Killing two birds with one currency: income and fiscal policies in a growth model of a currency union

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Introduction

The economic performance of the euro area has so far been disappointing. Figure 1 compares average growth rates in major regions of the global economy, using World Economic Outlook classification (IMF, 2016a). Before the global financial crisis, the euro area had the second smallest average growth rate (2.1%), only exceeding that of Japan (1.1%). Yet during the crisis, the Japanese economy proved more resilient than that of the euro area, despite the huge supply-side shock caused by the 2011 Tōhoku earthquake and tsunami. Growth in Japan slowed by only -0.8 percentage points, while the euro area experienced the sharpest fall in average growth, equal to 2.1 percentage points. This growth slowdown was only matched by the Middle-East and North Africa, i.e. the theatre of several major conflicts (two Libyan, the Syrian, the South-Sudanese and the Yemeni civil wars) with effects on adjoining countries (IMF, 2016b). The euro area took until 2015 to recover its pre-crisis income level, whereas the United States had already recovered in 2011.

[FIGURE 1 ABOUT HERE]

Though disappointing, this outcome should not be surprising, having been anticipated by mainstream and heterodox economists alike. Since member countries featured asymmetries in their technological levels, labour markets, average productivities and non-price competitiveness, it was generally expected that adoption of a fixed exchange rate would cause external imbalances among them. This view proved to be correct, as shown in Figure 2, which displays the intra-zone trade balances of the four major euro area members. Since adoption of the euro, these balances have diverged, with Germany accumulating surplus and France, Spain and to a lesser extent Italy accumulating deficits. Views differed about the significance of these imbalances. That of the European Commission, expressed by Emerson et al. (1990), was that member countries would no longer experience any balance-of-payments constraint owing to monetary integration. More specifically, national investment would not be constrained by national saving because financial markets would “finance all viable borrowers”, bringing the Feldstein-Horioka (1980) puzzle to an end (Blanchard and Giavazzi, 2002). Feldstein (1992) himself, among mainstream economists, as well as heterodox economists like Thirlwall (1991) and Godley (1992), immediately warned that monetary integration, while favouring the creation of imbalances, did not dispense countries from the need to adjust for them, and that fixed exchange rates would “transfer the task of adjusting for competitiveness to the labour market” (Dornbusch, 1996) through so-called “internal devaluation”.

[FIGURE 2 ABOUT HERE]

As a matter of fact, since the outbreak of the crisis, intra-zone imbalances (Figure 2) have been corrected by the “competitive unemployment” mechanism evident in Figure 3: the unemployment

rate rose in peripheral countries, repressing imports (through a fall in domestic demand) and fostering exports (through a fall in unit labour cost), while it fell in core countries.

[FIGURE 3 ABOUT HERE]

The crisis made it clear that owing to euro area structural asymmetries and in the absence of nominal exchange rate realignment, member countries must adjust relative prices through wage and price flexibility. More precisely, current neoliberal policies require that southern countries restore competitiveness through internal devaluation (wage cuts obtained by raising unemployment through restrictive fiscal policies), which in the long run allows them to rebalance their current account. According to mainstream economists, the disappointing results of these policies in terms of employment and growth do not demonstrate their failure, but rather the persistence of rigidities and frictions in the goods and labour markets. Their prescription is therefore to further liberalise and flexibilise these markets (e.g. Agnello et al., 2014; Bertola, 2016). According to heterodox economists, by causing recession, austerity policies repress investments and therefore undermine long-run growth in southern countries (Boyer, 2012; King et al., 2012; Petit, 2012).

These contrasting views on the appropriateness of austerity policies in Europe follow from two contrasting theoretical models of an open economy. The models disagree with regard to theoretical hypotheses and current account imbalance adjustment mechanism. On one hand, neoclassical models of international trade postulate full employment of the factors of production. This implies that countries are constrained by their endowment of resources and that wage and price flexibility allow optimal reallocation of factors of production among nations, depending on their comparative advantages, as well as adjustment of external imbalances. As a consequence, neoclassical economists sustain that countries do not really compete with each other, insofar as external imbalances are adjusted through wages and prices (Blecker, 1998). In post-Keynesian models, full employment is not granted and equilibrium is consistent with underutilization of factors of production, even in the long run. Since economies are not constrained by their factor endowments, international differences in long-run growth rates are explained by demand constraints (Thirlwall, 2002). In an open economy, access to foreign markets becomes the main determinant of economic growth, and the adjustment of external imbalances inevitably occurs through the level of economic activity in the short run and through the rate of growth in the long run. Contrary to the neoclassical vision, the post-Keynesian view is that countries compete with each other to appropriate a share of the international market.

Here we consider the adjustment of external imbalances in a monetary union in the framework of a Kaleckian model, where the economy is constrained by aggregate demand along post-Keynesian lines and income distribution plays a major role in long-run growth (Rowthorn, 1981; Dutt, 1984). Most open-economy Kaleckian models deal with an economy facing an exogenous “rest of the world”,

which is not affected by price and quantity adjustments in the country considered (Blecker, 1989, 1999, 2011; Krugman and Taylor, 1978; Lavoie, 2014 Ch. 7). As a consequence, they cannot really count on trade interlinkages, the role of which becomes crucial in a monetary union due to enhanced trade integration. As a matter of fact, by promoting intra-zone trade, monetary unions risk fostering external imbalances among their member countries. In order to achieve sustainable long-run growth, adjustment mechanisms are needed in each country. However, in the absence of nominal exchange rate realignment, the final effect of the available adjustment mechanisms is to amplify interdependence between member countries. In order to tackle these issues, we need to adopt a theoretical two-country growth model where trade interlinkages are explicitly taken into account.

Extensions of the Kaleckian framework to a two-country growth model are relatively limited (McCombie, 1993; Dutt, 2002; Vera, 2006). Their common goal has been to assess the impact of a country's growth on the growth of its trade partner through the balance-of-payments constraint. Building on Thirlwall's (1979) law, these models show that an economy cannot cumulate current account deficits indefinitely, and that adjustment of these imbalances constrains the growth path of partner countries. Dutt (2002) and Vera (2006) adapt this framework to a North-South model in order to revisit the issue of convergence between countries. In particular, they show that the composition of international trade causes uneven development between North and South. However, the most relevant reference for our analysis is McCombie (1993) who compares two advanced countries facing a balance-of-payments constraint. His paper shows the complementarity of growth regimes in the two countries: the sustainability of an expansionary policy stance in one country is constrained by reactions in the other country. The main shortcoming of McCombie's (1993) model is that it translates the standard short-term static Keynesian framework, where the variables are specified in levels, into a model expressed in rates of growth, without taking capital accumulation into account. As a consequence, the author cannot define the steady-state path of the economies.

Building on Dutt (2002), our purpose is to analyse the short- and long-run equilibrium, considering two developed economies belonging to a monetary union, i.e. in a setting in which nominal exchange rate realignment is prevented. The two countries considered feature different degrees of non-price competitiveness. As a consequence of this structural asymmetry, the long-run growth rates consistent with their respective balance-of-payments constraints differ. By endogenising the terms of trade through the wage and prices mechanism in both countries, we bring to the fore the goal of adjustment policies: to make domestic wage and price dynamics consistent with the external constraint (through the so-called "internal devaluation" mechanism). The structure of our model allows us to assess the appropriateness of austerity policies and their implications for the long-term growth paths of countries belonging to a monetary union.

A two-country Kaleckian model of a monetary union

Notation and hypotheses

We consider a monetary union consisting of two countries or regions (1, 2). The two countries are perfectly integrated and do not trade with the rest of the world. We assume that in both countries goods are produced by combining labour and capital with fixed-coefficient technology. Moreover, firms operate below capacity, which implies that production is demand-constrained. Due to an imperfect competition environment, firms practise full-cost pricing, by defining prices (P_i) through a markup on their unit variable costs:

$$P_i = \psi_i \frac{w_i}{Q_i} \qquad (i = 1,2) \tag{1}$$

where $\psi_i \geq 1$ is the markup, which depends on the degree of monopoly in the two markets, w_i is nominal wage, and Q_i is average labour productivity.

There are two categories of agents in each country: workers and capitalists. Equation (1) implies that workers earn a share of national income (before tax) equal to $1/\psi_i$, while capitalists take a share equal to $1-1/\psi_i$. Thus in both countries firms' markup behaviour affects the functional distribution of income. In our model, we endogenise the markup and consequently the functional distribution of income. Following Blecker (1988), we assume that firms chose their markup under the pressure of international competition in the goods and services market. More precisely, we assume that in order to preserve their competitiveness, firms reduce their markups when domestic production becomes more expensive than foreign production.[1] Since competitiveness is measured by the relative unit labour cost (RULC), namely the ratio of unit labour cost in country 1 to unit labour cost in country 2, the markup behaviour of firms can be represented as follows:

$$\psi_1 = \psi_1(\Omega), \qquad \psi_1' < 0$$
$$\psi_2 = \psi_2(\Omega), \qquad \psi_2' > 0$$

where $\Omega = (w_1/Q_1)/(w_2/Q_2)$ is the RULC. For mathematical convenience, we write these relationships using constant-elasticity functions:

$$\psi_1 = a_1 \Omega^{-\theta_1} \quad (\text{with } \psi_1 = 1 \text{ if } \Omega < a_1^{1/\theta_1}) \tag{2}$$

[1] This markup behaviour builds on the "profit squeeze" literature (Glyn and Sutcliffe, 1972; Milberg and Arestis, 1993-94).

$$\psi_2 = a_2\Omega^{\theta_2} \quad (\text{with } \psi_2 = 1 \text{ if } \Omega < a_2^{-1/\theta_2}) \tag{3}$$

where $a_i > 0$ and $0 \leq \theta_i \leq 1$ is the elasticity of the markup to RULC.

Elasticities θ_i (i = 1, 2) relate firms' markup behaviour to competitive pressure on international markets. When $\theta_i = 0$, competitive pressure plays no role and firms do not modify their markups in relation to RULC. As a consequence, any change in money wage is fully incorporated in domestic prices. On the contrary, when θ_i = 1, any change in RULC is fully transferred to the markup.

According to the Kaleckian model, we assume that capitalists save a share s_i of their income, while workers spend all their income.

For the sake of simplicity, we consider that governments finance public expenditure (G_i) by levying taxes on all incomes at the proportional rate t_i. As a consequence, t_i represents both the average tax rate and the share of public expenditure in each country's national revenue (Y_i).

Private saving (S_i) in the two member countries is:

$$S_i = s_i(1-t_i)\left(1-\frac{1}{\psi_i}\right)Y_i \tag{4}$$

By definition, the nominal exchange rate between two member countries of a monetary union equals one. As a consequence, by equations (1), (2) and (3), the real exchange rate between country 1 and country 2 is:

$$P = \frac{P_1}{P_2} = \frac{a_1}{a_2}\Omega^{1-\theta_1-\theta_2} \tag{5}$$

In order to describe the trade relations between the two countries we exploit a truism implied by economic system interdependence in a two-country model: exports in one country (X_i) must coincide with imports in the other country (M_j). Using standard trade equations, trade relations can be expressed as follows:

$$X_1 = P^{-\mu_2}Y_2^{\varepsilon_2} = M_2 \tag{6}$$

$$X_2 = P^{\mu 1}Y_1^{\varepsilon_1} = M_1 \tag{7}$$

where $\mu_i > 0$ and $\varepsilon_i > 0$ represent the elasticity of country *i*'s imports (or country *j*'s exports) to price and income, respectively.

We introduce structural heterogeneity between the two countries by assuming that their non-price competitiveness differs. More precisely, we say that country 1 is less competitive than country 2, and we express this by assuming that $\varepsilon_1 > \varepsilon_2$.

Balance-of-payments equilibrium in terms of country 1's goods reads:

$$F = \frac{M_1}{P} - X_1 = P^{\mu_1 - 1}(Ku_1)^{\varepsilon_1} - P^{-\mu_2}(Ku_2)^{\varepsilon_2} \tag{8}$$

where $F > 0$ measures capital inflows in country 1 (i.e. a deficit in its trade balance), and symmetrically, capital outflows from country 2 (an equivalent trade surplus). The contrary applies whenever $F < 0$.

Short-run equilibrium

In the short run, capital stocks (K_i) are given and wages (w_i) are constant. As a consequence, prices (P_i) and markups (ψ_i) are also constant. For the sake of simplicity, we assume without loss of generality that the initial capital stock is the same in both countries $(K_1 = K_2 = K)$ and we define their respective capacity utilization rates as $u_i = \frac{Y_i}{K}$, i = 1, 2. Following the Kaleckian approach, accumulation in both countries depends positively on the current profit and capacity utilization rates:

$$\frac{I_i}{K} = \eta_i + \gamma_i u_i + \alpha_i \frac{\pi_i}{K} \tag{9}$$

where π_i are profits in country i and $\eta_i > 0$ indicate autonomous investment.

Since $\frac{\pi_i}{K} = \frac{\pi_i}{Y_i} u_i = \left(1 - \frac{1}{\psi_i}\right) u_i$, the accumulation function can be written as:

$$\frac{I_i}{K} = \eta_i + \left[\gamma_i + \alpha_i \left(1 - \frac{1}{\psi_i}\right)\right] u_i \tag{10}$$

The equilibrium on the market for goods and services in the two member countries determines their ability to finance their respective investment flows:

$$I_1 = S_1 + F \tag{11}$$

$$I_2 = S_2 - PF \tag{12}$$

Since in the short run, wages and prices are constant, adjustment occurs through quantities, and in particular the equilibrium in real markets is restored by fluctuations in output. By substituting eqs. (4) and (10) in the accounting identities (11) and (12), we obtain the capacity utilization rate in the two countries:

$$u_1 = \frac{\eta_1 - \frac{F}{K}}{\left[s_1(1-t_1) - \alpha_1\right]\left(1 - \frac{1}{\psi_1}\right) - \gamma_1} \tag{13}$$

$$u_2 = \frac{\eta_2 + \frac{PF}{K}}{\left[s_2(1-t_2) - \alpha_2\right]\left(1 - \frac{1}{\psi_2}\right) - \gamma_2} \tag{14}$$

Given K, t_i, Q_i, and w_i, and hence p_i, ψ_i, P and Ω, equations (8), (13) and (14) form a system of three equations with three unknowns (F^*, u_1^*, u_2^*) that define short-run equilibrium.

Since our focus is on long-run growth, following McCombie (1993) and Dutt (2002) we introduce a simplifying hypothesis on the short-run equilibrium in order to cancel out capital flows between countries, and as a consequence ignore the level and dynamics of interest payments. To do so, we assume that the model's parameters (such as income and price elasticities of imports in countries *i* and *j*) and exogenous variables (such as average tax rate (t_i), initial capital stock (K) and average labour productivity (Q_i …)) are such as to ensure that in the short run $F = 0$.[2]

The short-run equilibrium of the model is therefore defined as follows (*i*=1,2):

$$u_i^* = \frac{\eta_i}{\left[s_i(1-t_i) - \alpha_i\right]\left(1 - \frac{1}{\psi_i}\right) - \gamma_i} \tag{15}$$

The stability conditions of the short-run equilibrium imply that the response of saving to a change in output is larger than the response of investment, in such a way that an excess of demand in the market for goods and services ($I_i > S_i$) is matched by an increase in output (Lavoie, 2010, 2014 Ch. 6):

$$\frac{dS_i}{dY_i} > \frac{dI_i}{dY_i} \Leftrightarrow s_i(1-t_i)\left(1 - \frac{1}{\psi_i}\right) > \gamma_i + \alpha_i\left(1 - \frac{1}{\psi_i}\right)$$

This standard condition for models in which short-run adjustment occurs through quantities ensures that the equilibrium values u_1^* and u_2^* are positive.

Long-run equilibrium

In the long run, wages and prices are flexible, as is the markup chosen by firms; the latter determines the functional distribution of income between workers and capitalists. We must therefore consider wage and price dynamics in the two countries. In out mode, we set an exogenous rate of technical progress equal to zero to keep the notation simple: $\dot{Q}_i = 0$ (in what follows, dots over variables indicate their rate of change).

[2] If we ignore interest payments, the long-run equilibrium is not affected even when $F^* \neq 0$.

Price dynamics depend on the behaviour of firms that set their markups under the constraint of international competition.[3] The constraint is expressed by the value of the parameters θ_1, θ_2 in equations (2) and (3). By log-linearising Eq. (5), we obtain terms-of-trade growth rate:

$$\dot{P} = (1 - \theta_1 - \theta_2)\dot{\Omega} = (1 - \theta_1 - \theta_2)(\dot{w}_1 - \dot{w}_2) \tag{16}$$

This equation shows that P varies as a function of the spread between the changes in nominal wages in the two countries, weighted by firms' markup behaviour. Price competiveness in both countries therefore depends on nominal wage growth spread. It is worth noting that the parameters θ_1, θ_2 summarize the "profit squeeze" behaviour of firms facing a change in their relative unit labour cost. Following Blecker (1998), we assume that $1 - \theta_1 - \theta_2 > 0$ in order to avoid the unrealistic case in which profit squeeze behaviour is so extreme that a worsening of RULC (an increase in Ω) would cause an improvement in price competitiveness (a fall in P).

Relative wage dynamics follow from wage bargaining in the two countries, which in turns depends on the power relations between workers and capitalists in their respective labour markets. In line with the post-Keynesian literature on workers' bargaining power (Lavoie (2003), Cassetti (2003, 2006), Dutt (1987, 1992), Sen and Dutt (1995)),[4] we represent wage bargaining by assuming that workers aim at a given level of real wage $(w_i/p_i)_W$. According to equation (1), this amounts to limiting firms' markup behaviour. In other words, workers' real wage target $(w_i/p_i)_W$ can be expressed as a markup target, ψ_{iW}. In order to achieve their real wage goal, trade unions exert pressure on nominal wage growth:

$$\dot{w}_i = \beta_i(\psi_i - \psi_{iW}) \tag{17}$$

where β_i is a positive parameter measuring the reaction of trade unions to the spread between actual (ψ_i) and desired (ψ_{iW}) markup rate. Therefore β_i measures worker bargaining power: the larger it is, the more powerful trade unions are.

According to the Phillips curve literature, the workers' wage target depends on the power relation between workers and capitalists, which in turn depends on labour market development, more precisely on the rate of change of employment, or on changes in the unemployment rate (Lavoie, 2014 Ch. 8; Cassetti, 2003; Screpanti, 1996, 2000). When the employment growth rate increases,

[3] Note that we distance ourselves from the standard modelisation of markups in the post-Keynesian literature, where markup behaviour results from the bargaining power of workers in their negotiations with firms (Cassetti, 2002, 2006; Lavoie, 2014 Ch. 8; Bastian and Setterfield, 2015).

[4] A recent mainstream interpretation related to recent labour market theories is provided by Blanchard and Giavazzi (2003).

trade unions raise their real wage target, which is equivalent to reducing their markup target, ψ_{iW}. We express this hypothesis using a linear function:

$$\psi_{iW} = \kappa_i - \tau_i e_i \tag{18}$$

where e_i is the employment growth rate in country *i*, κ_i is an autonomous effect (accounting for the unionization rate, the quality of wage bargaining institutions, and other exogenous factors), and τ_i measures the response of ψ_{iW} to the employment growh rate. As a consequence, τ_i measures the confrontational attitude of trade unions: a "radical" union will feature a high τ_i, while a "cooperative" or "reformist" union will feature a low τ_i.

Assuming the rate of growth of labour productivity is zero, the employment growth rate equals the GDP growth rate (and capital growth rate). Therefore:

$$\psi_{iW} = \kappa_i - \tau_i g_i \tag{19}$$

where g_i is the rate of growth of capital of country *i*.

By substituting equations (2), (3) and (19) in equation (17), we get the nominal wage rate of growth in the two countries:

$$\dot{w}_1 = \beta_1\left(a_1\Omega^{-\theta_1} - \kappa_1 + \tau_1 g_1\right) \tag{20}$$

$$\dot{w}_2 = \beta_2\left(a_2\Omega^{\theta_2} - \kappa_2 + \tau_2 g_2\right) \tag{21}$$

In the long run, capital stocks in both countries grow according to their respective accumulation rates, given by equation (10), where the short-run equilibrium conditions are always satisfied. Therefore, by substituting the short-run equilibrium values of the capacity utilization rate given by equation (15) in equation (10), we get the long-run growth rate of country 1:

$$g_1 = \eta_1 + \frac{\left(\gamma_1 + \alpha_1\Pi_1(\Omega)\right)\eta_1}{\left(s_1(1-t_1) - \alpha_1\right)\Pi_1(\Omega) - \gamma_1} \tag{22}$$

(where $\Pi_1(\Omega) = \left(1 - 1/\psi_1(\Omega)\right) = 1 - \Omega^{\theta_1}/a_1$ is the profit share in country 1's national income, which depends negatively on RULC, Ω), and country 2:

$$g_2 = \eta_2 + \frac{\left(\gamma_2 + \alpha_2\Pi_2(\Omega)\right)\eta_2}{\left(s_2(1-t_2) - \alpha_2\right)\Pi_2(\Omega) - \gamma_2} \tag{23}$$

(where $\Pi_2(\Omega) = \left(1 - 1/\psi_2(\Omega)\right) = 1 - 1/a_2\Omega^{\theta_2}$ is the profit share in country 2, which depends positively on Ω).

As a consequence, if income distribution Π_i is altered in both countries, a change in RULC affects their respective long-run growth. More precisely, using (22) and (23) it is easy to demonstrate that:

$$\frac{\partial g_1}{\partial \Omega} = \frac{\theta_1 \Omega^{\theta_1 - 1} \eta_1 \gamma_1 s_1 (1 - t_1)}{a_1 \left\{ \left[s_1 (1 - t_1) - \alpha_1 \right] \left(1 - \frac{\Omega^{\theta_1}}{a_1} \right) - \gamma_1 \right\}^2} > 0 \tag{24}$$

$$\frac{\partial g_2}{\partial \Omega} = -\frac{\theta_2 \Omega^{-\theta_2 - 1} \eta_2 \gamma_2 s_2 (1 - t_2)}{a_2 \left\{ \left[s_2 (1 - t_2) - \alpha_2 \right] \left(1 - \frac{1}{a_2 \Omega^{\theta_2}} \right) - \gamma_2 \right\}^2} < 0 \tag{25}$$

Equations (24) and (25) show clearly that growth is wage-led in our model, because by increasing the wage share 1-Π_1 in country 1 and reducing the wage share 1-Π_2 in country 2, an increase in Ω leads to an increase in long-run growth in country 1, and a decrease in long-run growth in country 2.

This result can be construed as a long-run extension of the Keynesian analysis: indeed, a change in the functional distribution of income affects consumption and investment alike. On one hand, a fall in wages depresses consumption, insofar as it transfers income to economic agents with a higher propensity to save (capitalists). On the other hand, the impact of wage moderation on investment is ambiguous: while markup increases enhance investment profitability, falls in the capacity utilization rate, caused by the fall in consumption, work in the opposite direction (see equation 9). As it happens, equations (24) and (25) demonstrate that the second effect more than offsets the first: hence, growth is led by consumption and wages.[5]

Whether growth is wage- or profit-led is still a hotly debated issue in the post-Keynesian literature (Bhaduri and Marglin, 1990; Taylor, 1991, 2004; Blecker, 2002), because the role and consequences of economic policies vary according to growth regime (Bowles and Boyer, 1988). Besides the discussion on what specification of the investments function will lead to different growth regimes in closed economy models (Lavoie, 2014, Ch. 6), it is argued that a fall in real wages or in the wage share can bring about an increase in output in open-economy Kaldorian models characterised by an exogenous rest-of-the-world. As a matter of fact, the increase in activity in export-led sectors, which benefit from reduction of unit labour costs, may more than offset the fall in domestic demand. These models therefore fall in the profit-led growth class: by raising aggregate demand, an increase in net exports increases profits as well as output in the country considered (Bhaduri, 1986; Blecker, 1989, 1999, 2011; Hein and Vogel, 2008; Lavoie, 2014 Ch. 7). In a two-country Kaleckian model, the advantages of export growth are neutralised by trade interlinkages, because all countries cannot

[5] Taking workers' propensity to save (s_w) into account does not modify this result, provided that $s_c - s_w > \alpha_i$ (see Lavoie, 2014 Ch. 6). This condition is found to be consistent with empirical data (Mott and Slattery, 1994).

enjoy a trade surplus at the same time, and long-run equilibrium has sustainability conditions that we specify in the next section.

Equations (23) and (24) show that the steady state is reached only when RULC (Ω), and as a consequence the terms of trade (*P*), are constant (see Eq. (16)).

Steady state equilibrium

Wage and price dynamics in each country are affected by firms' markup behaviour and wage bargaining on the respective labour markets. Steady state equilibrium is therefore determined by domestic power relations between workers and capitalists in each country. As shown above, long-run steady-state equilibrium implies that $\dot{\Omega} = \dot{w}_1 - \dot{w}_2 = 0$. Equations (20) and (21) imply that the steady-state RULC (Ω^*) is the solution of

$$\beta_1\left[a_1\Omega^{-\theta_1} - \kappa_1 + \tau_1 g_1(\Omega)\right] = \beta_2\left[a_2\Omega^{\theta_2} - \kappa_2 + \tau_2 g_2(\Omega)\right] \tag{26}$$

where $g_1(\Omega)$ and $g_2(\Omega)$ are the long-run growth rates defined by equations (22) and (23).

In order to demonstrate the existence and stability of the equilibrium, we must compare the nominal wage growth rates in the two countries. Equation (20) implies that:

$$\frac{\partial \dot{w}_1}{\partial \Omega} = \beta_1\left(-a_1\theta_1\Omega^{-\theta_1-1} + \tau_1\frac{\partial g_1}{\partial \Omega}\right) \tag{27}$$

The sign of (27) is undefined: the first term in the brackets is negative, because it depends on the markup revision by firms after a change in Ω, while the second term is positive, because it follows from revision of workers' wage targets after a change in Ω. For example, if Ω increases, firms will reduce their markups in order to preserve their competitiveness on international markets, which in turn reduces nominal wage growth in country 1. At the same time, owing to its positive impact on growth, the increase in Ω prompts workers to revise their real wage (markup) goal upwards (downwards), thereby increasing the nominal growth rate in country 1.

Along the same lines, from Eq. 22 we get:

$$\frac{\partial \dot{w}_2}{\partial \Omega} = \beta_2\left(a_2\theta_2\Omega^{\theta_2-1} + \tau_2\frac{\partial g_2}{\partial \Omega}\right) \tag{28}$$

The sign of Eq. (28) is again undefined: the first term in the brackets is positive and the second negative, a situation symmetrical to that of Eq. (27).

Nevertheless, regardless of the sign of expressions (27) and (28), the stability condition requires that:

$$\left.\frac{\partial \dot{w}_2}{\partial \Omega}\right|_{\Omega^*} > \left.\frac{\partial \dot{w}_1}{\partial \Omega}\right|_{\Omega^*} \tag{29}$$

This condition ensures that to the right of the equilibrium RULC, Ω^* (i.e. when $\Omega>\Omega^*$), the denominator of Ω, w_2, grows faster than the numerator, w_1, thus bringing Ω back to equilibrium (the contrary happens to the left). We now assume that the stability condition (29) is met. This occurs, in particular, if the revision of firms' markup prevails over the revision of workers' real wage goal in both countries: this case is represented by the solid lines in Figure 4, where the equilibrium is stable.

[FIGURE 4 ABOUT HERE]

Figure 4 shows that a fall in β_1 (the parameter measuring trade union strength in country 1), as well as an increase in β_2, bring about a decrease in the steady-state RULC, Ω^*. This result has an intuitive explanation: if the bargaining power of country 1's workers decreases, or that of country 2's workers increases, the steady-state ratio of their wages, Ω^*, will decrease (the shifts in the $\dot{w}_1$ and $\dot{w}_2$ curves are represented by dotted lines).

So far we have characterised the steady state in terms of domestic wage and price dynamics in both countries, without any reference to the external constraint imposed by their mutual trade interdependence. Starting from a short-run equilibrium where the balance-of-payments equilibrium is ensured by definition, we now investigate whether the steady-state RULC is consistent with external equilibrium in the long-run. In other words, we investigate the sustainability of long-run growth, considering trade interdependence between the two countries.

Long-run growth sustainability

In order to analyse long-run growth sustainability, we adapt Thirlwall's law to our theoretical model of a two-country monetary union. Thirlwall (1979) examines the long-run relationship between economic growth and the current account balance. While conventional theories of growth rely on neoclassical models to explain supply-side issues originating from factor accumulation or technological progress with or without the contribution of productivity growth, this alternative approach emphasises demand-driven mechanisms that limit growth. It postulates that the Balance-of-Payments (BoP) equilibrium of a country is the primary constraint on its economic growth in the long run. The original intuition in Thirlwall's (1979) paper was that a country cannot finance its growth indefinitely from increasing inflow of foreign capital, as this leads to unsustainable accumulation of foreign debt. Hussain (2006) expresses Thirlwall's law in these terms: *'In the long term, no country can grow faster than the rate consistent with the balance of payments equilibrium on the current account unless it can finance an ever growing deficit which, in general, it cannot'*.

Consequently, there is a growth rate that a country cannot exceed in the long run, because if it does, it will quickly run into BoP difficulties. This is the 'BoP equilibrium growth rate'. In its basic form, Thirlwall's Law postulates that the rate of growth of an open economy which is consistent with BoP equilibrium is determined by the growth rate of its volume of exports divided by the income elasticity of imports.

Davidson (1990-1991) and Dutt (2002) stress that Thirlwall's law is among the most influential contributions to the post-Keynesian literature, as witnessed by its many empirical applications to developing and developed countries (Thirlwall, 2012). In theoretical terms, Thirlwall's law becomes crucial in a model that takes trade interdependence between countries into account. The law implies that the steady state is sustainable if and only if the trade balance between member countries is in equilibrium in the long run. If this is not the case, the accumulation of trade deficits will lead to an unsustainable explosion of external debt in one of the two member countries.

In our model, the sustainability of steady-state equilibrium implies constant capital inflows, $\dot{F} = 0$. By expressing the BoP equilibrium condition (8) in rates of change, we obtain the rate of change of RULC consistent with BoP equilibrium in both countries:

$$\dot{\Omega} = \frac{\varepsilon_2 g_2 - \varepsilon_1 g_1}{(1-\theta_1-\theta_2)(\mu_1+\mu_2-1)} \tag{30}$$

Since the steady-state RULC is constant by definition ($\dot{\Omega} = 0$) under the assumption that $1-\theta_1-\theta_2 \neq 0$ and $\mu_1+\mu_2-1 \neq 0$, Eq. (30) implies that the long-run equilibrium is sustainable if:

$$\varepsilon_2 g_2 = \varepsilon_1 g_1 \tag{31}$$

Since we assume country 1 to be less competitive than country 2 ($\varepsilon_1 > \varepsilon_2$), the steady-state sustainability condition implies that in the long run country 2 will grow faster than country 1, i.e. $g_2 > g_1$. As a matter of fact, since current account adjustment occurs through the level of economic activity in a monetary union, it follows that in the long run the less competitive country must grow at a lower rate than the more competitive one. In this respect, our model reproduces a standard result of the BoP-constrained growth model, which in a two-country (or North-South) setting replicates the main features of so-called center-periphery models of uneven development (Thirlwall, 1983; Dutt, 2002).

The solution of the system of three equations (22), (23) and (31) defines the long-run sustainable equilibrium by determining the growth rates (g_1^*, g_2^*) and RULC (Ω_{SUST}^*) consistent with long-run BoP equilibrium in both countries. The long-run dynamic of sustainable growth and the RULC consistent with this dynamic are shown in Figure 2 in the space ($g_i; \Omega$).

[FIGURE 5 ABOUT HERE]

The upward-sloping curve g_1 is Eq. (22), while the downward-sloping curve g_2 is Eq. (23). The long-run sustainable RULC (Ω^*_{SUST}) occurs at the intersection of the curves $\varepsilon_1 g_1$ and $\varepsilon_2 g_2$, according to the long-run sustainability condition expressed by Eq. (31). Since $\varepsilon_1 > \varepsilon_2$, the curves g_1 and g_2 are necessarily displaced in such a way that $g_2^* > g_1^*$.[6] To the right of Ω^*_{SUST}, the rate of change of country 1's current account deficit is positive ($\dot{F} > 0$), causing explosive deficit ($F \to +\infty$), whereas to the left of Ω^*_{SUST} $\dot{F} < 0$, country 2's deficit becomes explosive ($F \to -\infty$).

If the Marshall-Lerner condition is satisfied ($\mu_1 + \mu_2 - 1 > 0$) and if the steady-state RULC obeys Eq. (30), the sustainable equilibrium is stable, because if $\varepsilon_1 g_1 > \varepsilon_2 g_2$, Ω will decrease (the converse is also true). The economic interpretation of sustainable equilibrium stability is as follows: given an initial RULC (Ω) such as $\Omega > \Omega^*_{SUST}$, Eq. (30) implies that the nominal wage growth will be smaller in country 1 than in country 2 ($\dot{w}_1 < \dot{w}_2$). Country 1's price competitiveness will therefore improve (which will bring about an increase in its exports and a fall in its imports), and its growth rate will decline, which in turn will help moderate its imports (the opposite happens in country 2).

At this stage of the analysis, we are left with two stable long-run equilibria: the first determined by domestic wage-price dynamics, the second by growth sustainability conditions imposed by the need to preserve the countries' external equilibrium in the long run. More precisely, Ω^* follows from firms' markup behaviour (which depends on competition in the market for goods and services) and from wage bargaining (which depends on the change in unemployment rate and on power relations between capitalists and workers), while Ω^*_{SUST} results from current account equilibrium, which in turn affects the sustainability of the long-run growth path in both countries. In principle, there is no reason why these two equilibria should coincide, since their dynamics differ. The model therefore reinstates the essential mission of economic policy, namely that of restoring compatibility between domestic wage and price dynamics and sustainable long-run growth. In analytical terms, the economic policy problem in our model can be represented as a system of four equations (22, 23, 26, 31) in three unknowns (Ω^*, g_1^*, g_2^*). In order to obtain a solution, we need to consider a further variable. In our model, two economic policy instruments can be used to restore compatibility between the two long-run equilibria: wage policy, in particular through union bargaining power, represented by β_i, and fiscal policy, summarized by the average tax rate, t_i.

[6] In Figure 5 we assume that ε_1 and ε_2 are greater than one, but the same results apply for every positive value of ε_1 and ε_2 provided that $\varepsilon_1 > \varepsilon_2$.

Economic policy and its long-run consequences

In order to study the implications of economic policy, we consider the more realistic case in which $\Omega^* > \Omega^*_{SUST}$, i.e. in which RULC in the less competitive country (country 1) is higher than that compatible with the long-run equilibrium of country 1's current account.[7] In other words, the domestic dynamic of country 1's wages is incompatible with a sustainable long-run growth path.

Wage moderation policy

Proposition 1: *Wage moderation policy in the less competitive country, aimed at reaching a sustainable long-run growth path, sets off a transition dynamic towards the new equilibrium, in which the country's growth rate is lower, and unemployment rate higher, to the benefit of the partner country.*

As shown by Figure 6, an upward shift in curve $\dot{w}_1$ (Eq. 20), namely a reduction in union power (decrease in β_1), aimed at implementing wage moderation policy, moves the domestic equilibrium towards the equilibrium compatible with sustainable long-run growth. During the transition, we observe that the fall in RULC, which brings Ω^* into line with Ω^*_{SUST}, comes with a reduction in country 1's growth rate and an increase in country 2's growth rate.

Wage moderation has a clear adverse impact on country 1, because it fosters recessions and moves its economy towards a long-run underemployment equilibrium. The model therefore applies a well-known Keynesian principle to the long run: while wage moderation, and its complement, the increase in the profit share, enhance investment profitability, this favourable effect is more than offset by the consequences of a fall in consumption expenditure.

[FIGURE 6 ABOUT HERE]

The value of β_1 compatible with long-run equilibrium can be obtained in analytical terms. Indeed, solving the system of Eqs. (22), (23) and (31) gives the long-run equilibrium values of Ω^*_{SUST}, g_1^* and g_2^*. Using Eq. (26), we obtain the value of β_1^* such that $\Omega^* = \Omega^*_{SUST}$:

$$\beta_1^* = \frac{\beta_2\left(a_2 {\Omega^*_{EXT}}^{\theta_2} - \kappa_2 + \tau_2 g_2^*\right)}{\left(a_1 {\Omega^*_{EXT}}^{-\theta_1} - \kappa_1 + \tau_1 g_1^*\right)} \tag{32}$$

[7] In terms of the euro area, country 1 can be likened to deficit countries (southern Europe), and country 2 to surplus countries (northern Europe). In this respect, our paper contributes to the large body of literature that analyzes the euro area using two-regions models (e.g. Benigno, 2004; Corsetti et al., 2014).

Eq. (32) shows that for wage moderation to be successful in country 1, causing a fall in Ω^*, the reduction in union bargaining power must be greater (β_1^* smaller):

- the more country 1's unions are radical (larger τ_1);
- the more country 2's unions are reformist (smaller τ_2)
- the weaker country 2's unions are (smaller β_2).

Fiscal policy

In a currency union, besides income policy, governments can use fiscal policy to bring the domestic long-run equilibrium into line with long-run sustainable equilibrium. In our model, governments apply a proportional tax rate t_i to all incomes to finance public expenditure (G_i), so that t_i represents the public-expenditure-to-GDP ratio in country *i*.

Proposition 2*: Expansionary fiscal policy in the less competitive country is unsustainable in the long run.*

Starting from Eq. (22), it is easy to demonstrate that $\frac{\partial g_1}{\partial t_1} > 0$. Expansionary budget policy in country 1 causes an increase in economic activity through an increase in aggregate demand. Indeed, tax-financed expansionary policy transfers income of agents with the largest propensity to save (capitalists) to public expenditure, thereby causing an increase in country 1's aggregate demand. This increase has two effects:

1. It causes leakage of aggregate demand through imports, to the benefit of the more competitive country (country 2). To restore long-run BoP equilibrium, RULC (Ω^*_{SUST}) must fall. As shown in Figure 7, the rise in t_1 shifts the curve g_1 to the left (towards g_1') bringing about a proportional shift in the curve $\varepsilon_1 g_1$ (towards $\varepsilon_1 g_1$') and this moves the system from long-run equilibrium 1 to long-run equilibrium 2. The rise in member countries' long-run growth is accompanied by a fall in (country 1's) RULC, Ω^*_{SUST}.
2. On the other hand, Eq. (19) shows that the increase in country 1's growth induces its unions to raise their real wage target (i.e. to lower ψ_{1W}). This puts upward pressure on the country's RULC. Figure 7 shows that the fall in ψ_{1W} caused by expansion in country 1 shifts the curve $\dot{w}_1$ downwards, thereby increasing the steady-state RULC compatible with internal equilibrium (Ω^*).

[FIGURE 7 ABOUT HERE]

As a consequence, expansionary budget policy in country 1 triggers divergence between domestic wage and price dynamics, and wage and price dynamics consistent with long-run sustainable growth. In analytical terms, an increase in t_1 cannot reconcile the domestic steady state, Ω^*, with long-run sustainable equilibrium, Ω^*_{SUST}. This policy goes with an increase in growth in both countries, but over time proves to be unsustainable because it exacerbates their external imbalances. Trade interdependences cause leakage of demand through imports in the less competitive country (country 1) to the benefit of the more competitive country (country 2). We conclude that expansionary budget policy is not a viable option for the less competitive country of a monetary union.

Corollary*: Restrictive budget policy in the less competitive country effectively reconciles the steady-state equilibrium with long-run sustainable equilibrium, but this comes at the expenses of a fall in growth rate in both countries.*

This situation is symmetrically opposite to the one described by Proposition 2. Restrictive budget policy in country 1 produces recession which propagates to country 2 through a reduction in country 1's imports (country 2's exports). In Figure 7, the shifts in Ω^* and Ω^*_{SUST} change sign, i.e. the two equilibria now move closer to each other, and hence become compatible. Wage and price dynamics in each country are eventually consistent with sustainable long-run growth. This adjustment comes with redistribution of income to the benefit of capitalists in both countries, as shown by an increase in their respective profit shares, Π_1 and Π_2.

Proposition 3: *Expansionary budgetary policy in the more competitive country (country 2) allows the policy maker to restore the compatibility between steady-state and external equilibrium in the long run, as well as to increase the growth rate in both partner countries.*

In the same way as for country 1, it is easy to show that $\frac{\partial g_2}{\partial t_2} > 0$ using Eq. (23). The increase in aggregate demand in country 2 brings about an increase in economic activity. It also produces an increase in country 1's exports, with two advantages for this country: the first in terms of economic activity, the second by loosening its external constraint. Figure 8 shows that the increase in t_2 shifts the curve g_2 to the right (towards g_2'). Accordingly the curve $\varepsilon_2 g_2$ moves towards $\varepsilon_2 g_2$', shifting long-term sustainable equilibrium from 1 to 2. Long-run sustainable growth increases in both countries, as does RULC (Ω^*_{SUST}), the latter being a consequence of the loosening of country 1's external constraint. As regards the domestic steady state, Eq. (21) shows that the positive impact of t_2 on g_2

shifts the curve $\dot{w}_2$ downwards (unions in country 2 raise their real wage target so that ψ_{2W} decreases). The steady-state RULC (Ω^*) decreases and eventually converges to the long-run sustainable RULC.

[FIGURE 8 ABOUT HERE]

Expansionary budget policy therefore allows policy makers to reconcile internal wage-price dynamics in both countries with long-run growth sustainability. In the long run, while enhancing growth in the whole area, this policy simultaneously brings about a redistribution of income in favour of workers in both countries, because both 1-Π_1 and 1-Π_2 increase. Formally, if we take t_2 as our control variable, solving the system of equations (22), (23), (26), (31) in four unknowns g_1^*, g_2^*, Ω^*, t_2^* provides an exhaustive description of long-run equilibrium.[8]

Conclusions

In a monetary union like the euro area, adjustment of external imbalances through nominal exchange rate realignment is prevented by definition. This raises the question of how to adjust the structural imbalances caused by non-price competitiveness differentials in the presence of trade interdependence. According to mainstream economists, adjustment occurs through relative prices. Deficit countries are therefore advised to practise internal devaluation (cuts in wages and public expenditure) in order to restore BoP equilibrium. These economists seldom investigate the long-run consequences of their recommendations in terms of long-run growth in countries that follow their advice, and hence in the whole area.

In tackling this question, we used a two-country (or two-region) model of a monetary union to examine the appropriateness of external imbalance adjustment policies, focusing on member-country growth path interdependence. Our model rests on the Kaleckian tradition, where growth is demand-led and the functional distribution of income plays a major role. It combines Thirlwall's analysis of BoP-constrained growth with the endogenisation of firms' markup behaviour and of workers' bargaining power in the two member countries. The sustainability of long-run growth is therefore gauged against the development of external imbalances. Appropriate economic policy brings the steady-state locus of domestic wage-price dynamics towards long-run sustainable growth equilibrium.

We demonstrate that labour market (structural) reform policies in the less competitive country depress its growth rate along the dynamic transition path, while increasing the growth rate of the more competitive country, thereby increasing structural divergence between the two member

[8] The nonlinearity of the system prevents a closed-form representation of the solution.

countries. At the same time, austerity policies in the less competitive country have adverse effects on long-run growth in both countries. The only sensible option to reconcile the steady-state with long-run sustainability is for the more competitive country to practise expansionary budget policy, as this reduces external imbalances, while promoting growth in the whole area.

The latter result formalises Keynes's (1941) analysis of international monetary system management, which we transpose to currency union level (i.e. a regional monetary system): the burden of adjustment of external imbalances must largely fall on the most competitive country, namely, on the country featuring a current account surplus, that should run an expansionary policy as this will benefit the whole area. If instead the burden is placed on weaker countries through austerity or structural reforms, as neoliberal economists suggest, these countries, and eventually the whole area, will be doomed to a low-growth path and perennial underemployment equilibrium.

An interesting development, which we leave for future research, would be to extend our model to a three-country setting, building on the work of Godley and Lavoie (2007), in order to analyze whether and how trade with the rest of the world (ROW) affects our conclusions. In other words, can trade with ROW compensate for a monetary union's internal imbalances? In principle, if trade with ROW does not affect the current account imbalances of the union's deficit countries, our conclusions will not be affected. If instead the union's less competitive countries can reduce their deficit (or achieve a surplus) at the expenses of ROW, since growth sustainability conditions also apply to ROW, the adjustment problems will shift to countries outside the monetary union. In more general terms, the model could address the issue of formalizing Keynes's (1941) prescriptions regarding the management of global imbalances. In any case, debate on the rationale of a monetary union is still open and is expressed by the following question: What are the benefits of a monetary union that fosters intra-zone trade, if it does not envisage and instituzionalize adjustment mechanisms for intra-zone imbalances so as to promote growth for the union as a whole?

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Figures

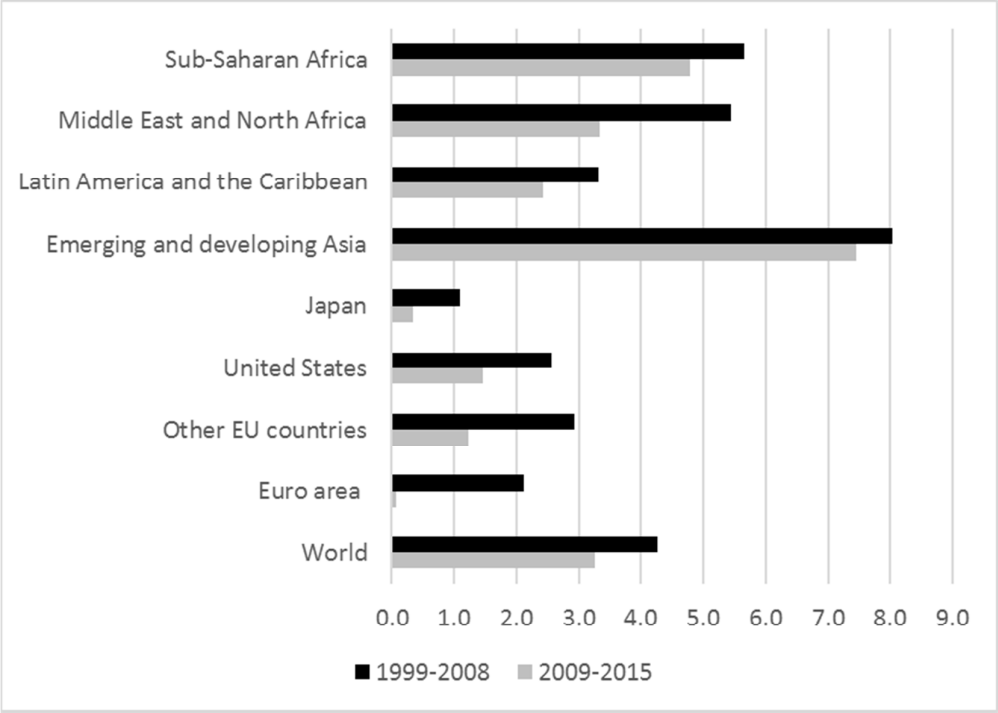

Figure 1 –Average growth rates of major regions of the global economy before and after the global financial crisis

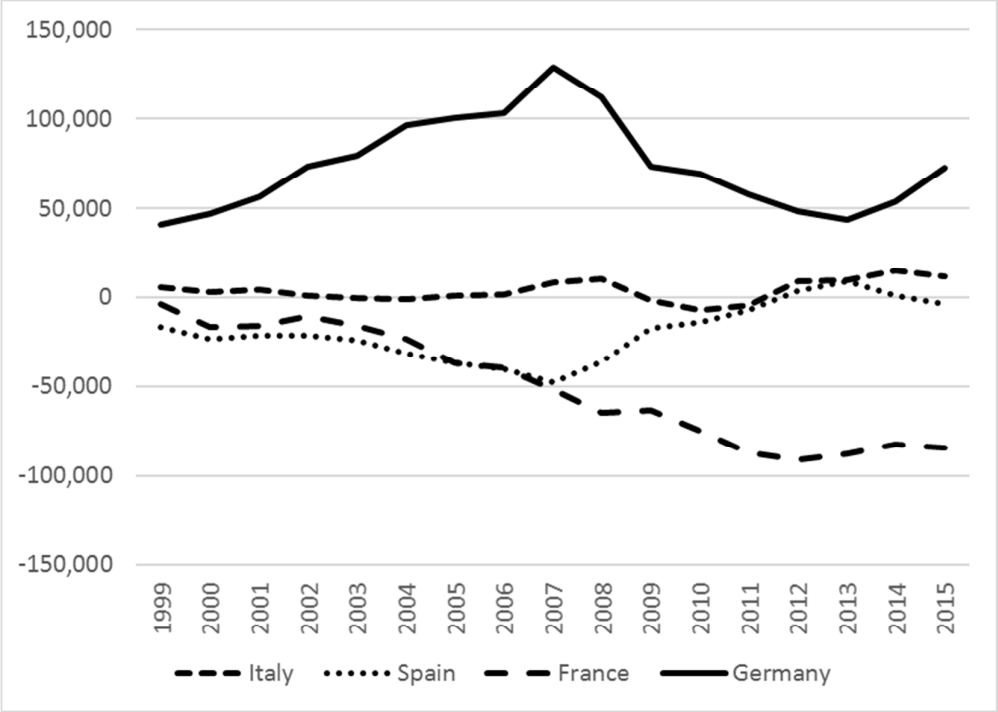

Figure 2 –Intra-zone trade balances of the four major euro area members

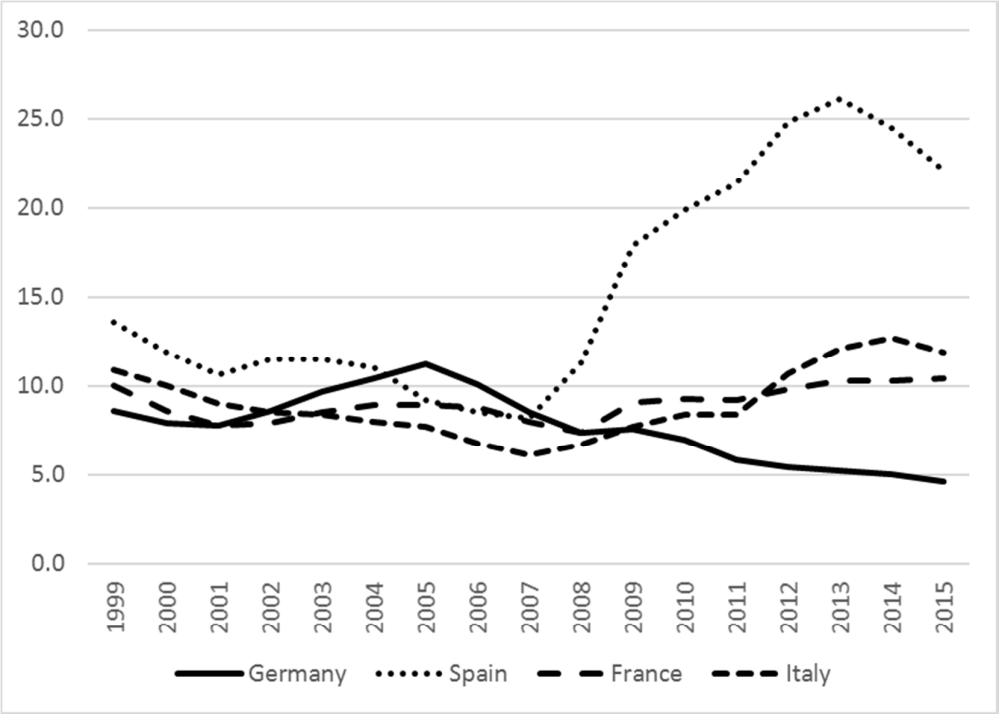

Figure 3 –Unemployment rates in the four major euro area members

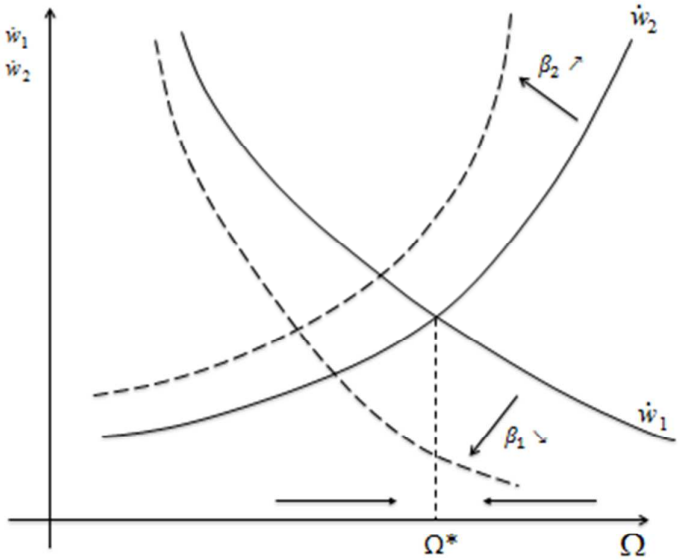

Figure 4 – The steady-state relative unit labour cost (RULC) and its stability. A decrease in the parameters measuring union strength in country 1 (or an increase in the parameters measuring union strength in country 2) moves the steady-state RULC to the left (see eq. 20 and 21 in the text).

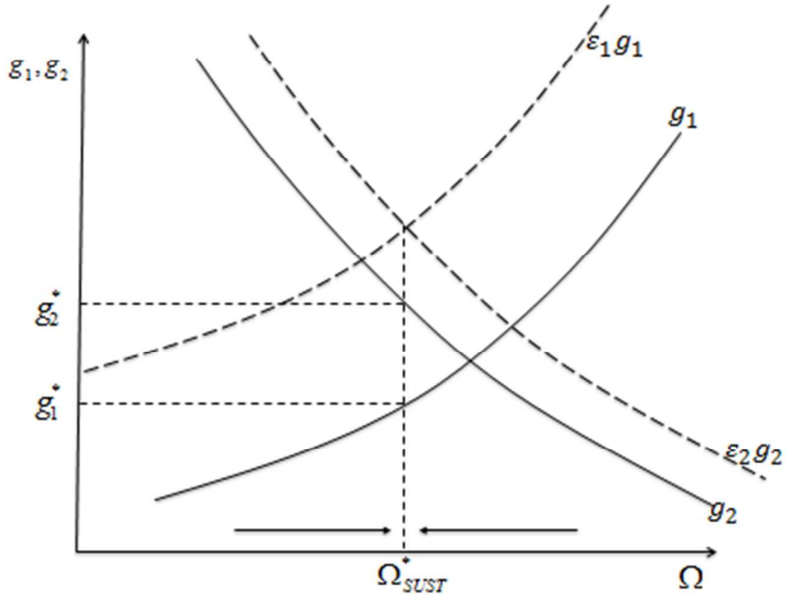

Figure 5 – Long-run sustainable growth rates in the two member countries and steady-state sustainable RULC

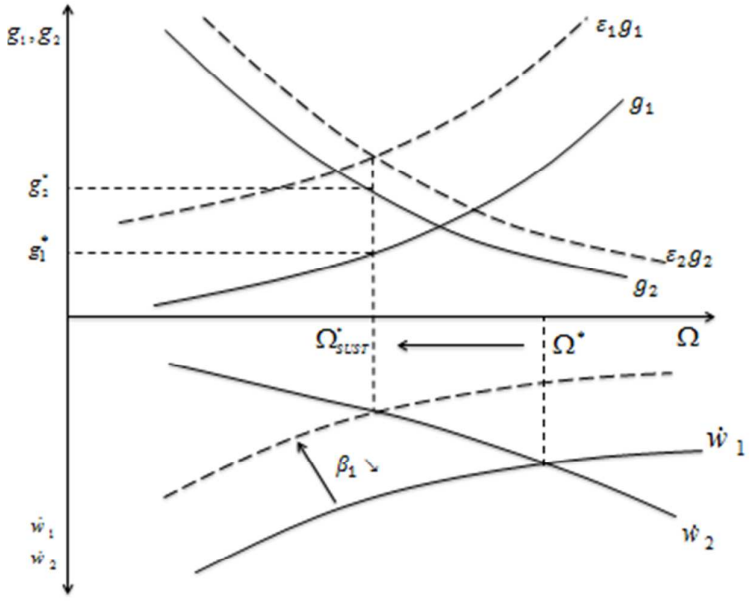

Figure 6 – The long-run consequences of wage moderation policy (decrease in β_1) in the less competitive country

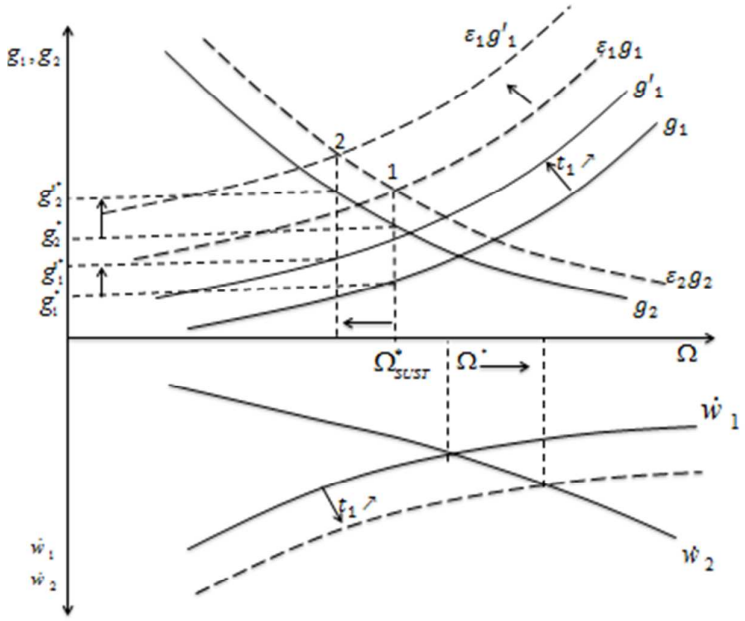

Figure 7 – The long-run consequences of expansionary fiscal policy in the less competitive country

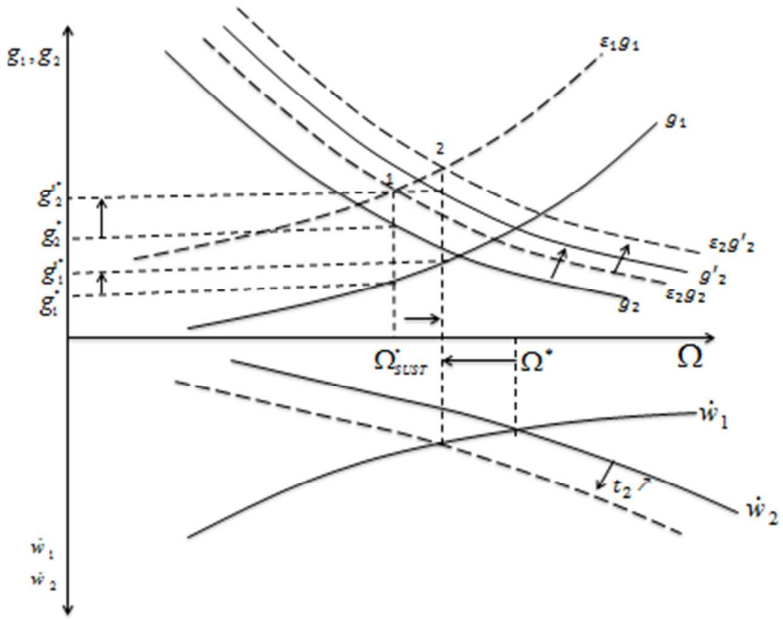

Figure 8 – The long-run consequences of expansionary budget policy in the more competitive country