resources in the market economies.



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