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post-Keynesian Eurozone
Center-Periphery Model**

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Conflicting Claims in Eurozone? Austerity's Myopic Logic and the Need of a European federal union in a post-Keynesian Eurozone Center-Periphery Model

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Abstract

In this paper we analyze the role of the nowadays Eurozone institutional setup in fostering the ongoing peripheral Euro countries' sovereign debt crisis. According to the Modern Money Theory, we stress that the lack of a federal European government running anti-cyclical fiscal policy, the loss of monetary sovereignty by Euro Member States and the lack of a lender-of-last-resort central bank has significantly contributed to generate, amplify and protract the present crisis. In particular, we present a post-Keynesian Eurozone center-periphery model through which we show how, due to the incomplete nature of Eurozone institutions with respect to a full-fledged federal union, diverging trends and conflicting claims have emerged between center and peripheral Euro countries in the aftermath of the 2007-2008 financial meltdown. We emphasize two points. (i) Diverging trends and conflicting claims among Euro countries may represent a decisive obstacle to reform Eurozone towards a complete federal entity. However, they may prove to be self-defeating in the long run should financial turbulences seriously deepen also in large peripheral countries. (ii) Austerity packages alone do not address the core point of the Eurozone crisis. They could have sense only if included in a much wider reform agenda, whose final purpose is the creation of a federal European government which can run expansionary fiscal stances and of a government banker. In this sense, the unlimited bond-buying program recently launched by the European Central Banks is interpreted as a positive although mild step in the right direction out of the extreme monetarism which has so far shaped Eurozone institutions.

Key words: Eurozone debt crisis, Modern money theory, post-Keynesian center-periphery model

JEL Classification: E02, E12, H63

1. Conflicting interests in the Eurozone?

From mid 2010 on, large part of the economic debate has devoted increasing efforts to explain the causes of the current Eurozone crisis. Different opinions, with some overlaps among them, have emerged. Some economists indentify EU Member States' fiscal profligacy as the root of the crisis (Kosters, 2009; Panetta, 2011; Weidmann, 2012; ECB, 2012). Others stress the

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existence of a Balance-of-Payments problem among Eurozone countries (Hein, Trucker and van Treeck, 2011; Perez-Caldentey and Vernengo 2012; Bilbow, 2012). Others, finally, emphasize that Eurozone is not an optimal currency area and that the existing crisis is nothing but the consequence of Eurozone difficulties to deal with asymmetric shocks (Krugman, 2012).

Inside this debate, a pretty relevant and transversal strand of thought describes Eurozone difficulties, and the crisis of peripheral economies in particular, as closely similar to the crises faced by several developing countries in the decades after 1982 (De Grauwe, 2011; Soros, 2012). According to this perspective, the creation of the monetary union has induced increasing financial flows to take place inside Europe. Once eliminated the exchange rate risk usually associated to allegedly unreliable Southern European countries, capitals have massively flown towards them (Waysard, Ross and de Guzman, 2010; Perez-Caldentey and Vernengo 2012; Lin and Treichel, 2012). As a consequence, interest rate differentials with respect to (presumed) more virtuous central Euro countries have mostly disappeared. Economic convergence between peripheral and central economies has shown up.

The 2007-2008 financial meltdown has abruptly changed this picture. Economic recession has affected all EU Member States. Economic downturns, however, have been particularly severe in Spain and Ireland, where previous enthusiastic economic performances were largely based on unsustainable housing bubbles. Their national governments, examples of rigorous fiscal discipline until that point (Council of the European Union, 2007a; 2007b), have had to come in to bail out financial institutions and provide relief from mounting unemployment. Spanish and Irish fiscal deficits and public debts have soared. In the case of Greece (and partially Italy), the problems connected to a pretty high public debt stock have started to obsess financial markets. Thanks to the existence of a common currency, capitals have suddenly changed direction. Financial operators have started to sell risky peripheral countries' bonds and buy safer central countries' Treasury Bills. Accordingly, center-periphery convergence has left the stage to widening diversities. Peripheral countries, interest rates have increased hugely, worsening even more their financial picture. Economic activity in the periphery has plumbed compared to the weak but positive performance of central economies.

Given this dismal scenario, which is the way out? The answer to this question mostly depends on the analysis of the causes of the crisis. In line with the idea that the current crisis is consequence of past irresponsible fiscal policies, most international institutions identify fiscal consolidation as the only solution to Eurozone problems. Debtor countries must pay their debt. To do so, they have to implement tough austerity packages. To ease the accomplishment

of this task, peripheral economies have also to launch ambitious structural reform programs. There are no precise definitions of what structural reforms actually mean. The general understanding, however, is that economic growth depends on supply-side factors. Therefore, the privatization of inefficient public enterprises, the downsize of muddled public bureaucracy and the liberalization of goods and labor markets are the measures to adopt to increase the efficiency of the overall economic system and unleash economic growth. In this picture, there is any role for demand-side factors to play.

There is widespread consensus among economists on the fact that productivity gaps and unit labor cost divergence are relevant causes of external account imbalances among central and peripheral Euro countries (De Grauwe, 2012). On the one hand, these disequilibria are somehow consequences of the process of monetary unification and financial integration described above. On the other hand, their solution seems to be hindered by the existence of the common Euro currency itself. Actually, in front of deep recessions, an exchange rate devaluation could help peripheral economies to bring back growth by encouraging exports; to eliminate external vulnerability by favoring Balance-of-Payments current account surpluses instead of deficits; to ensure fiscal solidity through growth-led increases in tax revenues and reductions in counter-cyclical expenditures. The loss of monetary sovereignty, however, put further strain on their adjustment process by depriving them of the exchange rate as policy tool. It is on the base of these arguments that an increasing number of experts, financial commentators and policy makers indicate the perhaps temporary exit of some Euro countries from the monetary union as the best, although costly, solution to the existing crisis (Roubini, 2011; Allen and Ngai, 2012; Miller and Skidelsky, 2012; Becker and Posner, 2012).

Even though some points of the previous analyses cannot be neglected, we are pretty skeptical about their effectiveness. Actually, the shortcomings of a simple austerity-centered strategy appear to be clear. On the one hand, fiscal problems in peripheral economies seem to persist due to a vicious spiral between fiscal restrictions, deepening economic recession and the need for further public balance corrections. On the other hand, it is pretty hard to understand how the structural reforms could help peripheral economies to end recession and reduce unemployment, given that these problems seem to mainly have a cyclical demand-side nature instead of a structural supply-side one.

As to the exit/devaluation strategy, the literature on contractionary devaluation comes at mind, according to which exchange rate devaluation may even deepen recession instead of alleviating it depending on the productive structure and aggregate demand composition of devaluating countries (Taylor, 1991). Actually, this may well be the case of Greece and

Portugal, i.e. relatively closed economies with pretty underdeveloped productive systems. Moreover, even admitting a positive effect of regained monetary independence on the economic performance of devaluating economies, we still doubt this event could solve the problems of a, let say, narrower Euro-zone. First, the abandon of the common currency by some European countries may do not have destructive effects on the remaining Eurozone insofar as such an exit strategy is restricted to small Member States like Greece, Portugal, perhaps Ireland¹. Things would change dramatically in the case of much larger economies such as Spain and Italy². Second, the likely emergence of contagion phenomena and speculative forces betting on the next country exiting Eurozone is to consider. We all know how powerful is financial speculation and its possibly devastating effects on the likelihood of the Euro project to survive.

In line with these observations, we think that the crucial point of the current crisis lies in the *incomplete* nature of the nowadays Euro building. First, the lack of a federal European fiscal policy carried out by a federal European government leaves Member States alone in their efforts to counteract economic recession. The absence of any fiscal transfer between (non-existing) federal institutions and national governments simply increases the debt burden of Member countries and the doubts about their sustainability. Second, but jointly with the previous point, the abandon of a national currency in favor of the common Euro currency has induced Member States to issue debt in a currency they do not control. According to the well-known Modern Monetary Theory (MMT), this fact seriously exposes Member States to default, hence the current financial turbulences (Papadimitriou and Wray, 2012). These would not take place in monetary sovereign economies with a full-fledged lender-of-last resort central bank such as UK or USA (De Grauwe, 2011).

More in general, all the above lacks in the original design of the European monetary union create or induce to perceive diverging trends and conflicting interests among Eurozone countries in presence of *common* (and not asymmetric), although with different intensity, adverse economic shocks. Since the outbreak of the 2007-2008 financial crisis, Eurozone

¹ In 2010, the real GDP of Greece, Portugal and Ireland represented, respectively, the 2.31 percent, 1.92 percent and 1.86 percent of Eurozone real GDP. In terms of trade statistics, in 2010, Greece accounted to a mere 0.62 percent of Germany's world exports, this data being equal to 0.82 percent and 0.44 percent in the case of Portugal and Ireland.

² In 2010, Italy and Spain were, respectively, the third and fourth largest economies in the Eurozone, their real GDP being equal to 16.52 percent and 11.22 percent of Eurozone GDP. According to data from UNCTAD, in 2010, more than 6 percent of all Germany's exports were directed towards Italy (i.e. the third largest Germany trade partner in the Euro-zone after France and Netherlands). This data was equal to 3.58 percent in the case of Spain. Besides this real-side aspects, also financial relations are to consider. Actually, financial links between Germany and Italy and Spain are far more relevant and stronger than those with all the other small peripheral Eurozone economies (see later on this point).

peripheral economies are suffering protracted financial instability whilst central economies, regardless of their effective financial solidity, are benefitting of never-before-seen low interest rates. Even more, whilst the former are stuck in an endless hurry to implement austerity packages that rising debt service costs may easily frustrate, the latter can safely pursue fiscal stabilization thanks to close-to-zero, or even negative, real interest rates. Finally, whilst peripheral economies likely need some expansionary, perhaps inflationist, monetary policy by the European Central Bank (ECB) and fiscal support from European institutions, central countries call for rigorous anti-inflationist monetary/fiscal policies to preserve their external competitiveness and their, let say, mercantilist-type export-led growth pattern. It is now easy to see that these differences can easily persuade economists and national policy makers from central economies that peripheral countries have to solve existing problems by *their own*. After all, central countries may argue, why should we provide any additional financial help or undertake expansionary measures to support recovery in the periphery given the amount of resources already conceded to them and the pretty well performance of our economic systems³? Further, the above divergences can work to impede or delay any serious attempt to end the present crisis by reforming European institutions in the direction of a federal European fiscal union with a true lender-of-last-resort central bank.

In this paper we stress that reforming European institutions towards the creation of a complete federal political union with a federal fiscal policy and full monetary sovereignty is the decisive step ahead to solve the Eurozone crisis. Accordingly, all the euro-skeptic feelings which take strength from the above divergences likely represent the worst threat to the survival of the Euro project. Indeed, they may prove to be narrow-minded and dramatically wrong in case of a collapse of the European monetary union. Also apparently invulnerable central Member States would likely suffer severe hardship and no center-periphery diverging interests would persist any longer in case of an unraveling Euro-zone. In the following sections, we try to formally address this point through a simple Eurozone center-periphery model. In doing this, we will distinguish between a big center-*small* periphery context and a big center-*big* periphery framework.

³ In this sense, the words released by German Minister for Foreign Affairs Guido Westerwelle in a recent interview to Focus Magazine are pretty clear: “Too much solidarity could also cause Europe to fail, if we demand too much of ourselves and too little willingness to reform from others (Focus Online, 4th august 2012)”.

2. The Model

Consider two countries, a well developed center and a relatively less developed periphery. They share the same currency and they have delegated monetary policy to a common central bank. Despite these common elements, the two countries maintain complete fiscal independence. Actually, they are responsible by their own for any fiscal policy aiming to regulate economic cycles, as well as all measures and fiscal aspects concerning pension system, social security, and the provision of public services such as healthcare and education. Fiscal deficits are financed by issuing national Treasury bonds denominated in the same Euro currency. According to the nowadays Eurozone framework, there is any federal fiscal authority which has the right to impose taxes, makes expenditures and collect financial resources by issuing federal government bills.

Into this context, equations (1) and (2) below define the growth rates of the center and the periphery along Keynesian lines, i.e. as a function of autonomous demand injections:

$$g_C = f_C \left(G_C, EX_C, I_C \left(P_C^T(i_C(\sigma_C)), P_P^T(i_P(\sigma_P)) \right) \right) \quad (1)$$

$$g_P = f_P \left(G_P, EX_P, I_P \left(P_P^T(i_P(\sigma_P)), P_C^T(i_C(\sigma_C)) \right) \right) \quad (2)$$

Expression (1) simply tells us that current economic performance of the center economy (g_C) positively depends on current domestic government expenditures (G_C), current net exports (EX_C) and total investment (I_C)⁴.

In the post-Keynesian tradition and according to the endogenous monetary theory, investment does not come from savings. On the one hand, investment depends on entrepreneurs' animal spirits demanding loans from banks in order to finance their projects. On the other hand, investment is affected by banks' credit policies. Credit conditions, we know, contribute to define what is usually labeled as the *effective* demand for credit and are

⁴ In a more realistic discrete time model, let define current output (Y_t) in this way: $Y_t = m(I_t + G_t + EX_t)$, where "m" stands for the Keynesian multiplier. Reminding that $Y_t = Y_{t-1}(1 + g_t)$, we can modify the formula above to express g_t , i.e. the annual growth rate of GDP at time t , as: $g_t = m(\eta_I g_t^I + \eta_G g_t^G + \eta_{EX} g_t^{EX})$. In our formulation, g_t^I , g_t^G and g_t^{EX} are the annual growth rate of total investment (I), public expenditures (G) and economy's exports (EX); η_I , η_G and η_{EX} are the corresponding shares on domestic GDP (here, for the sake of simplicity, assumed as constant). It goes without saying that, ceteris paribus, the higher I_t , G_t and/or EX_t , the higher the resulting growth rate and the performance of the economy as a whole.

⁵ The formalization in equations (1) and (2) of the real GDP growth closely resembles that adopted by Lavoie (2006).

highly influenced by the soundness of banks assets. Accordingly, equation (1) assumes that economic growth in the center is indirectly affected, through the investment channel, by the prices of center government's bonds (P_C^T) which, in turn, depends negatively on its own interest rates i_C . Actually, changing prices of center government's bonds will alter the solidity of banks balance sheets and therefore their credit policy. Investment demand will inevitably be affected by easing or, as is currently going on, tightening conditions on the credit market. Equation (1) also emphasizes that periphery government's bonds, and not only center government's bonds, may influence banks' credit policy in the center. Indeed, before the outbreak of the current crisis, central economy banks have largely provided loans to peripheral economies. They are now exposed to the risk of default in the periphery. This event may have significant effects on the functioning of the credit market and of the economy as a whole in central Euro Member States⁶.

Equation (2) gives us the GDP growth rate in the periphery. Its economic meaning is exactly equivalent to that of equation (1). According to the data provided by the most relevant international financial institutions, peripheral Euro countries are net receivers of foreign capitals, in particular from central Euro countries, and are net debtors on international financial markets. Yet, big peripheral economies such as Spain and Italy have also accumulated significant asset positions in the center. According to Waysard, Ross and de Guzman (2010), at the end of 2008 Italian institutions' assets in Germany amounted to 196 billion Dollars, i.e. the 8 percent of Italian GDP and 5,6 percent of German GDP. In the same period, Spanish asset holdings in Germany worth 88 billion Dollars, that is the 5 percent and 2,5 percent of Spanish and German GDP respectively. In light of these facts, in equation (2) we assume both peripheral and central bonds to be in the balance sheets of peripheral banks and therefore to influence, via banks' credit policy, domestic investment I_P . While this aspect will be neglected when considering center-peripheral dynamics in case of *small* peripheral countries, such an intertwined financial structure will prove to be fundamental to explain the co-evolution of central and *big* peripheral Euro countries.

In equations (1) and (2), interest rates i_C and i_P are influenced by parameters σ_C and σ_P , respectively. In our model, they stand for country-specific financial risk indicators which financial operators assign to assets issued by Eurozone countries (in this case government bonds only). Parameter σ_C represents the peculiar risk perceived by financial markets in acquiring central economy government's bonds. Parameter σ_P , instead, grasps all the country-

⁶ In equation (1), P_P^T stands for the market price of periphery government's bonds and i_P is the connected interest rate.

specific factors taken into account by financial investors when buying peripheral government's bonds. Such country-specific factors obviously influence the remuneration gained on central and peripheral economy bonds' holdings. In particular, they determine the spread between the central(peripheral) economy government bonds' interest rate $i_C(i_P)$ and the interest rate i^* associated to, say, a riskless financial activity such as US government Treasury Bills. This point is modeled in equations (3) and (4) below.⁷

$$i_C = i^* + \sigma_C \quad (3)$$

$$i_P = i^* + \sigma_P \quad (4)$$

Inflation is sometimes considered a possible way to follow by economic authorities in order to stabilize, or possibly reduce, too-high debt-to-GDP ratios. In this model, we formalize inflation at Euro-country level in a pretty standard accelerationist fashion:

$$\pi_C = \pi^T + \psi(g_C - g_C^n) \quad (5)$$

$$\pi_P = \pi^T + \chi(g_P - g_P^n) \quad (6)$$

Equation (5) tells us that the current inflation rate in the center π_C is equal to the inflation target π^T established by the common European Central Bank in case current growth g_C is equal to the central economy full-employment growth rate g_C^n . Should g_C be higher(lower) than g_C^n , inflation in the center will be higher(lower) than the long-run average inflation rate pursued by European monetary authorities. The same line of reasoning applies to equation (6), which gives us current inflation in the periphery π_P . In equation (6), g_P^n now stands for potential growth in the periphery⁸. Parameters ψ and χ represent the sensitivity of inflation dynamics to output gap in the center and in the periphery respectively.

⁷ Actually, according to the uncovered interest rate parity, if we assume US Treasury Bills as a sort of third-party riskless financial activity, interest rate spreads with respect to Euro governments' bonds should also take into account the Euro-Dollar exchange rate risk. For the sake of simplicity, in this model we neglect this point. We do this in order to stress the relevance of intra-Eurozone financial transactions among different Euro countries' bonds instead of capital flights from Eurozone assets towards third-countries' financial activities. In this sense, it is worth noting the pretty small devaluation of Euro with respect Dollar in spite of the considerable distress afflicting financial European markets since 2010.

⁸ In this model, we define g^n as the growth rate of real GDP consistent with the full utilization of available resources, in particular the domestic labor force, and given the growth rate of labor productivity. In this paper, for the sake of simplicity, we do not explicitly model the technological long-run factors and the cyclical ones

Equations (1)-to-(6) set the, let say, instantaneous values of some relevant economic variables such as $g_C(g_P)$, $i_C(i_P)$, $\pi_C(\pi_P)$. In this model, however, our concern is mainly on diverging trends (and the ensuing conflicting interests) among center and peripheral Euro countries. The word “trend” recall us some sort of dynamics in economic variables. The dynamic side of this model is encapsulated in the set of equations (7)-(10) reported below. In line with the aim of the paper, here we focus on, say, financial variables. In particular, we model the evolution of the debt-to-GDP ratio in both the central and peripheral economy, as well as the dynamics of the country-specific risk indicators σ_C and σ_P . We do this due to the mounting emphasis on debt-to-GDP ratios as fundamental signals of public balance solidity of the various Euro countries. The same logic applies to country-specific risk indicators and therefore to Euro country interest rate spreads, which have probably assured as the most observed economic variables by common people, economists, policy makers and financial operators in the last two years. Equations (7) and (8) give us the dynamics of the debt-to-GDP ratio d_C ⁹ and of the country-specific financial risk indicator σ_C in the center:

$$\dot{d}_C = d_C(\widehat{D}_C - \pi_C - g_C) = d_C \left[\frac{\Omega_C(d_C)}{d_C} + i_C - \pi^T - (1 + \psi)g_C + \psi g_C^n \right] \quad (7)$$

$$\dot{\sigma}_C = \beta(d_C - \overline{d}_C(d_C^*(\sigma_C), \varepsilon_P)) \quad (8)$$

With $\overline{d}_C = d_C^*$ if $\varepsilon_P = 0$; $\overline{d}_C > d_C^*$ if $\varepsilon_P > 0$

Equation (7) reads that the time derivative of the central economy debt-to-GDP ratio \dot{d}_C is a positive function of the primary deficit-to-GDP ratio $\Omega_C(d_C)$. In this model, we assume Ω_C to be a negative function of the debt-to-GDP ratio d_C . Actually, perhaps influenced by the apparently worldwide run against public debt, the higher d_C , the stronger the political pressures to squeeze primary deficits and possibly obtain primary surpluses, hence the negative relationship between Ω_C and d_C . Further, public debt-to-GDP dynamics in the center is positively affected by the interest rate i_C . The higher i_C , the higher the service costs of outstanding debt and therefore new debt issuances.

In equation (7), the inflation target π^T set by the European Central Bank has a negative impact on the dynamics of the central economy debt-to-GDP ratio. According to equation (5), ceteris

affecting the evolution of the potential growth rate. For more details on this point, see León-Ledesma and Thirwall (2002), Lavoie (2006).

⁹ d_C is defined as $D_C/P_C Y_C$. D_C stands for the stock of public debt in the center, P_C is the overall economy price level and Y_C central economy real GDP. In equation (7), \widehat{D}_C is the percentage variation in center economy's debt stock.

paribus, the higher π^T , the higher the inflation rate in the center and therefore its nominal GDP. Stabilization or reduction of the debt-to-GDP ratio would likely be easier. The current growth rate g_c shows a similarly negative effect on d_c . On the one hand, economic growth directly influences the debt-to-GDP ratio dynamics by increasing domestic real GDP Y_c . On the other hand, it may also trigger off an indirect effect by possibly leading to higher inflation (see equation (5)). Finally, the evolution of the debt-to-GDP ratio in the center is influenced positively by the potential growth rate g_c^n . Ceteris paribus, the higher g_c^n and the connected output gap, the lower will be domestic inflation or, even worse, the higher the risk to give rise to deflation. A dangerous Fisher-type debt-deflation process could take place, destabilizing the debt-to-GDP ratio.

Equation (8) tries to model how financial operators may periodically update the financial risk indicator attached to the center. We assume the central economy financial risk indicator to be revised by confronting the outstanding debt-to-GDP ratio d_c with some benchmark level \bar{d}_c . According to equation (8), should d_c be higher(lower) than the benchmark level \bar{d}_c , financial operators will increase(reduce) the financial risk indicator associated to central economy government's bonds, so that $\sigma_c > 0$ ($\sigma_c < 0$). Parameter β stands for the sensitivity of financial operator feelings to any gap between current debt-to-GDP ratio and the benchmark level \bar{d}_c .

In equation (8), the benchmark debt-to-GDP ratio \bar{d}_c plays a leading role in modifying financial operators' feelings towards central economy government bonds. How do financial operators set such kind of target? In our model, we assume \bar{d}_c to depend positively on two factors: d_c^* and ε_p . First, d_c^* stands for the equilibrium level of the debt-to-GDP ratio consistent with the economy growing at full potential. Other way round, d_c^* represents a sort of long-run equilibrium level of the debt-to-GDP ratio once the economy has achieved its potential growth rate g_c^n and, consequently, primary deficit (or surplus) is at its structural level. The full-employment debt-to-GDP ratio may be defined according to the expression below:

$$d_c^* = \frac{\Omega_c^*}{(g_c^n + \pi^T - i^* - \sigma_c)}$$

Where Ω_c^* is the primary deficit-to-GDP ratio at its structural level.

It times of financial stability, without any bad news from the center and, more relevantly, from the periphery of the Eurozone (i.e. $\varepsilon_p=0$), we assume financial operators to set the benchmark level \bar{d}_c equal to the long-run full-employment debt-to-GDP ratio d_c^* . In this case, financial

operators will upward revise the financial risk indicator σ_C only if current debt-to-GDP ratio is higher than its long-run expected value d_C^* . The most recent experience, however, tells us that financial operators do not only take into account domestic factors to evaluate financial risk in the center. In times of financial distress, also external factors may come to play a leading role. Actually, the Eurozone crisis clearly witnesses that bad news from the periphery can strongly influence investment portfolio decisions and induce capitals to suddenly leave the periphery in search for a safe haven in the center. Such capital flights can often be seen as irrational and de-linked from the effective financial solidity of allegedly safe central Euro countries¹⁰. Nonetheless, they are at the basis of the surge in interest rate spreads between central government bonds and peripheral Treasury Bills. In equation (8), term ε_P precisely aims to get this point. In particular, if we imagine some bad news coming from the periphery, i.e. a deeper economic recession than elsewhere or low space for anti-cyclical policies due to already high levels of the debt-to-GDP ratio, term ε_P will assume positive values. This will lead financial operators to increase the benchmark level \bar{d}_C . Regardless from the effective gap between d_C and d_C^* , financial markets will move capitals away from the periphery and towards the center and possibly reduce the financial risk factor σ_C and the interest rate i_C associated to central economy bonds.

Equations (9) and (10) correspond to equations (7) and (8), now referred to the periphery:

$$\dot{d}_P = d_P(\widehat{D}_P - \pi_P - g_P) = d_P \left[\frac{\Omega_P(d_P)}{d_P} + i_P - \pi^T - (1 + \chi)g_P + \psi g_P^n \right] \quad (9)$$

$$\dot{\sigma}_P = \delta(d_P - \bar{d}_P(d_P^*(\sigma_P), \varepsilon_P)) \quad (10)$$

With $\bar{d}_P = d_P^*$ if $\varepsilon_P = 0$; $\bar{d}_P < d_P^*$ if $\varepsilon_P > 0$

Equations (9) and (10) describe the dynamics of the debt-to-GDP ratio d_P and of the country risk factor σ_P in the periphery along similar lines to those assumed in the center. Note, however, a fundamental asymmetry with respect to financial risk dynamics in the center. Actually, adverse shocks hitting peripheral economies (i.e. $\varepsilon_P > 0$) will be immediately passed through a value of \bar{d}_P lower than d_P^* . Accordingly, huge capital outflows will take place and the peripheral economy financial risk indicator σ_P will be revised upward. Again, this rough but simple formalization tries to model the perhaps biased eyes through which financial

¹⁰ According to data from IMF, in 2011, the Spanish debt-to-GDP ratio was equal to 68.5%. It was much lower than the same data from Belgium, Germany or even UK, and very close to the value associated to Netherland.

operators seem to look at economic events in central Euro countries and peripheral economies.

Equations (7)-(8) and (9)-(10), if considered all together, give rise to a highly complex four-equation dynamic system, whose stability should be assessed by taking into account all possible real-side and financial links between central and peripheral countries. In order to keep the dynamic analysis of the model as simple as possible, for the time being we prefer considering the sets of equations (7)-(8) and (9)-(10) as independent. In particular, we now assume equations (7)-(8) and (9)-(10) to be somehow connected only by the exogenous asymmetric response of financial markets to bad news in the periphery (i.e. factor ε_P in equations (8) and (10) above). Actually, we will return to the full four-by-four dynamic system later on, when analyzing center-periphery dynamics in case of a large and economically influential peripheral economy. Moreover, let now focus on the central economy dynamic system only¹¹ and analyze the connected Jacobian matrix J_C (evaluated at the steady state). We get:

$$J_C = \begin{bmatrix} \frac{\partial \dot{d}_C}{\partial d_C} & \frac{\partial \dot{d}_C}{\partial \sigma_C} \\ \frac{\partial \dot{\sigma}_C}{\partial d_C} & \frac{\partial \dot{\sigma}_C}{\partial \sigma_C} \end{bmatrix} = \begin{bmatrix} d_C \left[\frac{\left(\frac{\partial \Omega_C}{\partial d_C} \right) d_C - \Omega_C}{d_C^2} - (1 + \psi) \frac{\partial g_C}{\partial d_C} \right] & -d_C(1 + \psi) \frac{\partial g_C}{\partial \sigma_C} \\ -/+ & + \\ \beta & -\beta \frac{\partial \bar{d}_C}{\partial d_C^*} \frac{\partial d_C^*}{\partial \sigma_C} \\ + & - \end{bmatrix}$$

As to the partial derivative $(\partial \dot{d}_C / \partial d_C)$, its sign is likely to be negative for low values of the debt-to-GDP ratio d_C . In this case, in fact, a slight increase in d_C may induce policy makers to cut primary deficit Ω_C . At the same time, a bit higher value of d_C would probably have any effect on current growth (i.e. $\frac{\partial g_C}{\partial d_C} = 0$). Things may radically change at much higher values of the debt-to-GDP ratio. First, when d_C is too high, reductions in primary deficits may prove to be too small and insufficient to stabilize public debt dynamics. Second, perhaps in presence of widespread fear among economic agents about public debt sustainability, economic performance may deteriorate and current growth decline, so that $\frac{\partial g_C}{\partial d_C} < 0$. An unstable

¹¹ Stability analysis of equations (9) and (10) is qualitatively equivalent to that of the dynamic system composed by equations (7) and (8). In the main text, we thus describe the center economy case only.

dynamics may thus emerge, possibly leading to higher and higher values of the debt-to-GDP ratio and¹².

As to derivatives $(\frac{\partial d_c}{\partial \sigma_c})$ and $(\frac{\partial \sigma_c}{\partial d_c})$, there are no doubts about their positive signs. In particular, a higher financial risk σ_c will further complicate public debt management given that it will increase debt service costs and, at the same time, hamper current economic growth through the interest rate-investment nexus (see equation (1)).

In the Jacobian matrix above, partial derivative $(\frac{\partial \sigma_c}{\partial \sigma_c})$ will have a negative sign. Actually, ceteris paribus, an increase in the risk factor σ_c will raise the long-run full-employment value of the debt-to-GDP ratio d_c^* , which in turn will induce to revise downward σ_c . In a way, we may interpret this point as a self-stabilizing force in the dynamics of the country risk factor. The higher σ_c , the more difficult is it will newly increase next time.

Graphically speaking, the dynamic system above and the set of equations describing how central economy works (but the same applies to the periphery) can be represented through the four-panel figure 1 below.

The top-right panel portrays the two loci for constant values of the debt-to-GDP ratio d_c and country risk factor σ_c . The $(\dot{d}_c = 0)$ locus is represented by an inverted U-curve. The $(\dot{\sigma}_c = 0)$ locus is an upward sloping curve with an horizontal asymptote when $\bar{d}_c = d_c^* = \frac{\Omega_c^*}{(g_c^n + \pi^T - i^* - \sigma_c)} = \infty$. Further, we assume it to have and horizontal segment, with $\sigma_c=0$, when d_c is lower than $d_{c(\sigma_c=0)}^* = \frac{\Omega_c^*}{(g_c^n + \pi^T - i^*)}$. Note two intersection points, hence the possibility for multiple equilibria to exist¹³. Equilibrium *A* features a lower debt-to-GDP ratio d_c^A , a lower country-specific risk indicator σ_c^A and a higher growth rate g_c^A than the records associated to equilibrium *B*. Further, whilst point *A* shows a stable dynamics in its neighborhoods, equilibrium *B* is unstable. In our mind, equilibrium *B* represents a sort of risky economic environment, the pre-crisis Greek context for instance, in which a temporary economic shock may well be enough to produce a right-to-left departure from the equilibrium and explosive dynamics in the debt-to-GDP ratio. In figure 1, for the sake of simplicity, we do not explicitly introduce any upper bound to the evolution of d_c . Such a ceiling is however a concrete possibility in the case of Euro Member countries given the present European

¹² See also Botta (2012) for more details on this point.

¹³ The specific multiple-equilibria scenario portrayed in figure 1 is only one among many possible. In the second part of the paper, we will also consider the case in which no long-run equilibria exist. Actually, it may describe the possibly disastrous long-run consequences of the 2007-2008 financial meltdown on the financial stability of some peripheral Euro Member States.

institutional framework¹⁴. It thus makes sense to believe that a destabilizing right-to-left dynamics in figure 1 cannot continue indefinitely and that an upper limit will eventually bind, beyond which public debt will not be rolled over any longer and default (and debt restructuring) take place.

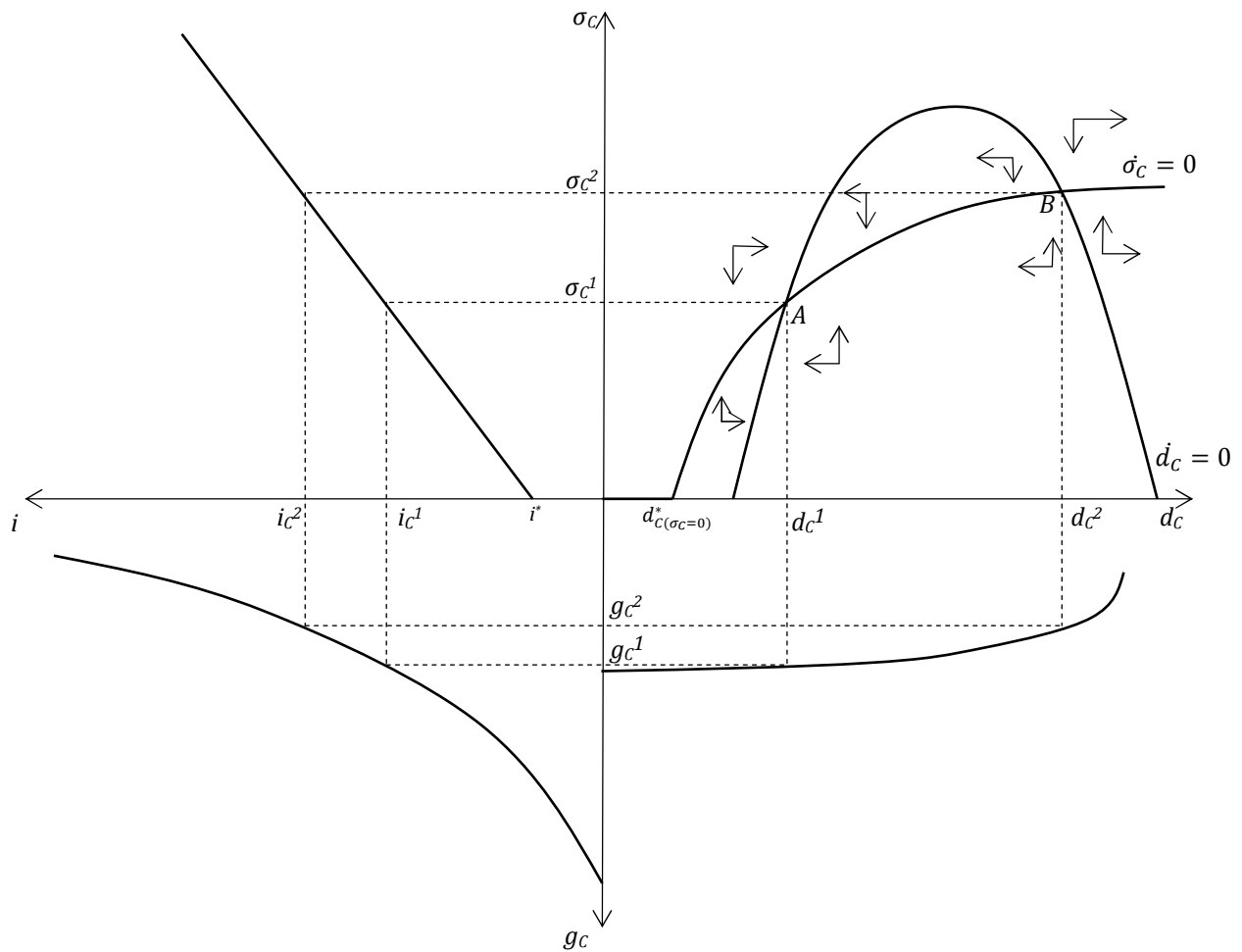


Figure 1 – Multiple long-run equilibria in the center

Moving counter-clockwise in figure 1, the remaining panels describe the economic mechanisms connecting d_c to g_c . In the top-left panel we portray equation (3), whilst in the bottom-left panel we draw equation (1). In the bottom-right panel, finally, we explicitly match each other debt-to-GDP ratios and GDP growth rates associated to the long-run equilibria reported in the top-right quadrant.

¹⁴ Actually, the apparently endless increase in Japan's debt-to-GDP ratio may confirm that "Sovereigns do not default (Kregel, 2012)". In the nowadays Euro framework, however, we all know how far Member countries are from being fully sovereign States.

3. Center-periphery divergence in the aftermath of the 2007-2008 financial meltdown

Equations (7)-(8) and (9)-(10) describe debt-to-GDP ratios and country-specific risk factors to follow broadly similar adjustment rules in both the center and in the periphery. Yet important asymmetries exist in the way the two countries can face common economic shocks. We have already discussed the role of factor ε_P in equations (8) and (10). Some more points is worth stressing here.

First, remarkable economic performances in peripheral Euro countries in the first half of the 2000s until 2007 were largely fed by mounting housing booms. This emerges clearly from table 1 in the appendix of the paper, which reports data on the sectoral structural composition and financial solidity of various Euro economies. Note the relevance of the construction sector (as a percentage of GDP) in countries such as Spain and Ireland, and, in a lesser extent, Greece, compared to what registered in central economies. We all know that, since 2007, the housing sector has been in the eyes of the storm. On the one hand, this has implied longer and sometimes deeper economic downturn in peripheral countries than elsewhere. On the other hand, peripheral governments have had to massively intervene to avoid the collapse of the financial system and provide safety net against widespread unemployment, with the ensuing higher-than-abroad burden on public finances.

Second, several peripheral countries still present relatively underdeveloped productive systems, at least with respect to the center. This is clear in the case of Greece and Portugal. In both countries, manufacturing amounts to far less than 15 percent of domestic GDP and a process of early deindustrialization seem having taken place. Further, these economies are poorly integrated on international markets and show a pretty low propensity to export¹⁵. On the one hand, this fact can be interpreted as a sign of lack of competitiveness of their productive patterns and provide an explanation for their difficulties to bring back growth soon by exploiting world recovery. On the other hand, it mirrors the net external debt position plaguing Greece and Portugal among the other peripheral countries.

Third, peripheral and central Euro countries show opposite positions on international financial markets. Since the beginning of 2000s, peripheral Euro countries have recorded significant Balance-of-Payments current account deficits and increasing net external debt stocks. On the contrary, most central Euro countries have registered large trade and current account surpluses. By the end of 2010, their foreign assets outstripped by far foreign

¹⁵ In 2010, Greek exports represented a mere 21 percent of GDP. In the overall Euro area, total exports stands at the 40 percent of Eurozone GDP.

liabilities. In times of financial distress, it makes a big difference being net creditor rather than net debtor on financial markets. Actually, peripheral Euro countries are highly exposed to capital flights and sudden stops, which can easily trigger off liquidity and, even worst, insolvency crises. This is particularly true inside EMU, in which liquidity can safely dry up in the periphery and move to the center without bearing any exchange rate risk. Central Euro countries, on the contrary, now appear as safe heaven to financial investors and their financial markets are plenty of liquidity, with obvious positive consequences in terms of financial stimuli to economic recovery.

Together with points 1 and 2, such financial markets' asymmetric response to economic shocks in central and peripheral countries is a core issue of this paper and the central point upon which the role of factor ε_P in equations (8) and (9) hinges on. Let try to see more formally the long-run consequences of such asymmetries both into a big center-*small* periphery setting and into a big center-*big* periphery context in the aftermath of the 2007-2008 financial meltdown.

3.1 The big centre-*small* periphery case

Imagine to deal with a large central economy, let say Germany, and a *small* peripheral country, Greece or Portugal for instance. Even further, on the basis of the simplifications introduced before, imagine that economic links between the two countries are pretty weak. First, center exports to the periphery amount to a negligible proportion of total central economy exports, so that we can assume $\left(\frac{\partial g_C}{\partial EX_C} \frac{\partial EX_C}{\partial EX_{C \rightarrow SP}} = 0\right)$ ¹⁶. Even though the opposite might be true in the periphery in a general center-periphery model, inside the Eurozone small peripheral countries do not seem to have tight trade relationships with central economies. Accordingly, let apply the above assumption also in the case of the periphery¹⁷. Second, even though we assume overall financial markets' response to bad news in the periphery and center-periphery capital flights to have significant economic consequences, imagine *direct reciprocal* center-periphery financial relationships to be negligible in case of a small peripheral

¹⁶ $EX_{C \rightarrow SP}$ stands for export of the center towards the *small* peripheral Euro country.

¹⁷ In 2011, Greek exports towards Germany amounted to 7,74 percent of total Greek exports. Due to the scarce incidence exports have on Greek GDP, we can reasonable assume that Greek exports to Germany represent a negligible demand injection to domestic growth. The same line of reasoning broadly applies to Ireland, where exports towards Germany represented a bit less than 7 percent of total Irish exports in 2011. In the case of Portugal, this value increases to 12 percent. In the same year, total exports represented only the 30 percent of Portuguese GDP, so that exports to Germany were less than 4 percent of Portuguese GDP.

country¹⁸. On the one hand, assume that center economy foreign assets in the periphery do not have much weight in center financial institutions' balance sheets. In equation (1), P_P^T may thus be irrelevant to determine g_C , so that $\left(\frac{\partial g_C}{\partial I_C}\right)\left(\frac{\partial I_C}{\partial P_P^T}\right) = 0$ ¹⁹. On the other hand, apply this line of reasoning also to equation (2) and to small periphery' asset holdings in the center. Accordingly, we assume $\left(\frac{\partial g_P}{\partial I_P}\right)\left(\frac{\partial I_P}{\partial P_C^T}\right) = 0$.

Into this framework, now assume that a common negative economic shock occurs, curtailing growth and increasing public deficits in both economies. Economic downturn in the periphery, however, is deeper and lasts longer compared to recession in the center. Moreover, peripheral public finances register deeper imbalances than abroad and fiscal deficits skyrocket due to the implementation of cumbersome financial sector rescue packages and due to the effect of automatic stabilizers.

In terms of a two-country version of figure 1, such events induce both loci ($\dot{d}_C = 0$) and ($\dot{d}_P = 0$) in the center and in the periphery to move downward. The extent of these movements, however, will be different. Deeper recession and wider public balance deficits call for stronger debt corrections in the periphery than in the center. Accordingly, the locus for stable d_P values will move far more down than the corresponding locus for a constant debt-to-GDP ratio in the center will do. Figure 2 below graphically reproduces this point. The upper part of figure 2 (henceforth figure 2.a) focuses on the periphery, while the bottom part of figure 2 (henceforth figure 2.b) plots changing dynamics in the center.

Beyond these movements or perhaps stimulated by these same events, capital markets will not react neutrally to economic recessions and increasing debts in the periphery and in the center. Actually, apparently worsen conditions in the periphery will suddenly induce capitals to leave the country and give rise to a "run to quality". The center, maybe thanks to its better capability to restore growth soon, will provide the right assets on which safely put money.

¹⁸ This assumption suits pretty well the case of financial relationships between central Euro countries and small peripheral economies such as Greece and Portugal. However, it might be partially amended in the case of Ireland, whose financial institutions present much stricter financial relationships with central economies.

¹⁹ Through this assumption, we do not intend to neglect possible negative effects of, say, debt default in Greece, Portugal or Ireland on financial institutions in central Euro countries. Yet, in this model we adopt a comparative perspective and put emphasis on the fact that things would radically change in case financial turbulences will continue and possibly lead to default also *big* peripheral countries. In this regard, take into account that, by September 2011, according to data from the Bank of International Settlements (BIS), more than 80 percent of French banks' foreign assets in peripheral Euro countries were concentrated in Italy and Spain. In the case of German banks, their exposure towards Italy and Spain amounted to 67 percent of overall German security holdings in peripheral Euro Member States. In light of this evidence, the above assumptions must be seen as a way to remark differences between a *soft* crisis scenario, in which small peripheral countries only risk default, and a much more worrisome crisis in which financial turbulences dramatically increase also in big peripheral economies.

According to the analysis above, factor ε_P will assume a positive value and lead financial operators to revise country-specific risks. In the periphery, an upward revision of factor σ_P will take place. Central economy bonds, on the contrary, will get higher ratings and the connected country-risk factor σ_C will decrease. Graphically speaking, such a diverging reaction of financial markets in the center and the periphery are portrayed through opposite movements in the loci for $(\dot{\sigma}_P = 0)$ and $(\dot{\sigma}_C = 0)$. In figure 2.a, the locus for constant values of σ_P will move to the left. In figure 2.b, the locus for $(\dot{\sigma}_C = 0)$ will shift to the right.

The final outcomes of these movements depend on their relative intensity. In figure 2 we provide a pretty extreme result, which nevertheless seems to well reflect the existing opposite dynamics between central and peripheral economies. In figure 2.a, higher public deficits, economic recession and financial markets' fear about debt default all induce substantial increases in the debt-to-GDP ratio d_P and in the risk indicator σ_P in the periphery. As a consequence of the initial temporary economic shock, the periphery seriously risks to permanently move from equilibrium A to a new equilibrium C , in which much higher interest rates will go hand-in-hand with far lower growth rates compared to the before-crisis period. Even worst, should the periphery be initially located in the unstable equilibrium B , perhaps the case of Greece, the above events could easily set in motion destabilizing dynamics and eventually lead the country to bankruptcy. Note that this could also happen in apparently much safer countries such as Spain and Ireland in case financial markets' reactions to the crisis would be so strong to lead the two loci for $(\dot{\sigma}_P = 0)$ and $(\dot{d}_P = 0)$ not to intersect any longer.

In the center, a radically different picture emerges. The crisis-driven downward movement in the locus for $(\dot{d}_C = 0)$ can obviously induce an increase of the debt-to-GDP ratio. However, financial markets reactions to crisis in the periphery, capital flights to the center and the ensuing rightward shift in the locus for $(\dot{\sigma}_C = 0)$ may tame such trend. Actually, a slightly increasing debt-to-GDP ratio may paradoxically combine with a lower country risk factor, easing conditions on credit markets and rebounding growth (see equation (1)). Should the reactions of financial markets be sufficiently strong, debt-to-GDP ratio may even decrease along with a country risk factor close to zero. This is the picture we portray in figure 2.b, which in turn seems to resemble pretty well what is going on in a large central Euro country such as Germany. According to data from the IMF (2012), thanks to never-before-seen low interest rates and considerable economic recovery in 2010 and 2011, German debt-to-GDP ratio has started to decrease since 2010 and it is expected to further do so in 2012.

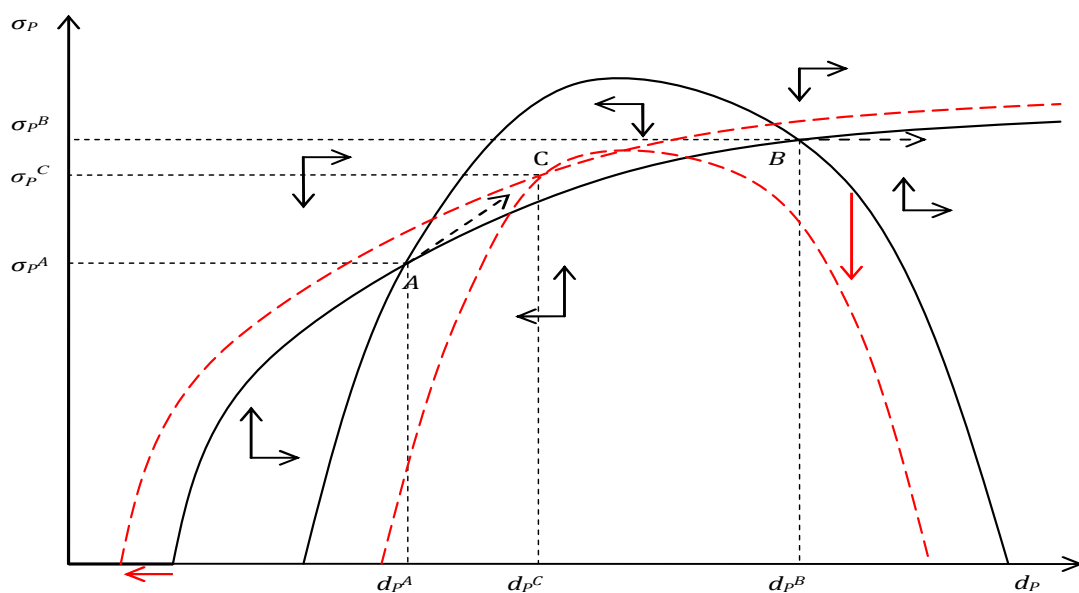


Figure 2.a – Debt-to-GDP ratio and country risk factor dynamics in the periphery in the aftermath of the 2007-2008 financial meltdown.

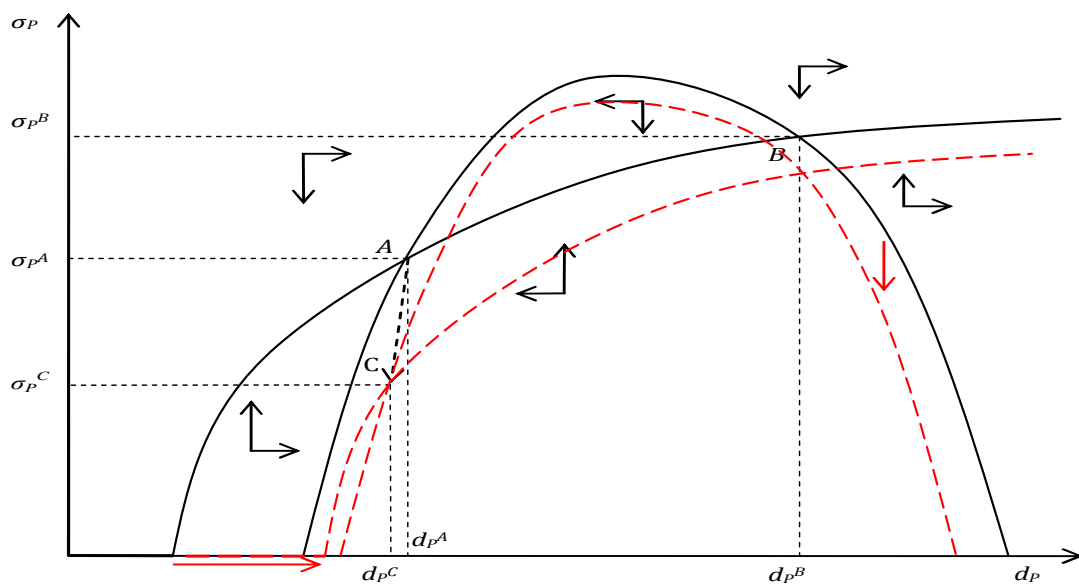


Figure 2.b – Debt-to-GDP ratio and country risk factor dynamics in the center in the aftermath of the 2007-2008 financial meltdown.

3.2 The big center-*big* periphery case.

The diverging outcomes of the 2007-2008 financial crash in the center and in the periphery of the Eurozone heavily depend on the assumption of weak center-periphery economic and financial relationships. This assumption sounds reasonable insofar as we deal with a small peripheral country. Things radically change and get much more complex in case of a *big* peripheral economy. There are at least two additional elements to consider which contribute to explain center-periphery joined dynamics in case of big economies.

First, trade relationships between a big center and a big periphery are likely stronger than in the case of a small periphery. Economic recession in Italy, for instance, will likely have negative effects on economic dynamics in Germany via the export channel. In terms of our model, this implies that $\left(\frac{\partial g_C}{\partial EX_C} \frac{\partial EX_C}{\partial EX_{C \rightarrow BP}} > 0\right)^{20}$. Note that a sort of perverse multiplicative feedback mechanism may emerge, according to which recession in a big peripheral country may curtail growth in the center, which, in turn, will deepen economic contraction in the periphery. More in general, besides such direct effects, crisis in big peripheral countries may produce a wide systemic contraction of trade relationships and economic dynamics. Italy is the second most important trade partner of France, which in turn stands up as the largest market for German exports. We cannot neglect the possibility that a severe economic downturn in Italy will hinder economic activity in France and therefore Germany.

Second, but perhaps more relevantly, central economy asset holdings in big peripheral countries are much more substantial than those in small economies (see footnote 15). It is thus pretty hard to believe that, even in presence of capital flights to the center, center's financial system will be immune to a mounting crisis in the periphery. Actually, the negative relationship between sovereign debt crisis in the periphery, falling prices of periphery bonds and worsening conditions on central economy credit markets may well be at work. On the one hand, investment in the center may be jeopardized by more stringent conditionalities set by a troubled banking system, so that $\left(\frac{\partial g_C}{\partial I_C}\right) \left(\frac{\partial I_C}{\partial P_P^T}\right) > 0$. On the other hand, note that the highly intertwined financial structure between central Euro countries and big peripheral economies would easily give rise to a perverse cycle between bankruptcies in the periphery and financial dislocation in the center. Accordingly, also central economy bonds may start to be under pressure should international investors fear about a chaotic Euro system collapse.

²⁰ $E_{C \rightarrow BP}$ stands for center economy exports towards the big peripheral economy. Analogously, $E_{BP \rightarrow C}$ represents big peripheral economy's exports to the center.

In light of all these new facts that might arise in case of a deepening financial crisis in a big periphery, it is much more complex than before to see diverging trends between central and peripheral economies. Positive factors which may somehow induce central economies to get benefitted from crisis in the periphery still exist. However, they are now counterbalanced by the cumbersome negative effects above. To try to see this more formally, take into account the full-extended dynamic system composed by equations (7)-(10). Moreover, try to assess its stability properties through the four-by-four Jacobian matrix $J_{C/BP}$.

$$J_{C/BP} = \begin{bmatrix} \frac{\partial d_C}{\partial d_C} & \frac{\partial d_C}{\partial \sigma_C} & \frac{\partial d_C}{\partial d_P} & \frac{\partial d_C}{\partial \sigma_P} \\ \frac{\partial \dot{\sigma}_C}{\partial d_C} & \frac{\partial \dot{\sigma}_C}{\partial \sigma_C} & \frac{\partial \dot{\sigma}_C}{\partial d_P} & \frac{\partial \dot{\sigma}_C}{\partial \sigma_P} \\ \frac{\partial \dot{d}_P}{\partial d_C} & \frac{\partial \dot{d}_P}{\partial \sigma_C} & \frac{\partial \dot{d}_P}{\partial d_P} & \frac{\partial \dot{d}_P}{\partial \sigma_P} \\ \frac{\partial \dot{\sigma}_P}{\partial d_C} & \frac{\partial \dot{\sigma}_P}{\partial \sigma_C} & \frac{\partial \dot{\sigma}_P}{\partial d_P} & \frac{\partial \dot{\sigma}_P}{\partial \sigma_P} \end{bmatrix}$$

The long list of equations below explicitly states the partial derivatives (evaluated at the steady state) contained in matrix $J_{C/BP}$ and the corresponding signs:

$$\frac{\partial d_C}{\partial d_C} = d_C \left[\frac{(\frac{\partial \Omega_C}{\partial d_C})d_C - \Omega_C}{d_C^2} - (1 + \psi) \frac{\partial g_C}{\partial d_C} \right] \text{ with } \frac{\partial d_C}{\partial d_C} < 0 \text{ when } d_C \rightarrow 0 \text{ and } \frac{\partial d_C}{\partial d_C} > 0 \text{ when } d_C \rightarrow \infty.$$

$$\frac{\partial \dot{d}_C}{\partial \sigma_C} = -d_C(1 + \psi) \frac{\partial g_C}{\partial \sigma_C} > 0$$

$$\frac{\partial \dot{d}_C}{\partial d_P} = -d_C(1 + \psi) \frac{\partial g_C}{\partial EX_C} \frac{\partial EX_C}{\partial EX_{C \rightarrow BP}} \frac{\partial EX_{C \rightarrow BP}}{\partial g_P} \frac{\partial g_P}{\partial d_P} \geq 0$$

$$\frac{\partial \dot{d}_P}{\partial \sigma_P} = -d_C(1 + \psi) \frac{\partial g_C}{\partial P_P^T} \frac{\partial P_P^T}{\partial i_P} \frac{\partial i_P}{\partial \sigma_P} > 0$$

$$\frac{\partial \dot{\sigma}_C}{\partial d_C} = \beta > 0$$

$$\frac{\partial \dot{\sigma}_C}{\partial \sigma_C} = -\beta \frac{\partial \bar{d}_C}{\partial d_C^*} \frac{\partial d_C^*}{\partial \sigma_C} < 0$$

$$\frac{\partial \dot{\sigma}_C}{\partial d_P} = 0$$

$$\frac{\partial \dot{\sigma}_C}{\partial \sigma_P} = 0$$

$$\frac{\partial \dot{d}_P}{\partial d_C} = -d_P(1 + \chi) \frac{\partial g_P}{\partial EX_P} \frac{\partial EX_P}{\partial EX_{BP \rightarrow C}} \frac{\partial EX_{BP \rightarrow C}}{\partial g_C} \frac{\partial g_C}{\partial d_C} \geq 0$$

$$\frac{\partial \dot{d}_P}{\partial \sigma_C} = -d_P(1 + \chi) \frac{\partial g_P}{\partial P_C^T} \frac{\partial P_C^T}{\partial i_C} \frac{\partial i_C}{\partial \sigma_C} \geq 0$$

$$\frac{\partial d_P}{\partial d_P} = d_P \left[\frac{\left(\frac{\partial \Omega_P}{\partial d_P} \right) d_P - \Omega_P}{d_P^2} - (1 + \chi) \frac{\partial g_P}{\partial d_P} \right] \text{ with } \frac{\partial d_P}{\partial d_P} < 0 \text{ when } d_P \rightarrow 0 \text{ and } \frac{\partial d_P}{\partial d_P} > 0 \text{ when } d_P \rightarrow \infty.$$

$$\frac{\partial \dot{\sigma}_P}{\partial d_C} = 0$$

$$\frac{\partial \dot{\sigma}_P}{\partial \sigma_C} = 0$$

$$\frac{\partial \dot{\sigma}_P}{\partial d_P} = \delta > 0$$

$$\frac{\partial \dot{\sigma}_P}{\partial \sigma_P} = -\delta \frac{\partial \bar{d}_P}{\partial d_P^*} \frac{\partial d_P^*}{\partial \sigma_P} < 0$$

According to partial derivatives' signs, we deal with a Metzlerian matrix with all extra-diagonal elements positive or null but not negative. Following Gandolfo (1996), a necessary and sufficient condition for stability thus requires upper-left minor principals of matrix $J_{C/BP}$ to alternate in sign starting with a minus sign associated to $(\partial \dot{d}_C / \partial d_C)$. Depending on the various signs that part of the above derivatives may assume, several stability scenarios exist. It is however pretty easy to see that the stability condition just reported will be immediately violated in case of a pretty high debt-to-GDP ratio in the center such that $(\partial \dot{d}_C / \partial d_C) > 0$ (i.e. equilibrium in the center on the downward sloping section of the locus for $(\dot{d}_C = 0)$). Let

thus consider the simplest and, say, safest scenario possible in which both the center and the big peripheral country present pretty low values of their own debt-to-GDP ratios, so that: $(\partial \dot{d}_C / \partial d_C) < 0$; $(\partial \dot{d}_P / \partial d_P) < 0$; $(\partial \dot{d}_C / \partial d_P) = 0$ and $(\partial \dot{d}_P / \partial d_C) = 0$. In this context, it is immediate to verify that:

$$|J_{C/BP}^1| = |\partial \dot{d}_C / \partial d_C| < 0$$

$$|J_{C/BP}^2| = |J_C| > 0$$

$$|J_{C/BP}^3| = (\partial \dot{d}_P / \partial d_P) |J_C| < 0$$

Once satisfied the above three sub-conditions, local stability also requires $|J_{C/BP}| > 0$. After a quite considerable amount of algebra, it is possible to show that:

$$|J_{C/BP}| = \frac{\partial \dot{d}_C}{\partial d_C} \frac{\partial \dot{\sigma}_C}{\partial \sigma_C} \begin{vmatrix} \frac{\partial \dot{d}_P}{\partial d_P} & \frac{\partial \dot{d}_P}{\partial \sigma_P} \\ \frac{\partial \dot{\sigma}_P}{\partial d_P} & \frac{\partial \dot{\sigma}_P}{\partial \sigma_P} \end{vmatrix} - \frac{\partial \dot{\sigma}_C}{\partial d_C} \left\{ \frac{\partial \dot{d}_C}{\partial \sigma_C} \begin{vmatrix} \frac{\partial \dot{d}_P}{\partial d_P} & \frac{\partial \dot{d}_P}{\partial \sigma_P} \\ \frac{\partial \dot{\sigma}_P}{\partial d_P} & \frac{\partial \dot{\sigma}_P}{\partial \sigma_P} \end{vmatrix} - \frac{\partial \dot{d}_P}{\partial \sigma_C} \left(-\frac{\partial \dot{\sigma}_P}{\partial d_P} \frac{\partial \dot{d}_C}{\partial \sigma_P} \right) \right\}$$

That is:

$$|J_{C/BP}| = |J_C| |J_P| - \beta \delta \left(\frac{\partial \dot{d}_P}{\partial \sigma_C} \frac{\partial \dot{d}_C}{\partial \sigma_P} \right) \geq 0 \quad (11)$$

From expression (11) for the determinant of the matrix $J_{C/BP}$, the sign of $|J_{C/BP}|$ can be either positive or negative. In the first case, the four-by-four dynamic system is locally stable. Otherwise, instability arises. Into a big center-big periphery context, therefore, stability cannot be assure even in the safest scenario possible assuming low initial values of debt-to-GDP ratios in both economies. Note that in such a context both systems would be stable if considered individually. Instability, however, may emerge due to the financial links connecting them (see the cross-country factors $(\partial \dot{d}_C / \partial \sigma_P)$ and $(\partial \dot{d}_P / \partial \sigma_C)$ in equation (11)). The more financially integrated countries are and the more exposed single-country credit institutions are to financial turbulences in the partner country, the higher the likelihood that financial instability in a big peripheral economy will extend to the center and give rise to

generalized Eurozone instability. Of course, instability would get even worse should the periphery be in a much more precarious position characterized by an initial pretty high debt-to-GDP ratio. In such a case, also a temporary and small shock may generate explosive dynamics with negative effects on both peripheral and central economic activity.

In order to figure out the point in a perhaps clearer way, try to modify figure 2 according to the new assumptions introduced. We do this in figure 3. In figure 3, the onset of the crisis follows the same lines seen in case of a small peripheral country. However, possible initial diverging trends between the center and the big periphery may now be replaced by cross-country similar dynamics when degrading financial conditions in the periphery will impinge financial institutions' solidity in the center, this way curtailing growth and raising the center economy debt-to-GDP ratio. In figures 3.a and 3.b, this event is represented by a sequence of downward movements in the two loci for $(\dot{d}_c = 0)$ and $(\dot{d}_p = 0)$, which will now feed back each other and spread financial and economic crisis in the overall Eurozone. It is now pretty easy to see that in case such a perverse cycle would effectively take place, no center-periphery diverging trends will exist any longer. Quite the opposite, without some Member States' common effort to stop the crisis, the breakdown of the overall Eurozone will appear as more than a concrete possibility.

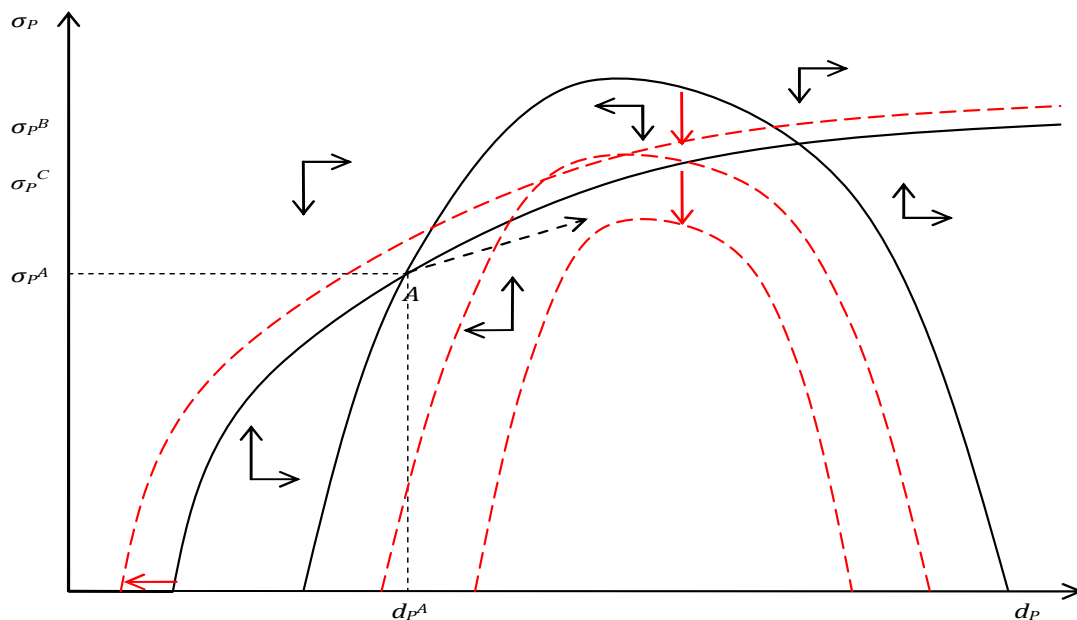


Figure 3.a – Peripheral economy financial instability in the center-*big* periphery case

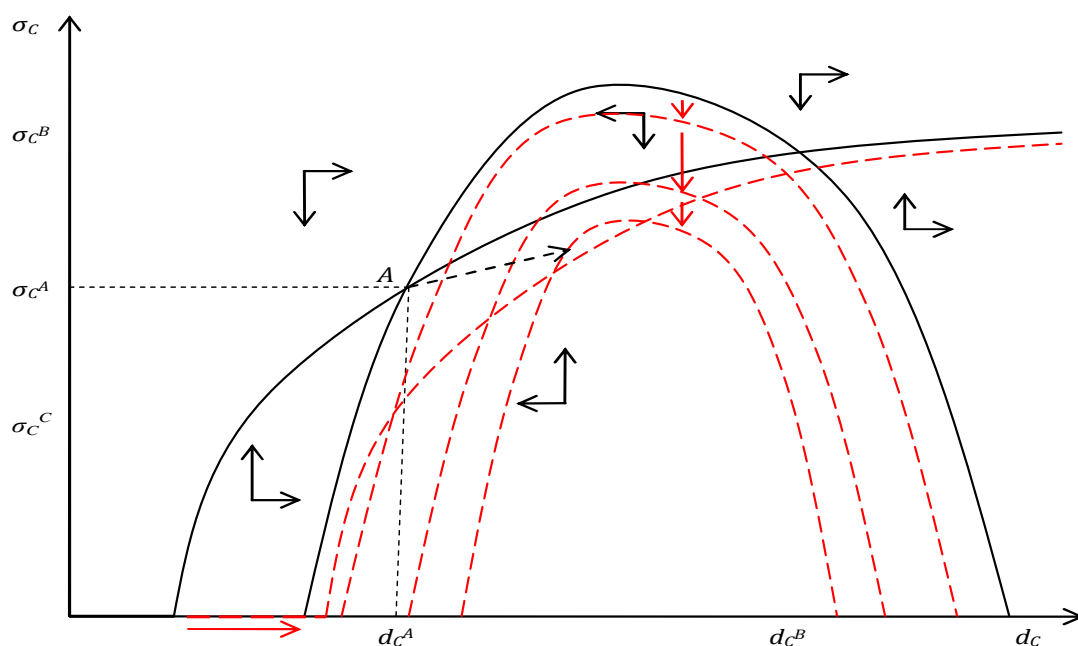


Figure 3.b – Central economy financial instability in the center-*big* periphery case.

4. The Myopic Logic of Fiscal Austerity and the Need of a Monetary Sovereign European Federal Government

The main challenge peripheral Euro countries are currently facing is a sovereign debt crisis. It consists in the incapability of peripheral Euro Member States to easily access financial markets and refinance outstanding debts (Kregel, 2012). This said, are such difficulties due to previous irresponsible fiscal policies? In the case of Greece, fiscal indiscipline is a long-lasting problem dating far back to Greek entry in the monetary union. In the case of Spain and Ireland, however, the answer is surely on the negative. Generalized fiscal profligacy cannot be identified as the in-deep source of existing problems in the Eurozone (De Grauwe, 2010).

Actually, the current Eurozone crisis seems to have been favored by the very original Eurozone institutional setup. The nowadays European Monetary Union (EMU) is a sort of confederation of independent States (Young and Semmler, 2011). First, Eurozone countries are in the same position of US States but without any federal institution helping them in case of severe economic downturns. Second, Euro countries are users of a common currency, but they do not issue them, so that they do not have monetary sovereignty any longer. The nowadays EMU thus works “much like a US with a FED, but with only individual state treasuries. It will be as if each EMU Member country were to attempt to operate fiscal policy

in a foreign currency; deficit spending will require borrowing in that foreign currency according to the dictates of private markets (Wray, 1998, pp. 91-92)".

Such an institutional framework may obviously work well in time of financial stability. However, due to the global economic recession triggered off by the 2007-2008 subprime crisis, Euro countries' deficits have soared as long as risk premia on their debts, this way giving rise to a perverse and possibly unstable cycle between fiscal imbalances and financial turbulences. As Papadimitriou and Wray (2012) clearly put it, "with no "Uncle Sam" to come to their rescue" peripheral Euro Member States now need help from the European Central Bank, but this option is explicitly forbidden by the monetarist-type statements included in Treaty on the Functioning of the Monetary Union. The peripheral Euro countries' sovereign debt crisis immediately follows from such a state of things as much as center-periphery capital flights and diverging trends do.

In the final part of the previous section we have shown that such diverging trends and conflicting interests may disappear in case default risks will deepen in big peripheral economies and spread also in central Member States. It is now straightforward to wonder whether the fear of a Euro system breakdown may lead Member countries to avoid Euro-skeptic positions and to undertake a common response to the crisis. If so, it also makes sense to wonder which kind of common solution could be adopted. Do Member countries have to continue on the way of fiscal austerity followed so far and rigorously adhere to the so-called Fiscal Compact? Alternatively, do we have to hope in a reform of the Euro system towards the creation of a fully sovereign federal European Union admitting more space for a federal expansionary fiscal policy?

As to the first point, when severe economic crises hurt, nationalistic and populist feelings could easily emerge and eventually sign the end of Euro Project. Indeed, worsening economic conditions in big peripheral economies and heavier repercussions in the center do not guarantee that converging interests among Euro countries would be recognized by national governments and that a strengthened European cooperation would take place.

As to the second point, the so-called Fiscal Compact does not add much to the already operative Stability and Growth Pact (SGP) nor it excludes, a priori, expansionary fiscal stances to be adopted in case of extraordinary events. Nevertheless, it remarks even more strongly than before the balanced budget principle as the general rule Euro Member States have to follow. First, such rule must be enforced through Member States' laws, better if constitutional laws. Second, fiscal deficits must be temporary and short-lived. Euro Member States are demanded to put in place automatic mechanisms to rapidly downsize fiscal deficit deviations

from their Medium-Term Targets, even in case of temporary deviations justified by extraordinary circumstances. The general philosophy of the fiscal compact is such that fiscal policy should be hardly available as stabilization tool and that Euro Member countries should be prohibited to run considerable fiscal deficits in the same ways sovereign States like US, UK and Japan have done since 2007.

According to our analysis, such kind of tighter Euro countries coordination does not address the core point of Eurozone difficulties. Indeed, all the perverse center-(big) periphery mechanisms that can deepen economic recession and spread it in the overall Eurozone are still at work even in presence of the Fiscal Compact. To see this, take figures 3.a and 3.b and assume that, according to the disposal of the Fiscal Compact, the two loci for ($\sigma_C = 0$) and ($\sigma_P = 0$) are pretty steep and lie very close to the origin of the axes²¹. Assume also that both the center and the periphery have initial debt-to-GDP ratios in line with the corresponding long-run values d_C^* and d_P^* implied by the Fiscal Compact. For the sake of simplicity, assume d_C and d_P to be originally equal to zero and the starting long-run equilibrium A to be located in the origin of the axes. We portray these scenarios in figures 4.a and 4.b below. Figure 4.a refers to a big peripheral Euro country. Figure 4.b represents the center.

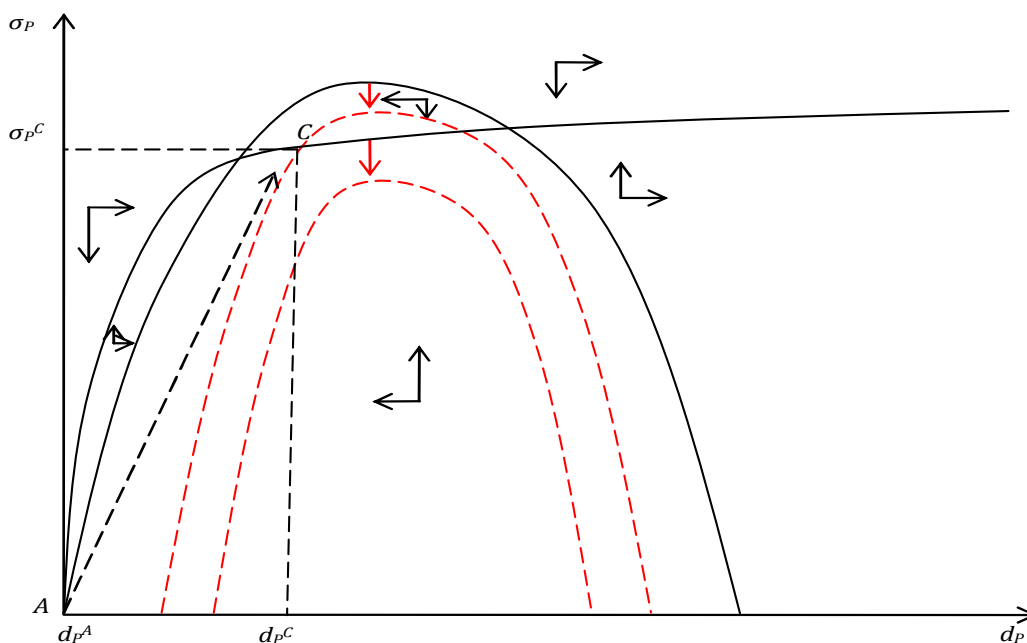


Figure 4.a – Global economic crisis in a big peripheral Euro country in presence of the Fiscal Compact

²¹ Remember that the Fiscal Compact imposes Euro Member countries to have a structural public balance deficit no higher than 0.5 percent of GDP (1 percent in case of Euro countries with a debt-to-GDP ratio lower than 60 percent). In terms of our model, this would imply $\Omega_{C(P)}^* \approx d_{C(P)}^* \approx 0$.

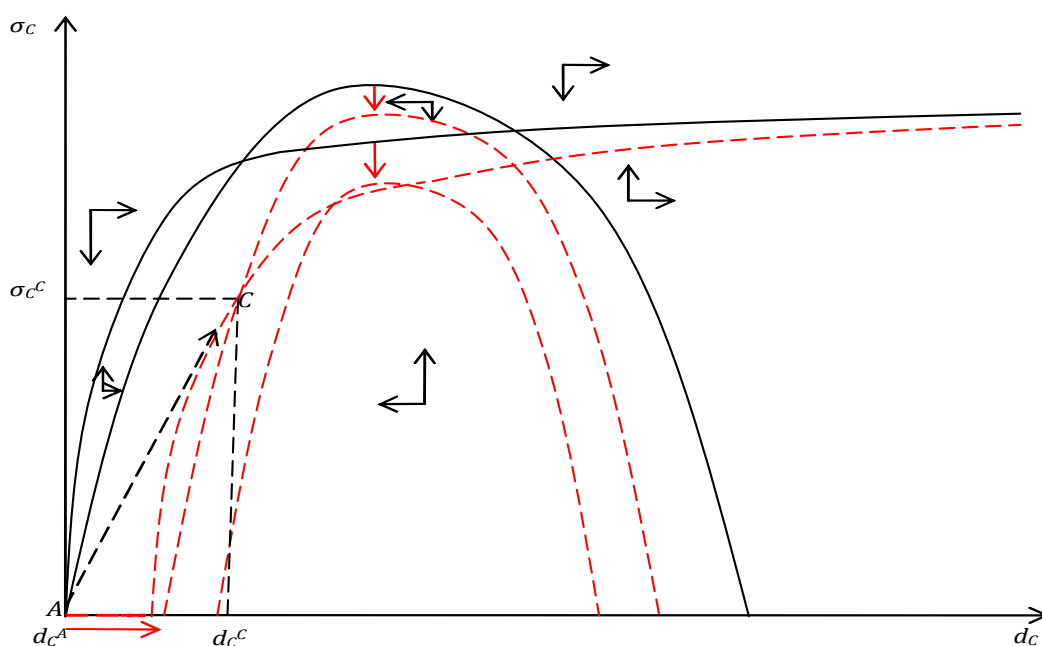


Figure 4.b – Global economic crisis in the center in presence of the Fiscal Compact

Now imagine that a global recession like the 2007-2008 crisis hurts, so that growth rates plunge and effective fiscal deficits, even though temporarily, widen. Accordingly, the two loci for $(\dot{d}_c = 0)$ and $(\dot{d}_p = 0)$ move downwards. Again, despite of capital flights from the periphery to the center²², Euro countries' risk factors may increase in both economies and trigger off the downward spiral already seen in figures 3.a and 3.b. Further, the automatic fiscal correction mechanisms envisaged by the Fiscal Compact may not help to improve the picture and stabilize (or reduce) debt-to-GDP ratios in Euro Member countries. First, restrictive national fiscal stances may exacerbate economic recessions in their own countries and paradoxically hinder fiscal consolidation itself. Second, and perhaps worst, a fallacy of composition problem may arise. Actually, in presence of a systemic recession, all Euro Member countries will have to simultaneously implement fiscal corrections regardless of the effective solidity of their public balances. Fiscal austerity in the big periphery will thus jeopardize growth and economic recovery in the center, which, in turn, due to its own fiscal stabilization package, will reduce economic activity in the periphery even further. Eventually,

²² As usual, we model financial markets' asymmetric reactions to the crisis and capital flight to the center through a rightward movement in the locus for $(\sigma_c = 0)$ in figure 4.b. Differently from figure 3.a, however, we assume the locus for $(\sigma_p = 0)$ not to move further to the left in figure 4.a. Actually, we capture the economic implications of the Fiscal Compact balanced budget rule by permanently placing the locus for $(\sigma_p = 0)$ in the farthest left position possible.

the obsession for a generalized fiscal austerity may result in a Eurozone center-periphery lose-lose game.

Reforms in the European governance and in the coordination of Member States economic policies should aim at strengthening Euro countries' fiscal solidity and, at the same time, providing enough room for expansionary counter-cyclical policies. Austerity packages alone do not help growth and, this way, eventually risk to endanger public balance stability as well. Fiscal consolidation and the balanced budget rule foreseen by the Fiscal Compact may instead be useful in case they should be part of a much wider reform agenda. The final achievement of such agenda should be the creation of a full-fledged European Federal Union. According to the analysis above, such political entity and the way to realize it such rely on two main features.

1. Due to financial market distress, Euro Member States and in particular peripheral countries are de facto impeded to run expansionary fiscal policies. Fiscal policies should therefore be implemented by European authorities. In institutional terms, this amounts to say that the current confederation of independent states should be progressively transformed in a federal union with a federal government charged to run fiscal policies eventually financed by issuing European Treasure Bills. More in detail, a fully developed European federal government should first have the right to levy federal taxes on European citizens and economic actors and to dispose of a federal budget. Second, the European government should take care of providing some social services connected, for instance, to the pension system and unemployment safety net. Last but not least, the future federal European government should implement an European industrial policy whose aim, among several, is to progressively eliminate structural differences among Euro countries and to level off regional inequalities. Actually, diverging trends among central and peripheral Euro countries also depend on their asymmetric productive structures. The ensuing Eurozone imbalances and Member countries different capabilities to deal with economic recessions can be hardly eliminated through painful macroeconomic adjustments and internal devaluations aiming to improve cost competitiveness only. Long-term industrial and development policies can do this. The process of market integration and the European competition policy, however, limit the possibility of national governments to run industrial and regional policies by their own. These kind of policies must thus be implemented at European level.

We are perfectly aware that the creation of a federal government of the Eurozone is a far-reaching objective. One the one hand, the implementation of some policies above will previously require a long process of harmonization among Euro countries in terms of the

standards of the social services now provided by each country individually and subsequently centralized at European level. On the other hand, both short-run anti-cyclical policies and long-run development policies will imply some sort of fiscal transfer from developed countries to relatively underdeveloped economies. Nevertheless, this is the only reliable solution to solve the present problems and, hopefully, avoid future sovereign debt crises due to national governments burdened by the full cost of deep recessions and financial sector rescue packages. Further, it appears to us as the only way to permanently eradicate structural differences among central and peripheral economies and to create a much more solid basis for the European economic and political integration.

2. The future European federal Union must have full monetary sovereignty. In this sense, the strictly monetarist philosophy inspiring the ECB statute should be deeply modified. Actually, the ECB should be transformed in the central bank of the European federal union and should be empowered of a lender-of-last-resort function. According to the MMT, this passage is fundamental to stop financial speculation and avoid any possible fear about European federal government financial soundness. Moreover, such a change does not threaten in any way central bank independence from the political sphere. Actually, it is useful to keep clear in mind the very difference between an independent central bank and a detached central bank (Palley, 2011). In the first case, the central bank is absolutely free from external influences in its decision making and can freely decide to buy or not to buy government Treasury Bills according to the objectives of the monetary policy. In the second case, on the contrary, the central bank is explicitly prohibited to buy government bonds or any other public institution liability. Whilst this last case corresponds to the nowadays ECB, the US Federal Reserve and the Bank of England are examples of independent-but-not-detached central banks. Future developments of the ECB should move it towards such an Anglo-Saxon model in order to provide the European federal Union with the complete prerogatives and financial credibility of sovereign states.

Which would be the consequences of these institutional changes on the center-periphery dynamics described in our model? We want to stress two possible aspects. First, thanks to the existence of a European federal government, the costs of anti-cyclical discretionary measures will largely move from national public balances to the European federal budget. Accordingly, whilst Member States may safely pursue some balanced budget rule without hampering economic activity, growth can be supported and brought back pretty soon by the counter-

cyclical policies adopted by the federal government²³. In terms of the graphical representations above, both the loci for stable debt-to-GDP ratios in the center and in the periphery will barely move downward or they will broadly remain in the same original positions. Second, and perhaps more relevantly, financial markets will not react nervously to the outbreak of the crisis and they will not give rise to center-periphery capital flights. Actually, fiscal stimuli to economic activity and financial system's rescue programs will not burden national government balances, so that no fear of national government insolvency will upset financial markets. Accordingly, speculative forces will not get strength; liquidity will not suddenly dry in the peripheral part of the system and move to the center. In terms of the graphs above, no asymmetric movements in the two loci for stable values of σ_C and σ_P will take place in the center and in the periphery and Euro Members' country-risk factors will not be revised upward. In this much safer context, it is easy to see that all the feedback mechanisms giving rise to a race to hell and to a perverse spiral between increasing debt service costs, fiscal correction and deepening crisis will likely be broken.

Of course, pretty relevant fiscal deficits may now emerge at federal level, with the federal European government financing expenditures by issuing new Euro bonds. Euro bonds, however, will be hardly subjected to speculative attacks. On the one hand, financial markets will perfectly know that the European government has full monetary sovereignty and that the ECB will back it in case financial turbulences should emerge. On the other hand, Euro bonds may appear as safe assets and temporary represent the best options for portfolio investment insofar as recession is over, economic activity recover and private assets return in the preferences of financial operators. Indeed, this seems to be what is going on in sovereign States such as US, UK or Japan, where Treasury Bills' interest rates are at never-before-seen low levels despite of remarkable fiscal deficits, actually much higher than those recorded on average in the Eurozone, and fast increasing debt-to-GDP ratios (De Grauwe, 2011; 2012).

5. Conclusions

Eurozone Member countries, peripheral economies in particular, have been dealing with a severe sovereign debt crisis since mid 2010. With the exception of Greece, this crisis does not depend on previous irresponsible fiscal policies. Indeed, its origin dates back to the 2007-

²³ Such an institutional arrangement may turn out to be pretty similar to the US institutional setting. In the US, in presence of a federal government budget whose total non-interest spending in 2006 (i.e. before the outbreak of the 2007-2008 crisis) were around 18 percent of US potential GDP, most US States follow some sort of balanced budget rules. See Auerbach (2008) and National Conference of State Legislature (2010) on this point.

2008 global financial and economic meltdown. The existing Eurozone institutional framework, however, has decisively contributed to generate, amplify and protract it. First, the lack of a federal European government running anti-cyclical policies has left alone national governments in their efforts to counteract recessions and avoid financial institutions' collapse. National governments' deficits and debt stocks have thus massively increased alongside default risks. Second, the loss of monetary sovereignty and the absence of a lender-of-last-resort central bank has further increased the risk Euro countries will not be able to meet debt payments. Such Eurozone peculiarities may well explain why financial turbulences paradoxically concentrate in Europe even though, on average, Eurozone's deficit and debt records are much lower than those observed in fully sovereign countries such US, UK and Japan.

In this paper, we show that, in the aftermath of the 2007-2008 crisis, the *incomplete* nature of the Euro system (as compared to a fully developed federal union) has created the proper environment for speculative center-periphery capital flights to take place. These movements have in turn given rise to diverging trends between central and peripheral Member States. On the one hand, the former now benefit of never-before-seen low interest rates which considerably ease fiscal consolidation and economic recovery. On the other hand, the latter are stuck in a never-ending adjustment process that financial market turbulences and mounting debt service costs persistently frustrate. In our view, such divergences and the ensuing conflicting claims between central and peripheral Euro countries can seriously feed peripheral country' crisis by hampering any attempt to reform Eurozone towards the creation of a complete federal entity. In the long run, however, they may prove to be self-defeating. Overall instability may indeed spread around Europe and center-periphery dichotomy not last any longer should financial turmoil deepen also in large peripheral economies.

The strategy adopted so far to end the crisis has been generalized austerity. The results, however, have been disappointing since that the crisis is still on and may even worsen. Actually, austerity-based reforms in European governance do not address the above deficiencies of Eurozone institutions. They could instead make sense into a more general reform agenda, whose final purpose is the introduction of a federal European government together with a government banker.

In our view, a full-fledged European federal union with a lender-of-last-resort central bank designs the final status current Eurozone institutions should aspire to. Yet, we are well aware that this reform will be ferociously disputed, it will take time to be implemented and cannot realistically provide immediate relief from existing difficulties. Accordingly, which are some

initial and perhaps narrower steps to be taken in the short run to stop the crisis? In the most recent period, economic chronicles have put emphasis on new monetary measures established by the ECB. In particular, attention is on the ECB Board announcement of an unlimited Euro country bond-buying program aiming to strike speculation, reduce interest rates and debt service costs, favor fiscal consolidation in peripheral economies. We all know that these measures are the result of intensive political bargaining among Euro countries' Heads, the ECB and the European institutions. Further, they do not get the support of all the authorities involved in the decision process (see the opposition of the Deutsche Bundesbank) and their adoption is conditional to the launch of austerity programs and structural reforms in the helped countries. Despite all these limits, there is however no doubt the ECB unlimited bond-buying program stands out as the most reasonable initiative policy makers could now take to tame the crisis and, perhaps, see the light at the end of the tunnel. It probably represents the first measure emending the strict monetarist paradigm inspiring the ECB statute and its behavior so far as well as, hopefully, the first step on the way towards the creation of a lender-of-last-resort central bank. This monetary measure is not enough. Actually, sustained growth and full recovery from the recession will hardly take place without considerable expansionary fiscal stances. Nevertheless, it will be much easier to find room for expansionary stances, at national level for the time being and at European level in the future, in presence of an interventionist monetary policy which contrasts financial speculation and ensures financial markets that the "Euro is irreversible (Mario Draghi, ECB Press Conference, September 6th 2012)".

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Appendix

Table 1 – Some central and peripheral Euro countries' Macroeconomic data.

Country\Year		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Austria	GDP	100	100	100	100	100	100	100	100	100	100	100	
	Agriculture, hunting, forestry, fishing	2,0	2,1	2,0	1,9	1,9	1,6	1,7	1,8	1,7	1,5	1,5	
	Sectoral	30,8	30,3	29,5	29,5	29,4	29,5	29,7	30,1	30,2	29,2	29,2	
	Structural	23,3	23,2	22,6	22,2	22,2	22,4	22,8	23,2	23,2	21,8	22,3	
	Composition	20,6	20,3	19,8	19,4	19,3	19,6	20,0	20,4	20,4	18,6	19,2	
	Construction	7,5	7,1	7,0	7,3	7,2	7,1	6,9	7,0	7,1	7,3	6,9	
	Services	67,2	67,7	68,5	68,6	68,7	68,9	68,6	68,1	68,0	69,3	69,3	
Trade and net financial external position	Exports of goods and services	46,2	48,1	48,7	48,2	51,5	53,8	56,4	58,9	59,3	50,4	54,0	
	Imports of goods and services	44,5	45,9	43,9	44,7	47,7	49,9	51,3	53,2	53,5	45,7	49,7	
	Trade Balance	1,7	2,2	4,8	3,5	3,8	4,0	5,1	5,7	5,8	4,8	4,3	
	Overall Current Account Balance	-0,7	-0,8	2,7	1,7	2,2	2,2	2,8	3,5	4,9	2,7	3,0	
	External Investment Net Position	-24,5	-25,6	-20,1	-14,3	-17,3	-21,7	-20,5	-18,2	-16,9	-8,0	-10,9	-3,4
General macroeconomic indicators	Public Deficit	-1,8	-0,2	-0,9	-1,7	-4,6	-1,8	-1,7	-1,0	-1,0	-4,1	-4,5	-2,6
	Public Debt	66,2	66,8	66,2	65,3	64,7	64,2	62,3	60,2	63,8	69,5	71,8	72,2
	Real GDP growth rate	3,7	0,6	1,7	0,6	2,6	2,4	3,7	3,7	1,4	-3,8	2,3	3,1
Belgium	GDP	100	100	100	100	100	100	100	100	100	100	100	
	Agriculture, hunting, forestry, fishing	1,38	1,32	1,18	1,12	1,11	0,83	0,90	0,88	0,67	0,67	0,70	
	Sectoral	27,0	26,1	25,5	24,8	24,6	24,1	24,0	23,8	23,2	21,7	21,9	
	Structural	22,1	21,2	20,7	19,9	19,7	19,2	19,0	18,5	17,7	16,3	16,6	
	Composition	19,3	18,5	18,2	17,4	17,5	17,1	16,7	16,3	15,7	14,4	14,6	
	Construction	5,0	4,9	4,8	4,8	4,8	4,8	5,1	5,2	5,5	5,4	5,3	
	Services	71,6	72,6	73,3	74,1	74,3	75,1	75,0	75,4	76,1	77,6	77,4	
Trade and net financial external position	Exports of goods and services	78,1	77,8	76,7	73,9	75,9	78,7	80,8	82,6	84,6	72,4	80,0	
	Imports of goods and services	75,2	74,2	71,0	68,5	71,0	74,8	77,0	78,8	83,7	69,6	77,3	
	Trade Balance	2,9	3,6	5,7	5,4	4,9	3,9	3,8	3,8	0,9	2,7	2,7	
	Overall Current Account Balance	4,0	3,4	4,5	3,4	3,2	2,0	1,9	1,6	-1,6	-1,7	1,5	
	External Investment Net Position			36,6	36,6	28,4	33,5	29,4	28,9	39,7	57,1	77,7	57,8
General macroeconomic indicators	Public Deficit	-0,1	0,2	-0,2	-0,2	-0,4	-2,8	0,1	-0,3	-1,3	-5,9	-4,2	-4,2
	Public Debt	107,8	106,5	103,4	98,4	94,0	92,0	88,0	84,1	89,3	95,9	96,2	98,5
	Real GDP growth rate	3,7	0,6	1,4	0,6	3,3	1,7	2,7	2,9	0,7	-2,8	2,3	1,9

Source: Data from UNCTAD, IMF, EUROSTAT. (continue)

Country\Year		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	
Finland	GDP	100	100	100	100	100	100	100	100	100	100	100		
	Agriculture, hunting, forestry, fishing	3,50	3,27	3,18	3,07	2,87	2,77	2,42	3,01	2,87	2,71	2,89		
	Sectoral	Industry	34,7	34,1	33,2	32,9	32,5	32,5	33,6	33,8	32,3	28,2	29,0	
	Structural Composition	Mining, manufacturing, utilities	28,4	28,1	27,5	27,0	26,3	25,8	26,8	26,8	25,0	21,2	22,3	
		Manufacturing	26,5	26,0	25,2	24,4	23,7	23,4	24,1	24,2	22,4	18,2	18,8	
		Construction	6,2	6,0	5,7	5,9	6,2	6,7	6,8	6,9	7,2	7,0	6,6	
	Services	61,8	62,6	63,7	64,0	64,6	64,8	64,0	63,2	64,9	69,1	68,1		
Trade and net financial external position	Exports of goods and services	43,6	41,5	40,6	38,7	39,9	41,8	45,5	45,8	46,8	37,1	40,3		
	Imports of goods and services	34,5	32,2	31,3	31,9	33,4	37,7	40,8	40,7	43,1	35,5	39,0		
	Trade Balance	9,1	9,4	9,2	6,8	6,5	4,1	4,7	5,1	3,8	1,6	1,3		
	Overall Current Account Balance	7,8	8,4	8,5	4,8	6,2	3,4	4,2	4,3	2,6	1,8	1,4		
	External Investment Net Position	-147,8	-82,2	-36,8	-26,4	-10,0	-15,3	-13,8	-27,9	-9,7	0,0	10,6	16,0	
General macroeconomic indicators	Public Deficit	6,9	5,1	4,1	2,4	2,2	2,7	4,0	5,3	4,2	-2,7	-2,8	-0,8	
	Public Debt	43,8	42,5	41,5	44,5	44,4	41,7	39,6	35,2	33,9	43,5	48,4	48,6	
	Real GDP growth rate	5,3	2,3	1,8	2,0	4,1	2,9	4,4	5,3	0,2	-8,4	3,7	2,9	
France	GDP	100	100	100	100	100	100	100	100	100	100	100		
	Agriculture, hunting, forestry, fishing	2,83	2,84	2,70	2,47	2,44	2,28	2,09	2,20	2,04	1,74	1,99		
	Sectoral	Industry	22,9	22,4	21,8	21,2	20,9	20,7	20,4	20,5	20,2	18,8	19,8	
	Structural Composition	Mining, manufacturing, utilities	17,7	17,1	16,5	15,9	15,4	15,0	14,4	14,2	13,6	12,4	13,4	
		Manufacturing	16,0	15,4	14,7	14,1	13,6	13,2	12,6	12,4	11,9	10,6	11,6	
		Construction	5,1	5,3	5,2	5,3	5,5	5,6	6,0	6,3	6,6	6,4	6,4	
	Services	74,3	74,8	75,5	76,3	76,7	77,1	77,5	77,3	77,7	79,5	78,2		
Trade and net financial external position	Exports of goods and services	28,8	28,4	27,5	25,9	26,1	26,4	27,0	26,9	26,9	23,3	25,5		
	Imports of goods and services	27,8	27,2	26,0	25,0	25,7	27,0	28,1	28,4	29,1	25,2	27,8		
	Trade Balance	1,0	1,1	1,5	0,9	0,4	-0,6	-1,0	-1,5	-2,1	-1,8	-2,3		
	Overall Current Account Balance	1,5	1,8	1,2	0,5	0,4	-0,5	-0,6	-1,0	-1,7	-1,5	-1,7		
	External Investment Net Position	-7,6	-2,0	3,0	-4,2	-4,7	1,1	1,1	-1,5	-12,9	-9,4	-7,8	-15,9	
General macroeconomic indicators	Public Deficit	-1,5	-1,7	-3,3	-4,1	-3,6	-3,0	-2,4	-2,8	-3,3	-7,6	-7,1	-5,3	
	Public Debt	57,3	56,9	59,0	63,2	65,1	66,7	63,9	64,2	68,3	79,0	82,4	86,3	
	Real GDP growth rate	3,9	1,8	0,7	0,6	2,3	1,9	2,7	2,2	-0,2	-2,6	1,4	1,7	

(continue)

Country\Year		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Germany	GDP	100	100	100	100	100	100	100	100	100	100	100	
	Agriculture, hunting, forestry, fishing	1,26	1,36	1,15	0,98	1,10	0,87	0,85	0,96	0,90	0,81	0,87	
	Sectoral Industry	30,3	29,7	29,1	28,9	29,3	29,1	29,9	30,4	29,6	26,5	27,9	
	Structural Mining, manufacturing, utilities	25,1	24,9	24,6	24,5	25,1	25,2	25,9	26,4	25,6	22,2	23,7	
	Composition Manufacturing	22,9	22,8	22,4	22,4	22,6	22,7	23,3	23,8	22,7	19,1	20,7	
	Construction	5,2	4,8	4,6	4,4	4,2	4,0	3,9	4,0	4,0	4,3	4,1	
	Services	68,5	69,0	69,7	70,2	69,6	70,0	69,3	68,6	69,5	72,7	71,3	
Trade and net financial external position	Exports of goods and services	33,4	34,8	35,7	35,7	38,5	41,3	45,5	47,2	48,1	41,9	46,8	
	Imports of goods and services	33,1	32,8	31,2	31,8	33,5	36,1	39,9	40,2	41,8	37,0	41,4	
	Trade Balance	0,3	2,0	4,5	3,9	5,0	5,2	5,6	7,0	6,2	5,0	5,5	
	Overall Current Account Balance	-1,7	0,0	2,0	1,9	4,7	5,1	6,3	7,5	6,2	5,9	6,1	
	External Investment Net Position	3,3	8,7	5,1	6,6	10,7	21,0	27,9	26,5	25,0	35,1	38,4	36,1
General macroeconomic indicators	Public Deficit	1,3	-2,8	-3,7	-4,1	-3,8	-3,4	-1,6	0,2	-0,1	-3,2	-4,3	-1,0
	Public Debt	60,2	59,1	60,7	64,4	66,2	68,5	67,9	65,2	66,7	74,4	83,2	81,5
	Real GDP growth rate	3,3	1,6	0,0	-0,4	0,5	0,6	3,9	3,4	0,6	-5,1	3,6	3,1
Greece	GDP	100	100	100	100	100	100	100	100	100	100	100	
	Agriculture, hunting, forestry, fishing	6,6	6,4	5,9	5,5	4,9	4,8	3,7	3,4	3,1	3,1	3,3	
	Sectoral Industry	21,0	21,4	19,5	19,0	18,7	19,2	19,4	18,8	18,1	17,8	17,9	
	Structural Mining, manufacturing, utilities	13,9	13,2	13,3	12,5	12,3	12,9	12,5	12,3	13,1	13,3	13,8	
	Composition Manufacturing	11,1	10,5	10,2	9,6	9,3	9,7	9,6	9,2	10,0	10,3	10,8	
	Construction	7,0	8,2	6,2	6,5	6,5	6,3	6,9	6,5	5,1	4,5	4,1	
	Services	72,5	72,2	74,6	75,5	76,4	76,0	76,9	77,8	78,7	79,1	78,8	
Trade and net financial external position	Exports of goods and services	24,9	24,0	21,1	20,0	22,4	23,2	22,9	23,5	24,1	19,2	21,5	
	Imports of goods and services	38,4	37,2	34,6	32,3	32,4	32,5	33,7	37,0	38,6	30,5	30,4	
	Trade Balance	-13,5	-13,2	-13,5	-12,3	-10,1	-9,3	-10,8	-13,5	-14,4	-11,4	-8,9	
	Overall Current Account Balance	-7,7	-7,2	-6,5	-6,6	-5,9	-7,4	-11,2	-14,4	-14,7	-11,0	-10,0	
	External Investment Net Position	-40,1	-46,5	-52,9	-58,9	-67,0	-77,3	-85,3	-96,3	-76,9	-86,1	-92,5	-79,5
General macroeconomic indicators	Public Deficit	-3,7	-4,4	-4,8	-5,7	-7,4	-5,6	-6,0	-6,7	-9,7	-15,6	-10,6	-9,2
	Public Debt	103,4	103,7	101,5	97,3	98,8	100,3	106,1	105,4	110,7	127,1	142,8	163,3
	Real GDP growth rate	4,5	4,2	3,4	5,9	4,4	2,3	4,6	3,0	-0,1	-3,3	-3,5	-6,9

(continue)

Country\Year		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Ireland	GDP	100	100	100	100	100	100	100	100	100	100	100	
	Agriculture, hunting, forestry, fishing	3,7	3,4	2,9	2,7	2,6	2,7	2,4	2,4	2,3	2,1	2,5	
	Sectoral	41,0	40,5	41,3	37,9	35,9	34,2	33,7	32,7	30,4	29,4	30,9	
	Industry	33,7	33,0	33,8	30,0	27,2	24,4	23,3	23,4	23,2	25,1	27,8	
	Structural	32,2	31,3	32,3	28,3	25,7	22,9	21,6	21,5	21,2	23,1	25,5	
	Composition	7,3	7,5	7,5	7,9	8,8	9,7	10,4	9,3	7,2	4,3	3,1	
	Construction	55,3	56,1	55,8	59,4	61,4	63,1	63,9	64,9	67,3	68,5	66,6	
Services													
Trade and net financial external position	Exports of goods and services	97,3	99,1	93,4	83,1	83,2	81,1	78,9	80,2	83,4	90,9	101,1	
	Imports of goods and services	84,0	83,7	76,3	67,2	68,3	69,4	69,3	71,3	74,4	75,4	82,0	
	Trade Balance	13,3	15,4	17,1	15,9	14,8	11,7	9,6	9,0	9,1	15,5	19,1	
	Overall Current Account Balance	-0,4	-0,6	-1,0	0,0	-0,6	-3,5	-3,5	-5,3	-5,7	-2,9	0,3	
	External Investment Net Position	-7,9	-15,1	-17,8	-20,0	-17,9	-24,5	-5,3	-19,4	-75,7	-103,1	-90,5	-97,6
General macroeconomic indicators	Public Deficit	4,7	0,6	-0,5	0,2	1,3	1,7	2,9	0,1	-7,3	-14,2	-31,3	-9,9
	Public Debt	37,5	35,2	31,9	30,7	29,1	27,1	24,7	24,8	44,2	65,2	92,5	105,0
	Real GDP growth rate	9,3	4,8	5,9	4,2	4,5	5,3	5,3	5,2	-3,0	-7,0	-0,4	0,5
Italy	GDP	100	100	100	100	100	100	100	100	100	100	100	
	Agriculture, hunting, forestry, fishing	2,8	2,7	2,6	2,5	2,5	2,2	2,1	2,1	2,0	1,9	1,9	
	Sectoral	28,4	28,1	27,8	27,1	27,0	26,9	27,2	27,5	27,0	25,2	25,3	
	Industry	23,4	22,8	22,4	21,4	21,2	20,9	21,1	21,4	20,9	19,0	19,4	
	Structural	21,0	20,4	19,9	19,0	18,8	18,5	18,7	19,0	18,2	16,4	16,8	
	Composition	5,0	5,3	5,4	5,6	5,8	6,0	6,1	6,1	6,1	6,2	6,0	
	Construction	68,8	69,2	69,7	70,4	70,5	70,9	70,7	70,4	71,0	72,9	72,8	
Services													
Trade and net financial external position	Exports of goods and services	27,1	27,1	25,7	24,6	25,4	25,9	27,7	29,0	28,7	23,8	26,8	
	Imports of goods and services	26,1	25,7	24,8	24,0	24,6	26,0	28,6	29,2	29,4	24,3	28,5	
	Trade Balance	0,9	1,4	1,0	0,6	0,7	-0,1	-0,8	-0,2	-0,7	-0,4	-1,8	
	Overall Current Account Balance	-0,2	0,2	-0,4	-0,8	-0,3	-0,8	-1,5	-1,2	-2,9	-2,1	-3,5	
	External Investment Net Position	-7,2	-5,8	-12,4	-13,6	-15,8	-16,8	-22,2	-24,5	-24,1	-25,3	-24,0	-20,6
General macroeconomic indicators	Public Deficit	-0,9	-3,1	-3,0	-3,5	-3,5	-4,4	-3,3	-1,5	-2,7	-5,4	-4,5	-3,9
	Public Debt	108,5	108,2	105,1	103,9	103,4	105,4	106,1	103,1	105,8	116,1	118,7	120,1
	Real GDP growth rate	3,7	1,9	0,3	0,0	1,7	0,6	2,2	1,7	-1,2	-5,5	1,8	0,3

(continue)

Country\Year		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Netherlands	GDP	100	100	100	100	100	100	100	100	100	100	100	
	Agriculture, hunting, forestry, fishing	2,6	2,6	2,3	2,3	2,2	2,1	2,2	2,1	1,8	1,7	1,9	
	Sectoral Industry	24,9	24,7	24,1	23,9	23,8	24,2	24,6	24,7	25,6	23,9	23,7	
	Structural Mining, manufacturing, utilities	19,3	18,9	18,4	18,3	18,5	18,8	19,1	19,1	19,8	17,9	18,4	
	Composition Manufacturing	15,6	14,8	14,3	14,1	14,3	14,3	13,9	14,1	13,7	12,6	13,2	
	Construction	5,6	5,7	5,7	5,5	5,4	5,4	5,5	5,6	5,8	6,0	5,3	
	Services	72,4	72,8	73,6	73,8	74,0	73,7	73,2	73,2	72,6	74,4	74,3	
Trade and net financial external position	Exports of goods and services	70,1	67,3	64,2	63,0	66,4	69,6	72,8	74,2	76,3	68,8	78,0	
	Imports of goods and services	64,5	61,5	57,6	56,7	59,0	61,1	65,1	66,0	68,0	62,0	70,6	
	Trade Balance	5,5	5,8	6,5	6,3	7,4	8,5	7,7	8,2	8,3	6,8	7,5	
	Overall Current Account Balance	2,0	2,6	2,6	5,5	7,6	7,4	9,3	6,7	4,3	4,2	6,6	
	External Investment Net Position	-15,2	-13,4	-24,3	-1,7	3,7	-2,6	3,2	-6,0	4,2	22,1	29,4	41,3
General macroeconomic indicators	Public Deficit	2,0	-0,3	-2,1	-3,2	-1,8	-0,3	0,4	0,1	0,3	-5,6	-5,1	-5,0
	Public Debt	53,8	50,7	50,5	52,0	52,4	51,8	47,4	45,3	58,5	60,8	62,9	66,2
	Real GDP growth rate	3,9	1,9	0,1	0,2	2,2	2,0	3,4	3,9	1,8	-3,5	1,6	1,3
Portugal	GDP	100	100	100	100	100	100	100	100	100	100	100	
	Agriculture, hunting, forestry, fishing	3,6	3,4	3,2	3,1	3,1	2,8	2,7	2,4	2,4	2,4	2,4	
	Sectoral Industry	28,5	28,2	27,7	26,8	26,3	25,6	25,4	25,3	24,6	23,3	23,5	
	Structural Mining, manufacturing, utilities	20,3	19,8	19,4	19,0	18,6	18,1	18,2	18,0	17,3	16,8	17,0	
	Composition Manufacturing	17,1	16,7	16,2	15,5	15,0	14,6	14,3	14,1	13,7	12,8	13,0	
	Construction	8,2	8,4	8,2	7,7	7,7	7,5	7,3	7,3	7,3	6,5	6,5	
	Services	67,8	68,4	69,1	70,1	70,6	71,7	71,8	72,3	73,0	74,3	74,2	
Trade and net financial external position	Exports of goods and services	29,0	28,1	27,7	27,7	28,1	27,8	31,0	32,2	32,4	28,0	30,9	
	Imports of goods and services	40,0	38,4	36,0	34,5	36,5	37,2	39,7	40,2	42,5	35,5	38,1	
	Trade Balance	-11,0	-10,3	-8,3	-6,8	-8,3	-9,4	-8,7	-8,0	-10,1	-7,5	-7,2	
	Overall Current Account Balance	-10,3	-10,3	-8,2	-6,4	-8,3	-10,3	-10,7	-10,1	-12,6	-10,9	-10,0	
	External Investment Net Position	-41,2	-47,5	-54,6	-57,5	-64,1	-66,9	-78,8	-87,9	-96,1	-110,3	-106,1	-102,7
General macroeconomic indicators	Public Deficit	-2,9	-4,3	-2,9	-3,1	-3,4	-5,9	-4,1	-3,2	-3,7	-10,2	-9,8	-4,0
	Public Debt	48,4	51,1	53,7	55,7	57,5	62,5	63,7	68,3	71,6	83,1	93,4	106,8
	Real GDP growth rate	3,9	2,0	0,5	-0,9	1,6	0,5	1,4	2,4	0,0	-2,9	1,4	-1,5

(continue)

Country\Year		2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	
Spain	GDP	100	100	100	100	100	100	100	100	100	100	100		
	Agriculture, hunting, forestry, fishing	4,4	4,3	4,0	4,0	3,6	3,2	2,8	2,9	2,7	2,6	2,7		
	Sectoral	Industry	29,2	29,2	28,9	28,9	29,1	29,7	29,8	29,2	28,4	26,1	25,7	
	Structural	Mining, manufacturing, utilities	20,9	20,3	19,5	19,0	18,5	18,2	17,8	17,3	17,0	15,3	15,6	
	Composition	Manufacturing	18,6	18,1	17,3	16,8	16,3	15,8	15,5	15,0	14,5	12,7	13,2	
		Construction	8,3	8,9	9,4	9,9	10,6	11,5	12,1	11,9	11,4	10,8	10,1	
	Services	66,4	66,6	67,0	67,1	67,3	67,1	67,4	67,9	68,9	71,3	71,7		
Trade and net financial external position	Exports of goods and services	29,0	28,5	27,3	26,3	25,9	25,7	26,3	26,9	26,5	23,4	26,3		
	Imports of goods and services	32,2	31,0	29,5	28,7	29,9	31,0	32,7	33,6	32,2	25,5	28,4		
	Trade Balance	-3,1	-2,5	-2,1	-2,4	-4,0	-5,3	-6,4	-6,7	-5,8	-2,2	-2,2		
	Overall Current Account Balance	-4,0	-3,9	-3,3	-3,5	-5,3	-7,4	-9,0	-10,0	-9,6	-5,2	-4,6		
	External Investment Net Position	-32,0	-35,6	-41,6	-45,2	-51,9	-55,6	-65,8	-78,1	-79,3	-93,7	-89,6	-91,6	
General macroeconomic indicators	Public Deficit	-1,0	-0,7	-0,5	-0,2	-0,3	0,7	2,0	1,9	-4,2	-11,2	-9,3	-8,5	
	Public Debt	59,3	55,6	52,6	48,8	46,3	43,2	39,7	36,3	40,2	53,9	61,2	68,5	
	Real GDP growth rate	5,1	3,6	2,7	0,1	3,3	3,6	4,1	3,5	0,6	-3,7	-0,1	0,5	

(continue)

