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Resolving Sovereign Debt Crises: Opening or Closing the Tap?

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Resolving Sovereign Debt Crises: Opening or Closing the Tap?

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Abstract

This paper first describes the ingredients the present crisis in the euro zone and then evaluates the key options that policy makers face in resolving the crisis and avoiding similar crises in the future. I argue that the crisis should not be seen as caused by government profligacy alone. In many troubled countries, an unsustainable build-up of private sector debt was involved as well. I argue that a more fundamental problem is that the euro zone lacks an adjustment mechanism for balance of payments crises that may arise in its member countries, with or without excessive government deficits. The metaphor of taps to be opened or closed by policy is used to discuss the core trade offs that policy makers face. I discuss monetary taps, bailout taps, austerity taps and devaluation taps. I propose a simple model of government bond markets with sovereign insolvency to be used in order to evaluate EU-type bailouts. I discuss the pros and cons of austerity as a precondition for such bailouts, and I criticize the use of Target2 as a mechanism to absorb balance of national payments crises.

JEL-Classification: F33, F366
Keywords: Euro, sovereign risk, sovereign default, government solvency, lender of last resort, external balance, balance of payments

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1 Introduction

Two years ago, it became evident that the Greek government would face the specter of bankruptcy, if left to finance its deficit through private lenders. Its fellow member countries of the euro zone quickly came to the rescue in a joint operation with the IMF, providing concessional lending in the amount of 110 bn euro (to be dished out over 3 years). What was the incentive for other euro member countries to step in? An obvious answer was that a Greek default would have had severe repercussions for the euro zone as a whole, particularly for other countries with high sovereign debt. Yet, at the time official comments were typically keen to point out that what we were witnessing was a pure sovereign debt crisis, not a crisis of the euro.

In the running up to the second bailout operation for Greece, agreed upon in February this year, negotiators of the EU were keen to point out that if Greece wasn't willing to accept tough conditionality, the EU would be quite willing to let Greece leave the euro zone. The sovereign debt of an unreformed Greece was seen as a threat to the euro zone which other members were apparently willing to avoid by shrinking the size of the euro zone. And Greece was not the only member to cause this type of headache. All in all, we have witnessed 4 bailout packages, totaling more than 350 bn euro, and yet the sovereign risk premia are not fully on retreat. Quite obviously, we do have a crisis of the euro.

The organizers of this conference suggest that we focus on the sovereign debt aspect of the crisis. However, I shall argue that we risk devising lopsided policy packages if we look at the present situation only as a *sovereign debt* crisis. In particular, as I shall detail below, in almost all of the troubled countries an unsustainable build up of *private sector debt* was involved as well. Indeed, the more fundamental problem may well be one of severe *balance of payments crises* within the European Monetary Union. These are likely to reoccur even if some of the troubled economies should eventually leave the euro zone and if the rest adheres to a strict fiscal compact.

The panel organizers use a tap metaphor, suggesting that the evolution as well as the resolution of the crisis may be seen as a matter of opening and closing taps. I think this metaphor is quite useful, although I see a whole array of taps, not a single tap. Let me start by briefly identifying the relevant taps. First, there is the *monetary tap*, either in the form of liquidity that is pumped into the banking sector, or in the form of a clear commitment by the central bank to act as a lender of last resort also in government bond markets. Next, there is the *bailout tap* in the hands of euro zone partner governments who still have sufficient fiscal room for manoeuvre, in order to step in if troubled countries loose access to capital markets when trying to refinance their debt, or are able to do so only in paying forbiddingly high interest rates. Related to the bailout tap, there is the *risk "communitization" tap* through the issuance of some form of eurobonds.

And then there are the *fiscal taps* operated by troubled countries' governments. These taps, however, are closely linked to the bailout tap through conditionality of bailout packages, and they stand for the degree to which a resolution of the crises

requires *present* austerity of the public sector.[1] This is a question that has drawn a lot of attention and controversial discussion among economists both in Europe and the US. And finally, there is what I call the *reserve currency tap* which allows troubled euro member countries to deal with a balance of payments crisis in pretty much the same way as reserve currency countries may do in a Bretton-Woods-type fixed rate system. This parallel may seem rather odd at first sight, but I shall argue why it is relevant in more detail below.

Obviously, the aforementioned taps are not just open or closed. If open at all, they are open to a larger or lesser extent. They pose the classical economic policy problem of finding the appropriate *degree* of action. All of them are *policy* taps, meaning that they are in the hands of policy makers. This, of course, also raises the question of *credibility*. The implication is that policy makers' own views on how open the taps are, or will eventually be, need not coincide with the private sector's view.

As with all types of plumbing systems, the aforementioned taps are interconnected. Specifically, what happens in case any one tap is closed, may depend on the degree to which the others are kept open, or closed as well. A key question in this context is whether closing one or more of the aforementioned taps leads to one or more countries leaving the euro zone. In a sense, one might consider this as opening up yet another tap, i.e., the *devaluation tap*.

In this paper, I first investigate the nature of the crises, and then proceed to a brief analysis of the policy problems and trade offs that are relevant for the above taps.

2 The crises

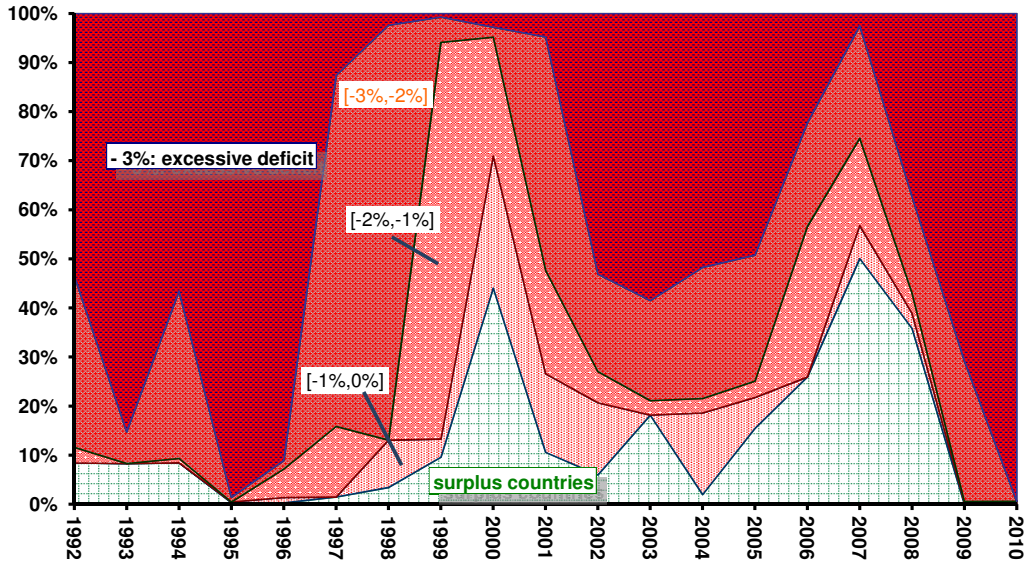
2.1 Public and private sector borrowing

It is quite clear that up to this point fiscal discipline in the euro area has been disappointing. Figure 1 gives a quick overview on the success of Maastricht, and the subsequent failure of the Stability and Growth Pact (SGP). It depicts the share of member countries of the euro(17) area, measured in terms of their GDP, that fall into different ranges of the general government net lending position. The figure considers deficit ratios higher than 3 percent, between 2 and 3 percent etc., for all years between 1992 and 2010. By 1999, the start of the monetary union, everything looked bright against the Maastricht benchmark, but within a matter of four years the share of excessive deficit countries (deficit ratios exceeding the 3 percent threshold) was up again, exceeding 50 percent, with a share of almost 80 percent for countries exceeding the 2 percent value.

Meanwhile, we seem to have reached a situation even worse than at the beginning of the Maastricht convergence process in the early 1990s. However, the years after 2007 reflect an external shock with disastrous fiscal effects. The world-wide recession sparked by the financial crisis of 2007/08 has prompted governments to resort to expansionary

[1] The same applies to eurobonds, although this has not moved much beyond loose proposals.

Figure 1: GDP-shares of 17 Euro countries in different ranges of net lending in percent of GDP



Source: European Commission, General Government Data and AMECO Database.

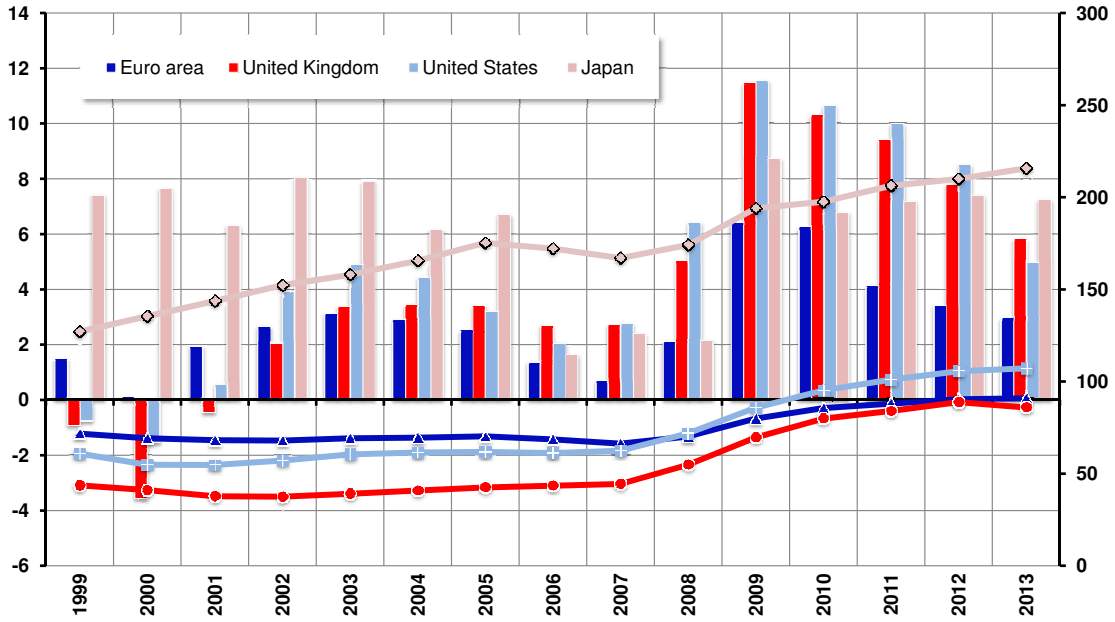
policies that were bound, together with the automatic stabilizers, to swell public debt beyond levels observed in "normal times". Although it should have been clear from the start that reinventing Keynesian policies would lead to a build-up of debt, at least temporarily, the specter of sovereign default within the euro area that arose in 2010 came as a shock that no one really had anticipated.

But violation of the SGP is not what makes the present situation a crisis. The Maastricht and SGP numerology is an arbitrary standard. Moreover, as I have just argued, some of the movement portrayed in figure 1 is surely due to time-specific effects that are not specific to the euro zone or to individual countries. Figure 2 therefore compares debt accumulation in the euro zone with the UK, the US and Japan. The figure tells us that the US and the UK, at least in recent years, have been equally, or even more, prone to run deficits as was the euro zone, not to mention Japan.

However, two further observations are more important. The first concerns the role that the *private* and the *public sector* have played in the evolution of the crises. And the second relates to the cause and the effect of private and public sector debt accumulation.

Take the first concern. Table 1 looks at the average annual net lending by the public and the private sector during the pre euro 1990s, during the first periods of the euro era from 1999 up to 2006, and then for the individual years since 2007. All figures are percentages of national GNP (GDP for public net lending). A first striking result is that the first episode of the euro, *prior* to the 2007/08 financial crisis, has mostly seen higher net lending ratios (lower deficit ratios) of the public sector than in the 1990s. In contrast, in most countries the private sector exhibits lower net lending ratios in the euro era than in pre euro times, the exceptions being Germany, Austria and Finland. Thus, violation of the SGP as evidenced by figure 1 notwithstanding,

Figure 2: Government balance and debt in percent of GDP



Legend: Annual deficit (bars) on the left axis, debt levels (lines) on the right axis. **Source:** AMECO Database.

one cannot say that the euro zone as a whole has quickly returned to old habits of reckless government borrowing that was characteristic of the early 1990s. Moreover, putting Greece aside, it was not the troubled countries of the present, often referred to as the GIPSIs (Greece, Ireland, Portugal, Spain and Italy), that were responsible for this violation. Indeed, Spain and Ireland stick out as troubled economies which even had positive public net lending during this era. Admittedly, one has to be cautious when interpreting these pre-2007 numbers, since these were unusually good times for governments, featuring low bond yields and high GDP growth rates. However, as we shall see below, they were unusually good for all countries, hence, Spain and Ireland still stick out.

When the financial crisis hit Europe in 2007 and thereafter, it did not hit countries that looked terribly vulnerable, judged from recent net lending records, again putting Greece aside, although the Italian debt level had traditionally been worryingly high. Yet, the effect of the crisis on the fiscal positions of some of the GIPSIs was disastrous. But again, it is interesting to note the difference between the private and the public sector. As the financial crisis had worked its way through to the public sector, Greece, Ireland, Portugal and Spain have experienced a rapid and protracted worsening of public net lending, while private net lending had mostly been restored to earlier levels or beyond by 2009. But these levels were far to low to match public deficits. Again the notable exceptions are Germany, Austria and Finland. This was bound to lead to current account deficits which turned out impossible to finance through private capital imports, and which in some cases were even paralleled by capital flight. The outcome eventually were a series of balance of payments crises within the euro zone. I shall return to this below.

The numbers of table 1 tell us very clearly that the present debt problem is ill diagnosed as the outcome of government profligacy alone. Of course, this is not to deny the presence of sovereign debt crises. But in some cases, particularly Spain and Ireland, these are long-run consequences of unsustainable levels of credit expansion in the private sector, and not a consequence of irresponsible government behavior to start with. One way to describe this is to say that a lot of private sector debt accumulated up to 2007 eventually got passed on to governments who felt obliged to step in so as to avoid systemic consequences of the financial crisis.[2] The willingness of fiscal policy makers to accept the present crisis as primarily one of fiscal profligacy may seem surprising. But from a political economy perspective, this seems like a relatively straightforward reaction if it is the political opponent that can be blamed for past profligacy. However, from the above we must conclude that this reaction pattern works counter to a well-balanced reform package that not only helps resolving the present crisis, but also helps avoiding similar crises in the future. Policy reforms that focus almost exclusively on government budgetary discipline are not enough to resolve the present crisis, and they will not be enough to avoid future problems of a similar nature. The subsequent sections will reinforce this point.

2.2 Sovereign risk premia

This leads me to the second concern, viz. the cause and effect of excessive borrowing. I argue that both have to do with the failure of financial markets to "correctly" price government debt. In the 1990s, we have observed a rapid nominal convergence as triggered by the Maastricht treaty. As a consequence, the governments of some euro zone member countries were enjoying much lower cost of government debt than they had historically been used to. Figure 3 presents the details for the GIPSI-countries as well as the UK. The premia, relative to German government bonds, that these governments had to pay in the 1990s had reflected *currency risk* as well as *sovereign default risk.* Once the monetary union had started in 1999, investors saw no currency risk any more. In other words, the monetary union as such was deemed credible. This was not too surprising. What was surprising, however, at least to some observers, was that they assumed sovereign risk had disappeared as well. With hindsight, we must state that this amounted to a severe mispricing of government debt.

One interpretation making sense of zero risk premia after 1999 would be that investors collectively did not put faith into the "no bail out clause" of the treaty of Maastricht. However, they would then have factored in a collective risk and charged a risk premium for all countries of the euro zone. However, the fact that yields have converged to the *lowest* level observed prior to the euro contradicts this interpretation. Moreover, if risk premia are explained by debt levels, as suggested in the literature [see for instance De Grauwe & Ji (2012)], the amount of debt reduction that had taken place in high debt countries during the 1990s could hardly explain a reduction of sovereign

[2]This line of argument is also found in Buiter & Rahbari (2010) Spain and Ireland are the most important cases in point.

risk premia down to zero by 1999; see again figure 3. The only interpretation left, then, is the "naive view" that all countries would be disciplined by the SGP and that this, in and of itself, would avoid all solvency problems. We might as well call this market failure.

An important consequence of the vanishing sovereign risk premia was that the *real* cost of government debt had fallen quite dramatically. As evidenced by figure 3, over some episodes the GIPSIs were enjoying close to zero or even negative real cost of government debt, measured by the difference between the nominal bond yield and the national rate of inflation. The figure measures the rate of inflation through the GDP price deflator, which was typically higher in these countries than in core countries of the euro zone. Indeed, while Germany had experienced a much lower real cost of its government debt than these countries in the pre euro era of the 1990s,[3] in each and every year since the start of the union, all of the troubled countries of the present have enjoyed a significantly lower real cost of government debt than Germany, which traditionally serves as the risk-free benchmark.

Other things equal, the interest paid on government debt is an important driver for debt accumulation, but so is nominal growth. I repeat the well known equation of motion as a lens through which to look at a further implication of the missing risk premia on government debt:

$$d_t - d_{t-1} = f_t + \frac{i_t - g_t}{1 + g_t} d_{t-1}, \tag{1}$$

where d_t is the stock of government debt at the end of period t, relative to GDP (at current prices) of period t, and f_t is the primary government deficit (i.e., excluding interest payments on existing debt) during period t. In turn, i_t and g_t, respectively are the nominal rate of interest paid during period t on pre-existing debt d_{t-1} and the growth rate of GDP between periods $t-1$ and t. Note that $-\left[(i_t - g_t)/(1 + g_t)\right] d_{t-1}$ gives the primary surplus necessary to hold government debt constant at the level inherited from the previous year $t-1$.[4] Paradoxically, a positive debt level $d_{t-1} > 0$ would allow a government to run a primary deficit, $f_t > 0$, and still avoid any further accumulation of debt, provided that $i_t < g_t$. In theoretical models this is discussed as a state of dynamic inefficiency and mostly considered as a theoretical curiosity which is unlikely to occur with moderate levels of population growth.[5] Yet, for euro zone governments of the 2000s, $i_t < g_t$ is what we observe for several of the economies prior

[3]Ireland is an exception where in 1997 and 1998 the rate of inflation was relatively high.

[4]Denoting absolute levels by upper case letters, the equation follows from $D_t - D_{t-1} = F_t + i_t D_{t-1}$, where F_t is the excess of non-interest expenditure of the general government over government revenue. Dividing through by perod t GDP, denoted by Y_t, we have $d_t - D_{t-1}/Y_t = f_t + i_t D_{t-1}/Y_t$, where lower case letters denote ratios to contemporaneous GDP. We have $Y_t = (1 + g_t)Y_{t-1}$, hence we may write $d_t = f_t + \frac{1+i_t}{1+g_t} d_{t-1}$, which may equivalently be written as $d_t - d_{t-1} = f_t + \frac{i_t - g_t}{1+g_t} d_{t-1}$. Alternatively, using π_t to denote the rate of inflation and defining the *real* interest rate r_t according to $1+r_t := (1+i_t)/(1+\pi_t)$, and defining the growth rate of *real* GDP according to $1+q_t := (1+g_t)/(1+\pi_t)$, we may rewrite $d_t = s f_t + \frac{1+r_t}{1+q_t} d_{t-1}$, whence we arrive at $d_t - d_{t-1} = f_t + \frac{r_t - q_t}{1+q_t} d_{t-1}$.

[5]See, for instance, Obstfeld & Rogoff (1996) p.171ff.

to 2007, as evidenced by figure 3.[6] This further reinforces the conclusion that the vanishing sovereign risk premium has played a key role in pandering to the excessive borrowing that has eventually lead to the present sovereign debt crises.

But a complete neglect of sovereign default risk, and a situation where $i_t < g_t$, could not go on forever. Once the automatic stabilizers as well as Keynesian policies and public bailouts of troubled financial intermediaries had swelled public debt in the first two years after the financial melt down of 2007/08, sooner or later awareness of, and worry about sovereign risk was bound to set in. In some countries, particularly Spain and Ireland, the debt implications of the fiscal policy response was aggravated by the budgetary impact of the government stepping in to avoid the systemic risk from bank failures. But even before this was going to happen, and independently thereof, failing to acknowledge the special and temporary nature of the extremely favorable conditions for government finance constitutes a policy failure that has aggravated the capital market failure mentioned above. Once the unavoidable turnaround had happened, debt accumulation according to (1) with i_t far in excess of g_t proved a relentless force that apparently took many policy makers by surprise. The effect of this can be seen at the far right of the panels in figure 3.

Were the risk premia that investors were asking for government debt of the GIPSI-countries justified by their fiscal positions? De Grauwe & Ji (2012) have investigated this question by means of formal statistical analysis. They estimate equations explaining risk premia through government debt levels as well as government deficits and current account deficits (the "fundamentals") for different sub-periods between 2000 and 2011 (pre and post financial crisis), and for different country sub-samples (euro member countries vs. "stand alone" countries). Two conclusions stand out. The first is that the pricing of public debt through government bond markets has followed different "rules" before and after the crisis, and it follows different rules for euro member countries and "stand alone" countries. With some degree of simplification, the rules may be described as *systematic overpricing prior* to the crisis and *underpricing after* the crisis, particularly for the euro zone member countries. De Grauwe & Ji (2012) explain this as an instance of *multiple equilibria*, with an expectation driven occurrence of a bad equilibrium where high risk premia endanger the solvency of otherwise solvent countries. I shall return to this issue below, but a telling example even on quick inspection is the comparison between Spain and the UK, as emphasized by De Grauwe (2011b): The UK government enjoys a close to zero risk premium although it has a higher debt ratio than Spain.

2.3 External and internal imbalance

The pattern of public and private sector net savings highlighted above has implications for the relationship between domestic absorption and domestic income and should therefore be reflected in *current account imbalances*, as evidenced by figure 4 which depicts the GIPSI-countries' current account over the period since 1999. Normally,

[6]Note that the within-year spikes of risk premia are not visible in annual averages.

if a country runs a current account deficit driven by low levels of savings, meaning high levels of expenditure, it should see high levels of employment. However, this need not be the case, if the real exchange rate is misaligned. And in the present case the GIPSI-countries are facing the equivalent of a strong real appreciation that has accumulated over the past decade through diverging unit labor costs in the face of a common currency with such countries as Germany, Austria or the Netherlands. The result was a trend towards an ever larger gap in international competitiveness of the GIPSI-countries, as evidenced by table 2.[7] The figures in that table seem to vindicate warnings voiced in the 1990s, particularly by US economists, that any currency union extending beyond the core EU countries would not constitute an optimal, or just a workable, currency union. Moreover, they suggest that any hope that the criteria for an optimum currency area would be met "endogenously" has now turned out to be an illusion.

Thus, in addition to high levels of expenditure through a low level of savings by the public and/or the private sector, the current account imbalances for the GIPSI-countries observed over the past decade also reflect expenditure switching towards tradable goods. And in the most recent years of the sovereign debt crises, which is characterized by private deleverageing (see the savings rates in table 1 above), we witness a particularly nasty combination of *internal* and *external imbalance* in these countries: Current account deficits, albeit in lower magnitudes than prior to the onset of the crises, and high levels of unemployment.[8] Figure 4 reveals this by juxtaposing current account imbalances of these countries with their rates of unemployment and their rates of real GDP growth.

All of this may sound a bit like old-fashioned macroeconomics, but in my view it is illuminating, and it delivers an important message. It is difficult to imagine how macroeconomic equilibria in GIPSI-countries can be restored without changing relative prices of traded and non-traded goods produced in these countries. A key policy challenge will therefore be how to achieve such a "revaluation" without falling back behind the euro or, to use the tap-terminology, to resort to the devaluation tap.

Against the backdrop of modern theory and empirical developments, some readers might question the relevance of current account imbalances of countries that belong to a currency area. After all, we do not normally worry about current account imbalances of regions within a country. Moreover, in a world with *capital mobility*, as within the euro zone, current account deficits need not constitute external imbalance; they simply reflect inter-temporal trade. The crucial question is whether capital imports financing a current account deficit do or do not violate a country's inter-temporal solvency. In a recent paper, Obstfeld (2012b) argues that current account imbalances should remain an important magnitude to watch even with a high degree of capital mobility.[9] In particular, longer stretches of current account imbalances caused by real appreciation

[7] I am grateful to Jan Hogrefe for helping me drawing up this table; see Hogrefe et al. (2012).

[8] See Corden (1994) for a nice theoretical treatment of the relationship between internal and external imbalance. The "locus classicus", of course, is Meade (1951).

[9] See also Obstfeld (2012a) and Courinchas & Obstfeld (2011).

and credit booms are likely to eventually lead to financial distress. In a world of high powered finance and with gross capital imports and exports several times the magnitude of current account imbalances, there is no guarantee that a country's net international investment position is in line with the financing needs implicit in past current account deficits.

The early years of the euro zone have seen large volumes of capital flowing from the core to the periphery, financing large current account deficits.[10] Partly, these capital flows came about by means of core country commercial banks serving as conduits for world savings finding their way into the euro zone periphery. The crucial question at the time was whether these were "good imbalances" reflecting a high marginal productivity of capital and high growth potential in the periphery (now integrated on both goods and capital markets), relative to the core; see Eichengreen (2012). In retrospect, the answer is no, and this became apparent when the financial crisis struck in 2007/08. In part, these countries had been riding on their own real estate bubbles that were going to burst around that time. By 2008, the core country "conduit banks" were no longer able and/or willing to sustain their flows of capital to the periphery. With capital imports drying up, the GIPSI-countries became dangerously exposed with their need to roll over high levels of foreign debt, reflecting past current account deficits. In some countries, particularly Ireland and more recently Italy, this was aggravated by capital flight; see Sinn & Wollmershäuser (2011) and Buiter & Michels (2011). In retrospect, one cannot help asking how the current account imbalances of the GIPSIs in the 2000s could for such a long time have been regarded as a mirror image of "healthy" capital movements from the core to the periphery. In any case, the outcome must be described as severe *balance of payments crises* developing after 2007, with net foreign investment positions of minus 104 percent of GDP in Portugal, minus 95 percent of GDP in Ireland, minus 92 percent in Spain and minus 88 percent in Greece.[11]

Some authors have preferred to speak of a euro zone *growth problem* instead of a balance of payments problem; see in particular Shambaugh (2012). This is just another way to describe the above mentioned coexistence of an external imbalance in the form of a protracted (if shrinking) current account deficit leading to high levels of foreign debt and an internal imbalance in the form of high unemployment. Note that an equation similar to (1) drives the evolution of a country's net international investment position. The crucial question here is what type of adjustment mechanism will eventually lead these countries back to sustainable paths of income and expenditure.

If the GIPSI-countries had had their own national currencies, other things equal, the development that I have just described would most probably have led to severe currency crises. Barring national currencies, however, a currency run could not take

[10]Empirical evidence on international capital flows is less easy to obtain than for current account imbalances. Evidence for the intra euro zone capital flows mentioned above is cited in Eichengreen (2012).

[11]Italy's position is much better, with minus 25 percent of its GDP. By way of comparison the net international investment position of the euro zone as a whole is minus 11 percent. The sources of these numbers are publications of national banks, as listed in http://en.wikipedia.org/wiki/Net_international_investment_position and accessed on April 4, 2012.

place. What has taken place instead is an accumulation of Target2 liabilities that these countries now have vis à vis the ECB, mirrored by Target2 claims held by core central banks, particularly the Bundesbank. This type of "adjustment mechanism" is described in great detail by Sinn & Wollmershäuser (2011). However, the key concern here, as I shall argue below, is that the "Target2 tap" is devoid of any adjustment mechanism that would help restore external equilibrium in these countries. Strong growth might resolve the internal imbalance and, by implication of equation (1), would also alleviate the sovereign debt problem, but it would not resolve the external imbalance. This requires undoing the severe real appreciation that these countries have undergone during the past decade.

There are two ways in which this may happen: *Internal relative devaluation*, with the GIPSI countries remaining in the euro zone, or *external devaluation* after they reintroduce their own national currencies. In turn, internal devaluation may take place with *absolute* nominal devaluation of wages and the euro zone as such maintaining its present degree of price stability, or devaluation of the periphery *relative* to the core facilitated through a more inflationary euro zone.

3 The taps

Against the backdrop of this very rough analysis of the crises, what can we say about the taps mentioned at the outset? Which of them should be opened or closed, relative to what we have observed up to this point? Naturally, I cannot go into great detail with any of the taps, and I shall treat some of them in less detail than others.

3.1 The monetary tap

I define this tap as being operated by the ECB. I see two key aspects. The first is the provision of *liquidity to the banking sector* through standard refinancing operations, the second is ECB activity in the secondary *government bond market*. The ECB has responded to the crises through both types of activity. Up until late 2009, the monetary base in the euro zone was on a pretty stable trend path, but then the monetary base departed visibly from this trend in 4 successive spikes (with contractions in between), the latest expansion starting mid-year in 2011 at 1.05 trillion euro and adding 0.55 trillion until the present. By mere inspection, the present stock of roughly 1.6 trillion is above the long term trend in the amount of roughly 0.4 trillion euro, which is about 30 percent.[12] Importantly, however, this expansion of the monetary base has not swelled the conventional monetary aggregates by nearly as much. For instance, while the monetary base has almost doubled since 2009, M1 has risen by just about a

[12]These numbers are taken from the ECB Statistical Data Warehouse under http://sdw.ecb.europa.eu/ (accessed April 5, 2012) and referring to the definition of Base Money [sum(L010&L021&L022)].

quarter.[13]

The second type of activity, purchasing government bonds in the secondary market, has started in May 2010 (in connection with the first Greek bail out) under the Securities Market Program. Over the past two years the ECB sovereign bond holdings have run up to over 200 bn euro. However, this is very small, relative to the US Fed which holds more sovereign debt in the amount of a trillion US$; see Shambaugh (2012).

Are we to conclude that these taps are unduly opened and should be closed, to some extent at least? Against the backdrop of the previous section, a first key policy question regarding liquidity is whether the ECB wants to get into the business of alimenting a more inflationary environment, in order to facilitate an easier devaluation (of wages etc.) in troubled GIPSI countries, relative to the core, and thus to contribute to restoration of these countries' external balance. Prominent voices advocating this policy are Rogoff (2011a) and Krugman (2012). This policy would also effectively heed the more general advice that many economists, above all Olivier Blanchard, have issued subsequent to the financial crises, although the argument there is different. It has to do with an enhanced degree of freedom to lower nominal interest rates to cushion recessionary shocks, if in "normal" times nominal interest rates are somewhat higher due to higher inflation; see Blanchard et al. (2010). In any case, I see no indication for this to happen, nor would I think this would be a successful policy to resolve the GIPSI problem. For one thing, opening up this tap does not automatically mean more inflation; see my earlier remark on the link between liquidity and M1. And even if the room for more inflation should eventually be utilized, there is still a long shot from higher inflation in the euro zone as a whole and the relative devaluation needed to restore external balance in the GIPSIs.

A second important question relates to whether the ECB should commit to playing the role of a lender of last resort also on government bond markets. It is important to recognize that when the ECB has purchased government bonds under the Securities Market Program it was *not* acting as a lender of last resort. This program was put in place to "address the malfunctioning of securities markets and to restore an appropriate monetary policy transmission mechanism", with no mention of the ECB acting as a lender of last resort. In theory, the need of such a lender hinges on a specific condition, viz. that there are multiple market equilibria driven by expectations, with the distinct possibility of a so-called "bad equilibrium" where fundamentally solvent debtors are driven into insolvency by self-fulfilling expectations. It is commonly accepted that the banking market suffers from this deficiency, whence central banks are ready - more or less explicitly - to step in as lenders of last resort in case such a "bad equilibrium" (i.e., a bank run) arises. Most of the time the commitment itself is sufficient to avoid such equilibria.

The question is whether government bond markets have this same characteristic or not. In a series of papers, Paul De Grauwe has forcefully argued that they do, and that the ECB should therefore be prepared to let markets know it will serve as a lender of last resort on government bond markets; see De Grauwe (2011b) and De Grauwe

[13]Again, the numbers have been taken from the Statistical Data Warehouse; see previous footnote.

(2011a). His argument rests on a political economy model in the spirit of the theoretical literature on sovereign default.[14] This model portrays a government that is hit by a negative shock and considers the benefit and cost of default. The benefit of default plausibly rises with the magnitude of this shock, and a key assumption of the model is that for any given shock the benefit is larger, if the default is expected than if it isn't. This is plausible against the backdrop of a sharp rise in the cost of debt that follows from bond holders expecting a (partial) sovereign default; see figure 3. Under reasonably general conditions regarding the cost of default, this leads to a range of shock magnitudes that entail multiple equilibria, similar to the multiple equilibria in the banking market that is induced by the specter of a bank run. If there is a lender of last resort, then the "bad equilibrium" no longer is an equilibrium.

A lender of last resort would thus prevent solvent governments from becoming insolvent as a result of a speculative attack on their bonds. A credible lender of last resort needs to have the power to print money. Hence, it can only be a central bank. Specifically, the European Stability Mechanism (ESM), even an enlarged one, cannot fulfil this role, quite apart from the fact that the ESM is designed as a bailout facility. But according to this doctrine, lending of last resort must be restricted to solvent governments. It must not be used towards a bailout. Nor may it be used as a vehicle to finance government expenditure under "normal times" where there is no threat of a "bad equilibrium" to arise. One way to avoid this is to make such lending available only at punitive cost (Bagehot doctrine). And it must be coupled with prudent supervision of borrowers who receive the benefits of last resort lending. All of this indicates that implementing this type of policy is difficult and requires careful design. But this is no excuse for denying a serious try, in time before the next crisis might arise.[15]

Econometric evidence compiled by De Grauwe & Ji (2012) shows that for equal fundamentals (such as debt and deficit ratios) capital markets do not charge sovereign risk premia for stand alone countries while doing so for euro zone member countries. Apparently, a country's ability to print the money in which government debt is issued is interpreted by capital markets as the presence of a lender of last resort, even if the central bank's statute or policy rules do not contain an explicit commitment to that effect. By the same logic, euro zone member countries lack any such de facto lender of last resort. Barring a debt instrument that collectivizes sovereign risk, they are left vulnerable to expectations-driven "bad" equilibria which may push them to the brink of insolvency. Obviously, this potentially causes high welfare cost, which could be avoided if the ECB was willing to act as a lender of last resort vis à vis bonds issued in euro by national governments, provided that the practical problems of implementation regarding incentives and the line between solvent and insolvent governments can somehow be solved.

[14] See Rogoff (2011b) for a concise overview of this literature.

[15] The most daunting challenge probably is to avoid adverse incentives and moral hazard. For a more detailed discussion of this and other issues, see De Grauwe (2011a).

3.2 The bailout tap

For the present purpose, I define bailout as a refinancing operation for a given level of sovereign debt which involves two elements: *Other sovereigns* (governments or institutions backed by governments) acting as lenders or through guarantees, and a rescue element in the form of *concessional financing* conditions. Concessional finance may range from interest rates below levels charged for competitive borrowing on the capital market, over restructuring maturities to outright transfer. The purpose generally is to avoid default, hence it usually involves debtors deemed to be at the brink of solvency. Note the difference to lending of last resort, where it is central banks, not governments, that become active, and where the financing conditions are punitive instead of concessional, in order to guarantee that it is restricted to solvent debtors. Bailouts are firmly placed in the realm of fiscal policy, while the role of a lender of last resort is a matter of monetary policy, although directed at government bond markets.

Up to this point, the EU has organized four bailout operations for three countries: Greece (May 2010 and March 2012), Ireland (November 2010) and Portugal (May 2011). These have been constructed as loan packages for troubled countries with two EU institutions extending these loans which they finance by issuing debt instruments on capital markets: The European Commission, authorized to do so under the *European Financial Stability Mechanism* (EFSM), and the *European Financial Stability Facility* (EFSF), a special company created in May 2010 by euro area member states, which essentially does the same and is backed by these countries' guarantees. These guarantees now total 780 bn euro, giving the EFSF a lending capacity of 440 bn euro. The EFSF was initially intended as a temporary institution lasting only for three years, to be replaced by the European Stability Mechanism (ESM) in 2013. But the ESM is now scheduled to start already in 2012, and the EFSF and the ESM are likely to coexist for some time. In addition to these EU institutions, all four rescue packages also involve lending through the *International Monetary Fund* (IMF).[16]

The first Greek loan facility has totaled 110 bn euro, the second loan facility of 2012 has added a further 130 bn euro.[17] As of December 2011, a total of 73 bn euro has been disbursed. The Irish loan package runs up to 67.5 bn euro, of which 42.25 bn has been disbursed up until March 2012.[18] The Portuguese bailout amounts to a total of 78 bn euro, of which 36.5 bn has already been disbursed. All of these packages involve a significant amount of conditionality relating to fiscal policy but also to other areas of economic policy and governance. I shall return to this below.

What is the rationale for these bailout packages? As argued above, bailouts usually intend to avoid disorderly sovereign default. However, if the debtor government is not

[16]Details of these bailout operations are found under
http://ec.europa.eu/economy_finance/eu._borrower/index_en.htm

[17]The second rescue package involves a private sector write down estimated at well above 100 bn euro.

[18]When all tranches will have been disbursed, the entire rescue lending to Greece and Ireland will have added up to about a third of the respective government revenues projected for the three years during which lending takes place.

fully solvent, it seems questionable whether a bailout will do more than postponing default. Gaining time may be a valuable outcome of a bailout in that it facilitates an orderly default later, provided the time bought is used wisely. Whether anything is gained beyond buying time much depends on the degree of concessionality. In principle, the concessionality of a bailout package can be tailored such that solvency of the government is restored.

Whether or not the bailout tap should be opened, once a specific case has emerged, is a contentious issue. The common argument is that a bailout avoids losses to private investors holding the sovereign debt in question, but involves a cost for the lending countries' taxpayers who shoulder risk that private lenders would not be willing to shoulder under the concessional conditions in question. Ex post, whether a bailout should be organized first and foremost seems a *distributional* issue. I shall demonstrate below that for the EU-type rescue packages this view is questionable. Depending on the details of the bailout loan package, the risk shouldered by lending countries' tax payers might be relatively small, while the risk of default for the private sector might increase significantly. But perhaps more importantly, there is an efficiency perspective as well. If lending institutions of the private sector are ill-prepared to take these losses because they lack adequate capital, then there may also be an ex post *efficiency* case for the bailout, which is to fend off a systemic banking crisis.[19]

Efficiency considerations are even more important from the *ex ante perspective.* The presence of a bailout mechanism like the EFSF and the ESM may serve a useful purpose in avoiding "bad" equilibria where insolvency arises in a "non-fundamental" way, through excessive risk premia driven by expectations. However, there is a danger of adverse incentives deriving from such bailout facilities. Note the difference to last resort lending, which is a very unattractive perspective due to punitive borrowing cost. A further difference seems important: The lender of last resort, by virtue of access to the printing press, has the necessary power to avoid any speculative attack. In contrast, the power of the EFSF and the ESM, even if they are merged as now envisaged, may well not be sufficient to deal with speculative attacks on larger member countries like Spain and Italy. If avoiding "bad" bond market equilibria is the objective, then the ECB as a lender of last resort seems a far superior instrument to use.

3.3 Bond market equilibrium with government insolvency

That said, one might still expect that that under certain conditions a bailout may have an effect similar to avoiding a "bad" equilibrium. Unfortunately, this is no forgone conclusion. To see why, take the above equation of motion for government debt (1).[20] If the government is to remain solvent, this equation must hold for any two periods, not just period t and $t-1$. For instance, we have $d_t = f_t + \frac{1+i_t}{1+g_t} d_{t-1}$ as well as

[19] A further efficiency case may be made on the grounds that numerous private lenders fail to coordinate in exerting pressure on borrowing governments to carry out reforms needed to avoid insolvency, and a large player like a bailout institution might be able to resolve this coordination failure.

[20] The subsequent analysis borrows from Grossmann (2011).

$d_{t+1} = f_{t+1} + \frac{1+i_{t+1}}{1+g_{t+1}} d_t$ etc. Remember that d_{t-1} is the debt ratio inherited from past government deficits, relative to period $t-1$ GDP and f_t is the excess of expenditure over revenue, falling due at the *end of period* t.

We now modify this dating convention: We define $\tilde{d}_t$ as the level of debt *at the beginning* or period t, relative to period t GDP. Accordingly, we assume that the flow magnitudes (revenue, expenditure) behind the deficit are falling due at the beginning of period, and we denote this deficit as $\tilde{f}_t$, again relative to period t GDP. Obviously, this is somewhat more than a mere change in the dating convention, as it has to do with the availability of flows. With this modification, the equation of motion is $\tilde{d}_{t+1} - \tilde{d}_t = \frac{1+i_t}{1+g_t}\tilde{f}_t + \frac{i_t}{1+g_t}\tilde{d}_t$, which may be rewritten as

$$\tilde{d}_t = -\tilde{f}_t + \frac{1+g_t}{1+i_t}\tilde{d}_{t+1}. \tag{2}$$

This equation relates the legacy of the government's past, reflected in the debt ratio at the beginning of period t, relative to GDP of period t and denoted by $\tilde{d}_t$, to the government's future, represented by its primary deficit in the upcoming period t, $\tilde{f}_t$, and the debt it will have to shoulder at the end of period t, $\tilde{d}_{t+1}$.

Writing $z_t := -\tilde{f}_t$ for the primary surplus (revenue minus non-interest expenditure), and assuming a time-invariant interest rate and growth rate of real GDP, we may repeatedly substitute future debt ratios for the entire time span up to $t = T$ to obtain

$$\tilde{d}_t = \sum\nolimits_{v=0}^{T} \left(\frac{1+g}{1+i}\right)^v z_{t+v} + \left(\frac{1+g}{1+i}\right)^{T+1} \tilde{d}_{t+T}. \tag{3}$$

Assuming that the second term on the right-hand side converges to zero as T goes to infinity,[21] and using $\bar{z}_{t+v}$ to denote the *upper bounds* of the range of conceivable or realistic values of z_{t+v}, we may now define the *"present value of the government"* (PVG) as

$$\mathrm{PVG}(g, i, \bar{z}_{t+v}) := \sum\nolimits_{v=0}^{\infty} \left(\frac{1+g}{1+i}\right)^v \bar{z}_{t+v}. \tag{4}$$

Importantly, in this definition i is the *risk-free* interest rate. The time-invariant growth rate g must be interpreted as the economy's *permanent* growth rate. The government is *insolvent* if

$$\tilde{d}_t > \mathrm{PVG}(g, i, \bar{z}_{t+v}), \tag{5}$$

meaning that its debt legacy is larger than the PVG, calculated at the risk-free interest rate. *Solvency* requires a weak inequality in the opposite direction. Obviously, the values $\bar{z}_{t+v}$ are difficult to pin down in an objective or scientific way. To a lesser extent, this also applies to the permanent growth rate g. In some cases, as for present day Greece, a consensus may be easy to achieve that this insolvency condition is satisfied, but in other cases judgement will be far more difficult, as for instance for Spain or Italy.

[21] This is the so-called "no Ponzi game" condition.

Assume that $\tilde{d}_t$ denotes the value of debt according to (3), i.e., based on expected values z_{t+v}. Suppose that at the beginning of t "news" about $\bar{z}_{t+v}$ that satisfy condition (5) arrives in the market. Then, investors who hold the outstanding debt $\tilde{d}_t$ at the beginning of period t can no longer expect to receive the full, risk-free service of this debt. If all values of $\bar{z}_{t+v}$ as well as g are known, and if the government credibly commits to these upper bound surpluses, a natural adjustment would be a spontaneous write-down of this debt to a fraction of its nominal value $\tilde{d}_t$ which is equal to $\text{PVG}(g, i, \bar{z}_{t+v})$ according to (4). This is the clean "haircut" solution. It rests on an unambiguous determination of the upper bound values $\bar{z}_{t+v}$ as well as g. In most cases, however, this is an unrealistic assumption.[22]

Suppose, therefore, that in investors' minds insolvency is a stochastic event, meaning that they expect the value of a euro of debt owned at $t-1$ to be equal to $\delta < 1$ at the end of period t. Risk-neutral investors, would be willing to hold this debt only at a nominal interest rate equal to q, which is implicitly defined as

$$1 + q := (1 + i)/\delta. \tag{6}$$

We may now speak of PVG defined in (4) as the *risk-free* PVG and define a *risk-adjusted* PVG

$$\text{R-PVG}(g, i, \bar{z}_{t+v}, \delta) := \sum\nolimits_{v=0}^{\infty} \left(\frac{1+g}{(1+i)/\delta} \right)^{v} \bar{z}_{t+v}. \tag{7}$$

The risk-free $\text{PVG}(g, i, \bar{z}_{t+v})$ in (4) describes the level of government debt that the entire stream of primary surpluses $\bar{z}_{t+v}$ is able to serve at the risk-free interest rate i, given the economy's permanent real growth rate g. By complete analogy, $\text{R-PVG}(g, i, \bar{z}_{t+v}, \delta)$ defines the level of debt that this same stream of government surpluses is able to serve at the risk-adjusted interest rate $(i+1)/\delta$, whereby $\delta \in]0, 1[$.

We can now consider possible equilibria in the bonds market, meaning possible equilibrium values of δ. Risk-neutral investors are indifferent between owning δ units of debt reflecting $\text{PVG}(g, i, \bar{z}_{t+v})$ that carries a risk-free interest rate i and owning one unit of debt reflecting $\text{R-PVG}(g, i, \bar{z}_{t+v}, 1)$ that carries a risk-adjusted interest rate q.[23] Accordingly, investors would be indifferent between holding a unit of inherited government debt $\tilde{d}_t$, if the government is solvent and the debt pays an interest rate i, and a spontaneous devaluation of that debt down to $\delta \cdot \tilde{d}_t$, provided that the debt now pays an interest rate equal to q. We now define the *risk-adjusted market value of government debt* (R-MVD) as

$$\text{R-MVD}(\delta, \tilde{d}_t) := \delta \cdot \tilde{d}_t. \tag{8}$$

[22]It is instructive to briefly consider an alternative scenario which involves *fiscal retrenchment*. This requires an increase in the PVG through an adjustment of $\bar{z}_{t+v}$ to bring $\text{PVG}(g, i, \bar{z}_{t+v})$ in line with $\tilde{d}_t$. But this implies that $\bar{z}_{t+v}$ are not the maximum conceivable surpluses. If this type of fiscal retrenchment is possible, then the government is in fact solvent.

[23]Holding a euro of debt which carries an interest rate equal to $(1+i)/\delta$ leaves the investor with $1+i$ at the end of the period, if the end of period debt is revalued to δ. Alternatively, holding debt worth a fraction δ of a euro which carries an interest rate equal to $q = (1+i)/\delta - 1$ similarly leaves the investor with $1+i$ at the end of the period, if no revaluation takes place.

Obviously, with government solvency, $\tilde{d}_t \leq \text{PVG}(g, i, \bar{z}_{t+v}) = \text{R-PVG}(g, i, \bar{z}_{t+v}, 1)$, a possible equilibrium is one where $\delta = 1$. Unfortunately, however, this need not be the *only* equilibrium, even if the government is fundamentally solvent. An arbitrage-free equilibrium requires

$$\text{R-MVD}(\delta, \tilde{d}_t) = \text{R-PVG}(g, i, \bar{z}_{t+v}, \delta). \tag{9}$$

If there is a value of $\delta \in]0, 1[$ that satisfies this condition, then we speak of a "speculative attack" on government debt, which gives rise to an equilibrium with self-fulfilling expectations of government default. This model delivers the possible coexistence of a *"good"* and a *"bad"* equilibrium in the sovereign bonds market. A good equilibrium may be one where the government is, and appears, solvent. A bad equilibrium is one where the government is fundamentally solvent, but appears insolvent due to the speculative attack. Standard models of sovereign default with this property usually follow a political economy approach, meaning that they focus on a government's willingness to pay based on political costs and benefits, as in De Grauwe & Ji (2012). In contrast, the present model has no political economy flavor to it in that there is no notion of a government considering benefits and cost of default. Instead, it is squarely centered on *solvency* and on *investors' expectations*.

To explore further, I simplify by assuming that there is a time-invariant value of the committed (maximum) primary surplus $\bar{z}$. This may be interpreted as the *permanent* level of the government surplus. Assuming $\tilde{d}_t > 0$, it seems reasonable to assume $\bar{z}$ to be positive as well, for otherwise the government would trivially be insolvent. It is relatively straightforward that the definition of R-PVG now reads as[24]

$$\text{R-PVG}(g, i, \bar{z}, \delta) \equiv R(g, i, \delta)\bar{z} \quad \text{where } R(g, i, \delta) := [1 - \delta(1 + g)/(1 + i)]^{-1} \tag{10}$$

According to (9), the R-MVD is a *linear* function of δ, with a slope equal to the inherited debt level $\tilde{d}_t$. On the other hand, equation (10) reveals that the R-PVG is increasing and *convex* in δ, with a finite value $R(g, i, 1) > 1$ and with $R(g, i, 1) = 1$. This latter property is worth a comment. It means that even with $\delta = 0$ there is a positive net present value of the future stream of $\bar{z}$. This has to do with the above assumption, introduced in connection with the dating convention, that the period t primary surplus is not subject to discounting. The implication is that there is no solvency risk during the contemporaneous period.

The condition (9) for a self-fulfilling speculative attack requires that the R-MVD and the R-PVG schedules have an intersection point with $\delta \in]0, 1[$. Figure 5, which is borrowed from Grossmann (2011), illustrates this condition. With a permanent primary surplus $\bar{z}_1$, the government would be solvent and not subject to the threat of a speculative attack, if its inherited debt ratio is $\tilde{d}_{t,0}$. The only non-degenerate equilibrium is full solvency, with $\delta = 1$. But if its permanent primary surplus is $\bar{z}_0$, where we have $\tilde{d}_t = \text{R-PVG}(g, i, \bar{z}_{t+v}, \delta)$, then a further equilibrium is given with $\delta = \underline{\delta}_1$. This tells us that an interior equilibrium with a self-fulfilling default expectations *always*

[24]The term $\sum_{v=0}^{\infty} \left(\frac{1+g}{1+q}\right)^v$ may be written as $1 + a + a^2 + \ldots$, which has a finite value equal to $1/(1 - \alpha)$. Substituting for a, we obtain a value equal to the expression $R(\delta, g, i)$ above.

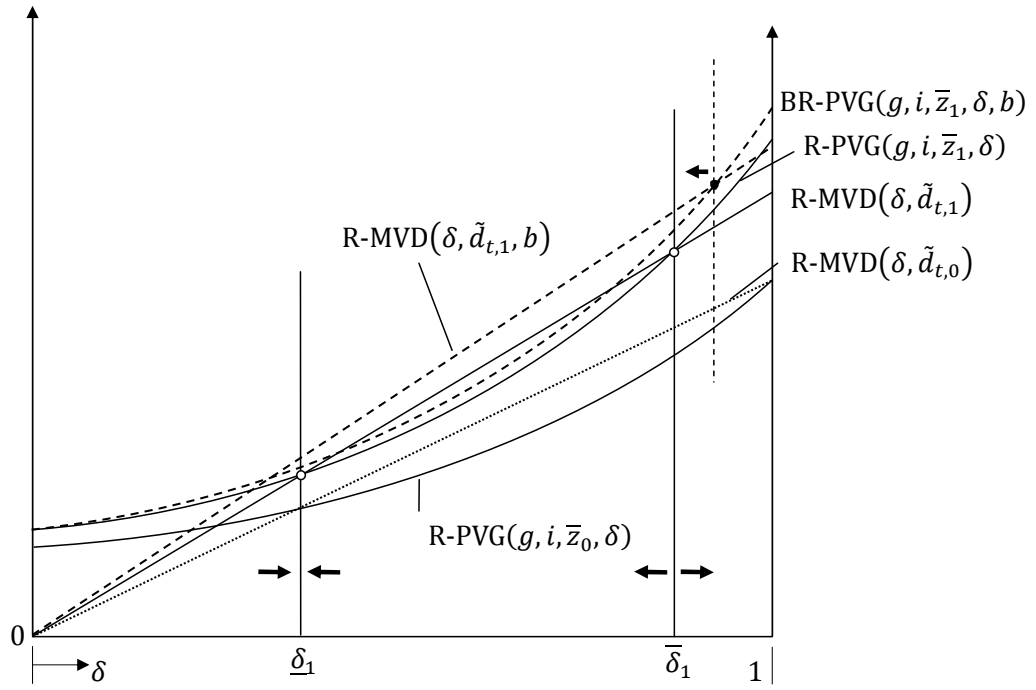


Figure 5: EU-type bailout and the risk premium in the government bond market

exists, if $\tilde{d}_t = \text{R-PVG}(g, i, \bar{z}, 1)$, i.e., if the government is at the brink of insolvency in that its permanent primary surplus just allows it to service the inherited debt level $\tilde{d}_t$ at the risk-free interest rate i. For a range of larger primary surpluses, we obtain two such interior equilibria. For instance, if the debt ratio is $\tilde{d}_{t,1}$ and the primary surplus is $\bar{z}_1$, then the "bad" equilibrium involves insolvency expectations $\underline{\delta}_1$, and the "good" equilibrium equilibrium features an equilibrium value of $\delta = \overline{\delta}_1$.

To consider dynamics we must consider possible adjustment mechanisms. A reasonable adjustment hypothesis is that δ increases (falls), if the R-PVG$(g, i, \bar{z}, \delta)$ is above R-MVD$(\delta, \tilde{d}_t)$. This is depicted in figure 5 by the solid horizontal arrows. As perhaps expected, if the government is solvent and if there are interior equilibria, then the "good" equilibrium is unstable, and the "bad" equilibrium is stable.

De Grauwe (2011b) argues that the susceptibility of government bond markets to multiple equilibria driven by investor expectations constitutes a case for the ECB to act as a lender of last resort. He sketches a political economy-type model to substantiate the hypothesis of speculation-driven market equilibria where governments that are fundamentally solvent appear insolvent as a result of high risk premia that are not justified by fundamentals. The above analysis reinforces this case in that it demonstrates that such equilibria may arise also without any government calculus about the political cost and benefit of default.

3.4 How do EU-type bailouts affect expectations?

We may now consider the effect of an EU-type *concessional bailout package*. Thus, suppose, that a public authority purchases a fraction of existing debt at par value b, to be served at a concessional rate equal to the risk-free interest rate i, instead of q which includes a risk premium according to (6). The bailout institution receives a claim with a present value equal to $R(0,g,i)\beta\bar{z}$, where β is implicitly determined by

$$R(1,g,i)\beta\bar{z} = b. \tag{11}$$

The term b may simply be called the size of the bailout package. The interpretation of equation (11) is that the bailout authority enjoys seniority over private creditors, which is in line with the way that the EU-type bailout packages are designed. The bailout institution will always find that the debt that it owns is honored in full, even if there is a partial government default. We may call (11) the *seniority condition*.

This type of bailout package affects the condition (9) in two ways. It shifts the R-MVD schedule to the "bailout-induced" R-MVD level

$$\text{BR-MVD}(\delta,\tilde{d}_t,b) := \delta(\tilde{d}_t - b) + b = \text{R-MVD}(\delta,\tilde{b}_t) + (1-\delta)b \tag{12}$$

Note that, due to seniority, the MVD of bailout debt b enters without any risk-adjustment. Consequently, with $\delta < 1$ the bailout-induced R-MVD is larger than the ordinary R-MVD. At the same time, the bailout also shifts the R-PVG to BR-PVG$(g,i,\bar{z},\delta,b) := R(\delta,g,i)(1-\beta)\bar{z} + R(1,g,i)\beta\bar{z}$. But observing $\beta\bar{z} = b/\,R(1,g,i)$ from the seniority condition (11), the bailout-induced R-PVG emerges as

$$\text{BR-PVG}(g,i,\bar{z},\delta,b) \equiv \text{R-PVG}(g,i,\bar{z},\delta) + b\left(1 - \frac{R(\delta,g,i)}{R(1,g,i)}\right). \tag{13}$$

Since $R(\delta,g,i)$ is increasing in δ, we have $\frac{R(\delta,g,i)}{R(1,g,i)} < 1$. We may thus summarize that the bailout increases both, the aggregate risk-adjusted market value of debt and the risk-adjusted present value of the government, provided that economy is in an interior equilibrium with $d < 1$. The R-MVD increases by $(1-\delta)b$ and the R-PVG increases by $1 - \frac{R(\delta,g,i)}{R(1,g,i)}$.

What is the effect of this EU-type bailout package on self-fulfilling expectations δ? It is relatively straightforward to show that under plausible conditions the R-MVD shifts up by a larger amount than the R-PVG, if the initial equilibrium is in the neighborhood of $\delta = 1$, as seems plausible for the present case, or in the neighborhood of $\delta = 0$.[25] The outcome of the bailout is as depicted by the dashed lines in figure 5. The message

[25] The condition for this is $1-\delta > 1-R(\delta,g,i)/R(1,g,i)$ or $\delta < R(\delta,g,i)/R(1,g,i) = [1-(1+g)/(1+i)]/[1-\delta(1+g)/(1+i)]$. Assuming, plausibly, that $i > g$, this may be written as $\delta - \delta^2(1+g)/(1+i) < 1-(1+g)/(1+i)$. For values of δ close to zero, this is satisfied. For $\delta = 1$ we have equality. The left-hand expression has a negative slope, if $2\delta(1+g)/(1+i) > 1$. For values close to 1, this is likely to be satisfied. But a negative slope means that the left-hand expression increases as δ falls below 1. Hence, for δ-values close to 1, the condition is likely to be satisfied as well.

is delicate: If prior to the bailout the economy was perceived as partially insolvent in that $\delta < 1$ and if the economy is in an unstable "good" equilibrium with δ close to unity, then the bailout pushes the economy to the "wrong" side of this equilibrium, where the R-DV exceeds the R-PVG, and where dynamic adjustment leads to a lowering of δ, leading the economy to the "bad equilibrium".

What is the explanation of this result? The key to understanding is *seniority*. The bailout authority provides concessional financing, but it also commands seniority over private investors. As a result, the arbitrage-free equilibrium requires a further write-down of the privately held government debt (reduction of δ), which is coupled with an increase in the risk premium. This aspect of EU-type rescue mechanisms has been criticized by Gros (2010) who speaks of a private sector "bail in". Our model further substantiates this point.

It is somewhat surprising that the architects of the EU-type bailouts have long failed to consider this possibility of an adverse effect of seniority of the bailout loans. It was not until the second rescue operation for Greece, which was agreed upon in March this year, that this problem has been acknowledged. It was acknowledged in the form of about 30 bn euro of the loan money being ring-fenced for the service of what was left as outstanding debt held by the private sector. This seemed like a "sweetening", necessary for the private sector to agree to a significant voluntary write-down.

Of course, a bailout in the form of a *plain transfe*r would have a much more favorable outcome, as emphasized by Grossmann (2011). More specifically, in terms of figure 5 a transfer, unlike a bailout loan, would not shift the R-DV schedule. Consequently, the upward shift of the R-PVG schedule may conceivably put the economy on a path towards solvency. But such transfers are obviously much more difficult to accept by bailout countries, and they involve potentially severe moral hazard problems. Having done it once makes this type of tap difficult to decline in the future. And if they are anticipated by borrowers, the adverse incentive effects are all too obvious.

Although the effect of a bailout described in figure 5 is not a necessary outcome, it seems a likely outcome, since the situation in which it is implemented is likely to involve a value of δ below, but close to unity. This substantiates the claim that I made above that the mainstream notion of EU-bailout packages is flawed. The mainstream holds that the bailout saves private investors at the expense of the taxpayer. The above analysis shows that taxpayers are unlikely to bear much risk if the bailout loans command seniority, while the self-fulfilling private sector expectations of government default are likely to be increased.

3.5 Austerity - unavoidable yet dangerous?

The analysis in the previous section does not do full justice to the bailouts that European institutions have organized for Greece, Ireland and Portugal, and to the institutions that have been put in place in order to organize future bailouts should the need arise. Perhaps the most important element of EU-type bailouts ignored in the above is *conditionality* of the loans extended on government austerity in the recipient countries.

The above analysis needs to be modified in two ways. The first relates to the

assumption of a *given* permanent primary surplus. In practice, the GIPSI-countries economies have come into trouble because they were perceived as being on a path of excessive government deficits. The deficits were deemed *excessive* in two different ways. First, in the formal sense of violating the SGP criteria. And secondly, in a more fundamental way, because there was no credible plan or strategy for how the present deficits would eventually be *changed* into something vaguely connected to the notion of a permanent surplus that is consistent with inter-temporal solvency, given the debt accumulated in the past. The whole idea of bailout was to help the troubled countries finding a credible turnaround of their fiscal stance that is in line with, or at least not in blatant contradiction to, the inter-temporal budget constraint.

Of course, if the government is insolvent in the above sense, then there is no way around *writing off* part of the existing debt. The debate will then be about who bears how much of this adjustment burden, and the policy challenge is to establish workable procedures to resolve this debate with due speed. I shall not analyze this aspect any further in this paper.

An issue arising in all cases of excessive deficit, whether solvency is involved or not, is to define a long-run permanent primary surplus that reflects the *policy preferences* of the country regarding the size of the government in terms of public expenditure and tax revenues, while at the same time being *"solvency-consistent"* with the inherited debt ratio. Remember that the equation of motion for government debt is

$$\tilde{f}_t = \frac{1+g_t}{1+i_t}\tilde{d}_{t+1} - \tilde{d}_t. \tag{14}$$

Given an inherited debt level $\tilde{d}_t < 0$, a constant debt ratio, $\tilde{d}_{t+1} - \tilde{d}_t = 0$, implies

$$\tilde{f}_t^* = \frac{g_t - i_t}{1+i_t}\tilde{d}_t < 0, \tag{15}$$

provided that $i_t > g_t$, which is likely to be fulfilled in the long run.[26] A negative primary deficit $\tilde{f}$ means a primary surplus. If $-\tilde{f}_t^*$ as determined in (15) is below the upper bound $\bar{z}$, the country would be able to stabilize the inherited debt ratio by aiming for a permanent primary surplus equal to $-f_t^*$. Of course, this might already be a formidable challenge, if the present primary balance is negative, as in the GIPSI-countries around 2010. But the country might be well advised to aim for a more ambitious long-run target, so as to avoid being exposed to bond market vagaries through a high debt ratio. In any case, having a clear and *credible target* value for the *long-run debt ratio* and the corresponding primary surplus is an indispensable element of any plan for a troubled economy to return to normalcy in government finance.

The second aspect which is ignored in the above analysis is that both, the cost of government debt g and the nominal growth rate of GDP g are not independent

[26] See my earlier remark on dynamic efficiency. Notice the difference to equation (1), which is explained by the above mentioned change in our dating convention from *end of period* to *beginning of period* notation of stocks and flows.

of fiscal policy, i.e., on the government deficit and the debt ratio. Arguably, this concern is more relevant in the short run than in the long run. Indeed, it seems relatively safe to assume that the long-run cost of government debt as well as the long-run growth potential are independent on the long-run debt ratio and the associated primary surplus, provided they *credibly* satisfy the long-run solvency condition (15). What should be born in mind, however, is that even solvent governments may be subject to "speculative attacks". And from the previous subsection we learn that a government with a higher debt ratio is more heavily exposed to such attacks than a government with a lower debt ratio.

Suppose policy makers have succeeded in finding a consistent and credible long-run target for the debt ratio and the associated primary surplus. The *short-run* challenge for a troubled economy then is to find an optimal *adjustment path* to the long run, permanent stock and flow. It is at this point that the bailout activities of the euro zone have recently met strong criticism for their *single-minded focus on austerity*. The issue here is not whether or not austerity is needed at some time, but whether there is a danger of trying to implement too much of it too quickly, given the present macroeconomic conditions. Specifically, too much discretionary fiscal adjustments may be implemented at a time of poor economic growth. To the extent that the fiscal policy has "Keynesian effects", such adjustments, particularly if implemented simultaneously in many countries, will amount to a critical drag on aggregate demand, thus aggravating the poor short-run growth perspectives. In turn, poor growth aggravates the fiscal position of the government through the automatic stabilizer as well as through the adverse effect of low growth rate g_t on debt accumulation; see equation (1). This concern has been voiced by many prominent observers, both with a view on the euro zone and with respect to the US and other industrialized countries.[27]

While the general concern is probably valid, it is very difficult to judge whether or not present fiscal policies are placing too much emphasis on austerity. Corsetti & Mueller (2011) point out that across countries and time high government risk premia have been correlated also with high borrowing cost for the private sector. Although the causality is not perfectly clear, this sovereign risk channel suggests an argument against leniency that has so far received little attention. If austerity measures succeed in reducing the government risk premium, and if this leads to lower private borrowing cost, then this at least mitigates the contractionary effect of austerity. Other defendants of tough fiscal adjustment even in an environment of poor growth have gone much further in turning to the idea of a *"double dividend"* of austerity. The argument is that

[27]To mention just a few, see Blanchard & Cottarelli (2010), Blanchard (2012), and Stiglitz (2012). The Economist warns of the danger to repeat a terrible mistake that was made by the US during the Great Depression. Worried by debt accumulation, the US administration was urging the US Congress to implement a fiscal adjustment amounting to 5.5 % of GDP during the years 1936-1938, in order to stop debt accumulation. Interestingly, the debt ratio that gave rise to the concerns was no more than 40 % of US GDP, which pales against the present debt levels even of sound governments. In any case the result was a "recession within the great depression". The Economist estimates that the fiscal adjustment has caused an 11 percent drop in GDP and a 4 percentage point increase in unemployment; see "There could be trouble ahead", *The Economist*, print edition of Dec 10th 2011. See also Krugman (2012).

austerity, if implemented in the right way, not only has the direct effect of limiting (or even turning) debt accumulation through a lower primary deficit, but also an indirect effect through a positively effecting the real growth rate. The argument primarily rests on oft-quoted evidence presented by Alesina & Ardagna (2010), who look at numerous large, discretionary fiscal adjustments implemented in OECD countries between 1970 and 2007 in order to reduce public debt. They differentiate between tax based and expenditure based adjustments, finding that adjustments based on expenditure cuts have tended to be more successful than adjustments based on tax increases. Moreover, they find that in some cases fiscal adjustment has even lead to higher growth, albeit with a several year time lag.[28]

What can we conclude from this evidence for the concern about too much austerity in EU-type bailout activity that I mentioned above? Taking the evidence at face value, one might be tempted to conclude that the concern is misplaced and even dangerous in giving fiscal policy a pretext for procrastination. However, a case for procrastination cannot be constructed if the concern about overly restrictive policy is expressed in a well balanced and thoughtful way, as in the references that I gave above. There is certainly a case for *careful timing* of the necessary adjustment, coupled with a clear and credible commitment to a long-run target value of the debt ratio and the corresponding permanent primary government surplus.

Conversely, advocating particularly tough austerity on the grounds of a possible "double dividend" is very difficult to construct from the evidence presented in Alesina & Ardagna (2010) and Guajardo et al. (2011). There are several specific conditions that one can think of, under which a fiscal adjustment might be followed - with a certain lag - by real expansion. But one can easily imagine conditions where the opposite is true. Growth having picked up *in a few years time* seems a necessary condition for GIPSI-countries' return to solid government finance in any case. What present policies must try to avoid is a further aggravation of the *present* recession. Without knowing the specific conditions that were prevailing in the expansionary cases identified by Alesina & Ardagna (2010), it seems very difficult to draw reliable conclusions about whether such an effect might also be expected fast enough in any one of the troubled economies of the present.[29] Perotti (2011) has looked into successful fiscal adjustments that have been implemented in EU countries during the past two decades. He argues that the specific conditions leading to expansions in these cases (Denmark, Ireland, Finland, Sweden) are unlikely to play a role in the adjustments implemented in GIPSI countries at the present: external demand from devaluations and lowering of interest rates.

On the other hand, one conclusion seems relatively safe and robust to draw from Alesina & Ardagna (2010) and Guajardo et al. (2011): Under many circumstances, fiscal adjustment to correct excessive government debt is more successful if done through

[28]The study by Alesina & Ardagna (2010) has drawn criticism on methodological grounds; see in particular Guajardo et al. (2011) and the reply by Alesina under http://www.economics.harvard.edu/faculty/alesina/Alesina. For the present purpose, however, we need not enter this debate.

[29]This case has also been made by Krugman (2010).

expenditure cuts than through *tax increases*. However, even here it is relatively easy to think of cases where the opposite is true. Figure 6 gives a quick overview on the magnitude and pattern of fiscal adjustments that have so far been implemented in GIPSI countries. In all countries there was a fair amount of emphasis on expenditure cuts, but in Greece and Italy, tax income has increased as well. And this is for good reason, since part of the underlying problem is tax evasion and a large shadow economy. From quick inspection of these figures it is also difficult to conclude overly strong austerity.

3.6 The "debt multipliers"

The discussion should not revolve around whether or not fiscal adjustment is likely to enhance growth. What matters for a debt adjustment policy is to aim at a fiscal package with a large "debt multiplier". By this I simply mean the magnitude of debt reduction that is likely to follow from a given magnitude of discretionary fiscal adjustment (on the revenue or expenditure side of the budget). Thus, consider a certain pre-reform path of debt accumulation as characterized by equation (1) above, and assume that a package of fiscal reform is implemented during period t which features a certain change in the primary deficit $f_t = x_t - r_t$, where x and r denote the ratio of government expenditure and revenue ratio, respectively, to GDP. Suppose that this reform is described by $\Delta x_t := \Delta X_t/Y_{t-1} = (\Delta X_t/Y_t)(Y_t/Y_{t-1}) = (\Delta X_t/Y_t)(1+g_t) > 0$ and $\Delta r_t := \Delta R_t/Y_{t-1} = (\Delta R_t/Y_t)(1+g_t) < 0$. These are the discretionary changes vis à vis a pre-reform level of deficit projected at the beginning of period t. Note that Δr_t and Δx_t express the revenue and expenditure changes implied by the reform relative to period $t-1$ GDP. Hence the reform affects the primary deficit according to $\Delta f_t = (\Delta X_t/Y_t) - \Delta R_t/Y_t = (\Delta x_t - \Delta r_t)/(1+g_t)$.

Now suppose that the cost of government debt depends on the debt level, such that $q_t = q(d_t)$. An equation of this form was estimated by De Grauwe & Ji (2012). Given the the inherited debt level d_{t-1}, the change in the debt level is determined by the present deficit, and the debt-cost-effect of fiscal reform follows as $\Delta q = q_d(\Delta x_t - \Delta r_t)/(1+g_t)$. This assumes that the change in the debt level induced by the fiscal adjustment (relative to the status quo), is equal to the fiscal adjustment itself. As we shall see, this very interest rate effect implies that this is not the case. To simplify my argument, I assume that lenders ignore the indirect debt reduction effects that derive from the risk premium and the fiscal multipliers (see below).

Suppose, moreover, that the short-run policy effects may be described by Keynesian expenditure and revenue multipliers such that $\Delta Y_t = Y_R \Delta R + Y_X \Delta X$. I am not suggesting that fiscal policy should generally be based on such short-run multipliers, or that they are different from zero under all circumstances. I simply want to explore the role of these multipliers for the debt reduction effect of a given fiscal adjustment. More specifically, I want to identify threshold values of these multipliers that need to be surpassed for the debt reduction effect to be dampened by the aggregate demand effects on GDP.

I measure the success of this reform package by the resulting change in the deficit level at the end of period t, denoted by Δd_t. Notice that this is the change relative to the non-reform path of debt accumulation. With the above assumptions, it can be

shown that the success emerges as follows:[30]

$$\begin{aligned}\Delta d_t &= \frac{\Delta x_t}{1+g_t}\left[1 - D_t\left(\gamma_t Y_X - \frac{q_d}{q_t - g_t}\right)\right] \\ &\quad -\frac{\Delta r_t}{1+g_t}\left[1 - D_t\left(\gamma_t Y_R - \frac{q_d}{q_t - g_t}\right)\right] \qquad (16)\end{aligned}$$

In this equation, $D := \frac{q_t - g_t}{1+g_t} d_{t-1}$, q_t and g_t are the pre-reform levels of the interest rate and the nominal growth rate, and $\gamma := (1+g_t)/(q_t - g_t) + 1$. The equation tells us that for heavily indebted economies the magnitude of debt reduction that may be expected from a given austerity program $\{\Delta r_t, \Delta x_t\}$ is also determined by the indirect effects on the interest rate and the growth rate. Everything boils down to the magnitude of the *aggregate demand multipliers*, i.e., on Y_X, Y_R, and whether this channel can overcompensate the *interest rate effect* q_d. The aggregate demand effect is what critics of austerity have emphasized, whereas advocates of strong austerity emphasize the direct debt reduction effect of a higher primary surplus as well as the effect of a lower cost of government debt through the interest rate effect.[31] The term D_t measures the "leverage" for these multiplier and the interest rate effect that is afforded by the inherited debt level.

To be a little more precise, we may refer to De Grauwe & Ji (2012) for the magnitude of q_d. For a linear specification of $q(d)$, they report an estimate of $q_d = 0.0190 + 0.0844 = 0.1034$ for euro zone countries. Assuming "Greek values" of $d_{t-1} = 1.6$, $q_t = 0.15$ and $g_t = -0.05$, we obtain $D_t = 0.337$ and $\gamma_t = 0.95/0.2 + 1 = 5.75$. Given these values, we may calculate expenditure and tax multipliers, Y_X and Y_R, that would dampen, or even nullify, the debt reduction effect of fiscal adjustment. Setting the terms in parentheses on the right-hand side of (16) equal to zero gives a threshold value of Y_X or Y_R equal to 0.09. Multipliers exceeding this value imply that the aggregate demand effect of fiscal adjustment overcompensates the interest rate (or risk premium) effect, so that the magnitude of the debt reduction is lower than the fiscal adjustment itself. Setting the square-bracketed terms equal to zero, we obtain a threshold equal to 0.606. Multipliers exceeding this value imply, somewhat paradoxically, that fiscal adjustment even worsens the debt ratio, due to a strong aggregate demand effect.

Should fiscal adjustment aimed at reducing euro zone sovereign debt levels be based on the indirect effects represented by the parentheses terms in (16)? The above calculations indicate that for extreme debt levels, these effects might be quite important, *temporarily*. However, in general it seems questionable whether we have reliable information on the empirical magnitudes involved in the countries in question. Unfortu-

[30] The equation is derived in the appendix.

[31] Although the literature emphasizes a positive response of the cost of government debt to an increase in the debt ratio, some observers plausibly argue that investors also factor in economic growth as an important precondition for a government to honor its debt; see Krugman (2012). However, it seems questionable that investors would place much long-run confidence in aggregate demand effects for a country's long-run growth potential. See also the sovereign risk channel pointed out by Corsetti & Mueller (2011).

nately, there seem to be as many estimates of fiscal multipliers as there are historical episodes to draw upon. For a useful very brief summary of estimates obtained in the literature, albeit for the US, see Boskin (2012). For a discussion of why multipliers might be unusually large in the present situation, see Stiglitz (2012). It is obvious from (16) that the empirical significance of the indirect channels for the debt reduction effect of fiscal adjustment heavily depend on the inherited debt ratio d_t. Perhaps the deeper message conveyed by my above calculation of the upper threshold level of 0.5322 is just how "astronomical" a "Greek debt ratio" of 1.6 really is.

If relevant at all, such considerations will help only for the very short run. Relying on aggregate demand multipliers for a *long-run* strategy to resolve the euro zone sovereign debt problem would, indeed, be voodoo economics; see Barro (2009). Long-run target levels of the debt and the primary surplus need to be based on long-run growth rates, which are beyond the control of demand-oriented fiscal policies. However, if labor markets are subject hysteresis effects on unemployment, avoiding short-run unemployment does have a long-run level effect on output.

3.7 The curse of external imbalance

When thinking about an appropriate fiscal policy package to resolve the present mess in the euro zone, it is important to bear in mind that the countries in question are not only suffering internal imbalance, but external imbalance at the same time. I have already emphasized this awkward double imbalance in section 2 above. Here, we need to observe that any lenience on austerity, much as it might be suggested from the channels identified in the previous subsection, aggravates the external imbalance. This is the classic policy dichotomy analyzed in detail in Corden (1994). The external imbalance is caused by a misalignment of the real exchange rate, which in turn is the result of a long-run path of an ever widening gap between unit labor cost in different euro zone countries that cannot be compensated by nominal exchange rate adjustments.

As to the magnitudes of the misalignments for various countries, I refer to table 2 above. As regards the policy conclusion, we face a very difficult situation. I would argue that any long-run solution of the present crises requires changes in relative prices, so as to restore external imbalance. In other words, in addition to resolving the problem of *government* debt that we have highlighted above, euro zone countries also need to bring their expenditure *levels* as well as their expenditure *patterns* (on non-traded, imported and exported goods) in line with their inter-temporal budget constraints relative to the "outside world" (including other non-euro countries), given their respective inherited net *foreign* indebtedness. Importantly, this holds true not just for the deficit countries, but also for the surplus countries. The mechanics behind this type of constraint is formally analogous to the above condition of government solvency, although it tends to receive less attention in the public debate. As I have shown above, the inherited debt levels for the GIPSI-countries are formidable, the largest observed in the developed country world.

If we agree on the need of correcting misaligned real exchange rates, what are the possible adjustments? I see three possible adjustments, two of which I have already briefly pointed out when commenting on the "monetary tap" in subsection 3.1 above.

The first of these is returning to national currencies and go for external devaluation. The second is to stick to the present euro zone and try to implement internal devaluation, i.e. cuts in nominal incomes. In terms of the metaphor used in the title, one might speak of two *devaluation taps*.

It is often argued that *internal* devaluation of the necessary magnitude faces insurmountable political resistance. If this is true, then it also has severe implications for the *external* devaluation tap. The point is that either type of devaluation involves broad and severe *real income cuts*. If there is political resistance to such cuts, then a successful adjustment through nominal devaluation of the external type is likely to be frustrated by domestic inflation, with misalignments unchanged, at least in the long run. We have ample evidence of this from historical episodes of systematic use of nominal devaluations. This, in addition to several other considerations relating to practical problems of "undoing" the euro zone as well as fundamental policy considerations regarding European economic integration, should prompt us to think twice before suggesting to "open the external devaluation tap".

The hope, in my view, lies in the third adjustment which is a change, not of relative prices in line with given productivity levels, but of productivity levels so that these are in line with relative prices. In terms of the present metaphor, we might speak of a *productivity tap* that needs to be opened fast. There is evidence of a significant potential in the GIPSI-countries to increase their productivity levels. Again, I cannot go into detail here, but it is relatively obvious that existing regulation of both product and labor markets in GIPSI countries should constitute significant potential for improvement.[32] More specifically, it is well known that the Mediterranean member countries of the euro zone suffer from a bias towards small firm sizes, which is likely to involve a cost in terms of low productivity. Although one has to be cautious in reading productivity effects into firm size as such, and also in attributing small firm size to regulation, there is evidence that in the case of GIPSI-countries a fair amount of both is justified.[33]

Some improvement is to be expected from the new EU procedures to tackle excessive imbalances (EIP) within the euro zone. An important precondition for troubled economies to return to growth and an increase in productivity is that they regain a sound system of financial intermediation that fulfils its role of channeling savings to high productivity use. This, in turn, requires resolving the banking crisis, which may be considered a crisis in and of its own [see Shambaugh (2012)], and which I do not touch upon in this paper.

3.8 Target2 and the reserve currency tap

If none of the above mechanisms of resolving external imbalance is tried or, if tried, all of them should fail to deliver, where are we heading? In this final subsection, I want to

[32]For instance, Greece, Italy and Spain are all ranked low (below rank 77) in the World Bank Indicator of "Starting a Business"; see http://www.doingbusiness.org/rankings.

[33]New evidence in this direction is discussed in a recent article entitled "Decline and Small" in *The Economist*, print edition of March 3rd, 2012.

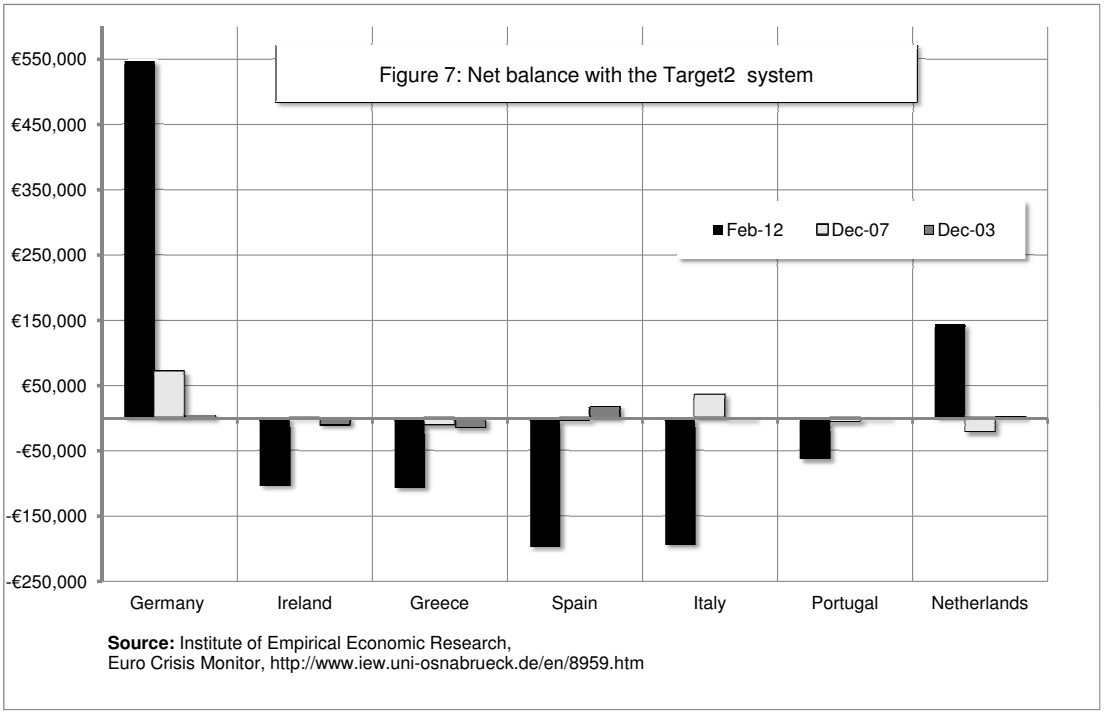
point out a special adjustment mechanism that the euro zone has resorted to in order to deal with internal balance of payments crises. Identifying this adjustment mechanism sheds some light on where we are heading. As emphasized above, these crises have evolved due to the misalignment of real exchange rates, coupled with high expenditure levels. Together, these two forces have led to a build-up of current account deficits that eventually turned out to be impossible to finance through private capital imports, and were partly aggravated by capital flight; see Sinn & Wollmershäuser (2011) and Buiter & Michels (2011).

In a fixed exchange rate mechanism of the Bretton Woods type, such imbalances would have been reflected in a loss of foreign exchange reserves, unless the deficit country happens to be the country that enjoys the reserve currency privilege, like the US in the Bretton Woods system. In the latter case, the country would be able to finance its deficit by printing additional reserve currency, which would, in turn, show up as an increase in foreign exchange reserves in the surplus countries' central banks' balance sheets. According to classical balance of payments theory, this would be coupled with long-run adjustment through the price specie flow mechanism. In very simple terms, this process implies that the surplus countries undergo inflation which eventually leads to the type of external devaluation that I have identified above. The Bretton Woods system was abandoned in the early 1970s, because the surplus countries of the time were no longer willing to tolerate this build up of inflationary potential.

In Kohler (2012) I have argued that something very similar to this process has been going on within the euro system through its Target2 mechanism. This mechanism not only facilitates the cross-country *use of existing central bank money* for the purpose of international transactions within the monetary union, but it also facilitates varying cross-country distributions of the *creation of new central bank money* within the union.[34] In the present context, the central aspect of the Target2 system is that a *current account deficit* of any euro zone country vis à vis other member countries which is not financed by private capital imports from these countries leads to additional central bank money *created* in the deficit country, but *used* in surplus countries. The same applies if there is *capital flight* from a member country to other euro zone countries which is not mirrored by a corresponding current account surplus. If such imbalances accumulate according to a systematic trend, then in the course of time deficit countries will accumulate net liabilities under the Target2 system, while surplus countries accumulate net claims. Importantly, however, these are liabilities and claims held by the respective countries' central banks *vis à vis the ECB*.

The evolution of facts has been extensively described in Sinn & Wollmershäuser (2011). Figure 7 gives an overview by comparing the balances of selected countries as of February 2012 and two arbitrary points in "earlier times", December 2007 and 2003. The numbers hardly need much comment as such. The point is that, starting in 2007, a systematic trend has set in leading to a stark imbalance, while in "earlier times" no such trend was present. In light of my earlier remarks on fixed rate systems, the claims held by the German Bundesbank correspond to the accumulation of foreign

[34]See Sinn & Wollmershäuser (2011) for a detailed description of Target2.



exchange reserves denominated in the reserve currency. And the liabilities of, say Spain, correspond to reserve currency issued in the deficit country and ending up as foreign exchange reserves of the surplus country. An important limitation of the analogy to the Bretton Woods system is that in the present case the surplus countries were not forced, or indeed able, to let the process end up in an inflation of the stock of central bank money. The decision about the overall amount of central bank money circulating in the euro zone is, of course, made by the ECB and not by any one of the national central banks. And up to the present, the whole process has *not* led to such inflation.[35]

A heated debate has arisen about the correct way to interpret the Target2 balances. I see two crucial questions that are logically distinct and should be separated from each other. The first relates to whether the balances may legitimately be called loans. The fact that they constitute liabilities and claims, not vis à vis other countries, but vis à vis the ECB, has prompted some observers to question the description of Target2 balances as *cross-country loans*. Ultimately, this leads us to the fundamental question of whether the euro zone can or should be viewed as a quasi-fixed-rate system or as a true monetary union. In a nominal sense, the answer quite trivially seems that it is a monetary union. However, in substance it seems legitimate to call it a quasi-fixed-rate system, for the simple reason that it lacks political union of the countries using the euro. And if this is the lens of interpretation, then quite clearly Target2 balances do constitute cross-country loans.

Given that we may thus speak of cross-country loans, the second question then is

[35]See the detailed figures presented in Sinn & Wollmershäuser (2011). See Kohler (2012) for a detailed treatment of the analogy between the Target2 system and the reserve currency privilege.

what it is that these loans have been financing. Since for some countries, particularly for Ireland and Italy, the Target2 liabilities have evolved in strong disparity with (higher than) their current account deficits, it is sometimes argued that it is wrong to speak of the Target2 system as being used to finance GIPSI-countries' current account deficits.[36] Some of the comments that I have come across seem to indicate that Target2 balances that reflect capital exports or capital flight must be seen as entirely disconnected from financing of current account deficits; see for instance Bornhost & Mody (2012). Let me conclude by briefly commenting on this issue.

By construction, changes in Target2 claims or liabilities reflect unbalanced bilateral exchange in the sense that a country's expenditure on present goods, or on claims on future goods of a specific other country within the euro zone, exceeds the revenues from its sales of present goods or claims to that country. On a fundamental level, whatever the pattern of expenditure on present goods or claims, it seems rather futile to construct a relationship between the Target2 balances and any one type of expenditure. If a country faces capital flight, this is presumably because investors have lost confidence in the claims that they have hitherto held on future payments, ultimately on future goods, from this country. One way or another, these claims have been issued in the past in order to finance the country's current account deficits of the past. If for whatever reason investors now shed these claims, then the country faces the need to refinance foreign debt that reflects these past current account deficits. If private investors who are willing to step in cannot be found, then, with a system like Target2 in place, a change in Target2 balances is what we will observe instead. Although they do not reflect financing of a contemporaneous current account deficit, the do reflect re-financing of past current account deficits. But financing a current account deficit is what happens regardless. Emphasizing that Target2 balances mirror capital flight and insinuating that this is fundamentally different from Target2 balances that reflect current account deficits is thus misleading.

4 Summary and conclusions

In the public debate, the present crisis in the euro zone is largely portrayed as a sovereign debt crisis. At times it appears that almost all of the policy energy in Brussels is mustered for rescue and reform packages aimed at avoiding sovereign default in troubled economies of the euro zone. Yet, looking at it solely from the perspective of excessive government debt does not do justice to the situation and risks lopsided policy conclusions. Based on simple descriptive statistics, I have argued that the euro crisis has to do almost as much with the build-up of private debt as with government debt. Indeed, the more fundamental problem that the euro zone is facing is that it lacks an adjustment mechanism for internal balance of payments crises. I argue that such crises are likely to occur even if countries adhere to strict fiscal compacts.

During 2010 a situation has emerged where a significant number of euro zone coun-

[36] As regards the figures, I may again refer to Sinn & Wollmershäuser (2011).

tries have faced delicate combinations of internal as well as external imbalance. There were multiple reasons: excessive build-up of private debt prior to the financial crisis of 2007/08, misalignments of real exchange rates due to the lack of nominal exchange rate changes, and a fair dose of government profligacy. Excessive government borrowing had been fostered by the complete disappearance of sovereign risk premia for government debt immediately after the start of the monetary union in 1999. I have argued that this must be regarded as a failure of capital markets, to be followed by an opposite failure in terms of excessive risk premia after the onset of the financial crisis in 2007/2008.

I have used a simple model of government insolvency to show that expectations-driven multiple equilibria in the government bond market may create a situation where fundamentally solvent governments are driven towards appearing insolvent through excessively high cost of government debt. I conclude that this generates a case for the European Central Bank to act as a lender of last resort in government bond markets. Moreover, this same model also suggests that bailout packages of the type recently orchestrated under the EFSF and the EFSM may have the perverse effect of increasing, rather than decreasing, sovereign risk premia.

These bailout packages have placed much emphasis on austerity in the public sector of the troubled economies. However, a single-minded focus on austerity is often criticized as aggravating the situation, or at least causing unnecessary cost in terms of lost growth, with a negative feedback on debt accumulation. I have critically evaluated the pros and cons of partly relaxing this austerity, to conclude that in the long-run austerity will be unavoidable. However, a careful timing and pattern of contractionary measures may reduce some of the adjustment burden, although it seems questionable whether the relevant Keynesian multipliers are of the required magnitudes.

As to the internal balance of payments crises within the euro zone, I have argued that the recent accumulation of imbalances under the Target2 mechanism of the Eurosystem has played the role of an adjustment mechanism akin to the mechanism of a fixed-rate system, where the country enjoying the reserve currency privilege is able to finance its deficit by printing and issuing additional reserve currency. It is all too obvious that this mechanism is not viable in the long run. Installing an adjustment mechanism that is more in line with the price specie flow mechanism of a fixed rate system constitutes a key reform challenge for the euro zone.

Appendix:

Equation (16) can be derived as follows. First, note that $\Delta f_t = \Delta X_t/Y_t - \Delta R_t/Y_t = (\Delta x_t - \Delta r_t)/(1+g_t)$. Since $g_t = Y_t/Y_{t-1} - 1$ is the real growth rate in the current period, we may write $\Delta g_t = \Delta Y_t/Y_{t-1}$. If Y_X and Y_R are the expenditure and revenue multipliers, respectively, we have $\Delta g_t = Y_R \Delta R_t/Y_{t-1} + Y_X \Delta X_t/Y_{t-1} = Y_R \Delta r_t + Y_X \Delta x_t$. Returning to (1), we have

$$d_t - d_{t-1} = f_t + \frac{q_t - g_t}{1+g_t} d_{t-1} \tag{17}$$

$$\text{hence} \quad \Delta d_t = \frac{\Delta x_t - \Delta r_t}{1+g_t} + d_{t-1}\left[\frac{1}{1+g_t}(\Delta q_t - \Delta g_t) - \frac{q_t - g_t}{(1+g_t)^2}\Delta g_t\right] \tag{18}$$

We have $\Delta q_t = q_d\left(\Delta x_t - \Delta r_t\right)/\left(1+g_t\right)$ and $\Delta g_t = Y_x \Delta x_t + Y_r \Delta r_t$. Defining $\hat{q}_t := \Delta q_t/(1+q_t) = q_d$ and $\hat{g}_t := \Delta g_t/(1+g_t)$ we may write

$$\Delta q_t - \Delta g_t = \frac{1}{1+g_t}\left[(\Delta q_t - \Delta g_t) - \frac{q_t - g_t}{1+g_t}\Delta g_t\right] \tag{19}$$

$$= \frac{1}{1+g_t}\left[\Delta q_t - \left[1 + \frac{q_t - g_t}{1+g_t}\right]\Delta g_t\right] \tag{20}$$

$$= \frac{1}{1+g_t}\left[(1+q_t)\hat{q}_t - (1+g_t)\hat{g}_t - (q_t - g_t)\,\hat{g}_t\right] \tag{21}$$

$$= \frac{q_t - g_t}{1+g_t}\left[\frac{(1+q_t)}{q_t - g_t}\hat{q}_t - \left(\frac{1+g_t}{q_t - g_t} + 1\right)\hat{g}_t\right] \tag{22}$$

$$\Delta d_t = \frac{\Delta x_t - \Delta r_t}{1+g_t} + \frac{q_t - g_t}{1+g_t} d_{t-1}\left[\frac{(1+q_t)}{q_t - g_t}\hat{q}_t - \left(\frac{1+g_t}{q_t - g_t} + 1\right)\hat{g}_t\right] \tag{23}$$

The interest rate and growth rate effects are as follows

$$\hat{q}_t = \frac{\Delta q_t}{1+q_t} = q_d \frac{\Delta x_t - \Delta r_t}{(1+g_t)(1+q_t)} \tag{24}$$

$$\hat{g}_t = \frac{\Delta g_t}{1+g_t} = \frac{1}{1+g_t}\left(Y_X \Delta x_t + Y_R \Delta r_t\right) \tag{25}$$

Inserting, and defining $D_t := \frac{q_t - g_t}{1+g_t} d_{t-1}$ and $\gamma_t = \frac{1+g_t}{q_t - g_t} + 1$, we obtain

$$\Delta d_t = \frac{\Delta x_t - \Delta r_t}{1+g_t} + \frac{q_t - g_t}{1+g_t} d_{t-1}\left[\frac{q_d(\Delta x_t - \Delta r_t)}{(q_t - g_t)\,(1+g_t)} - \frac{\gamma_t}{1+g_t}\left(Y_X \Delta x_t + Y_R \Delta r_t\right)\right] \tag{26}$$

$$= \frac{\Delta x_t}{1+g_t}\left[1 - D_t\left(\gamma_t Y_X - \frac{q_d}{q_t - g_t}\right)\right] - \frac{\Delta r_t}{1+g_t}\left[1 - D\left(\gamma_t Y_R - \frac{q_d}{q_t - g_t}\right)\right] \tag{27}$$

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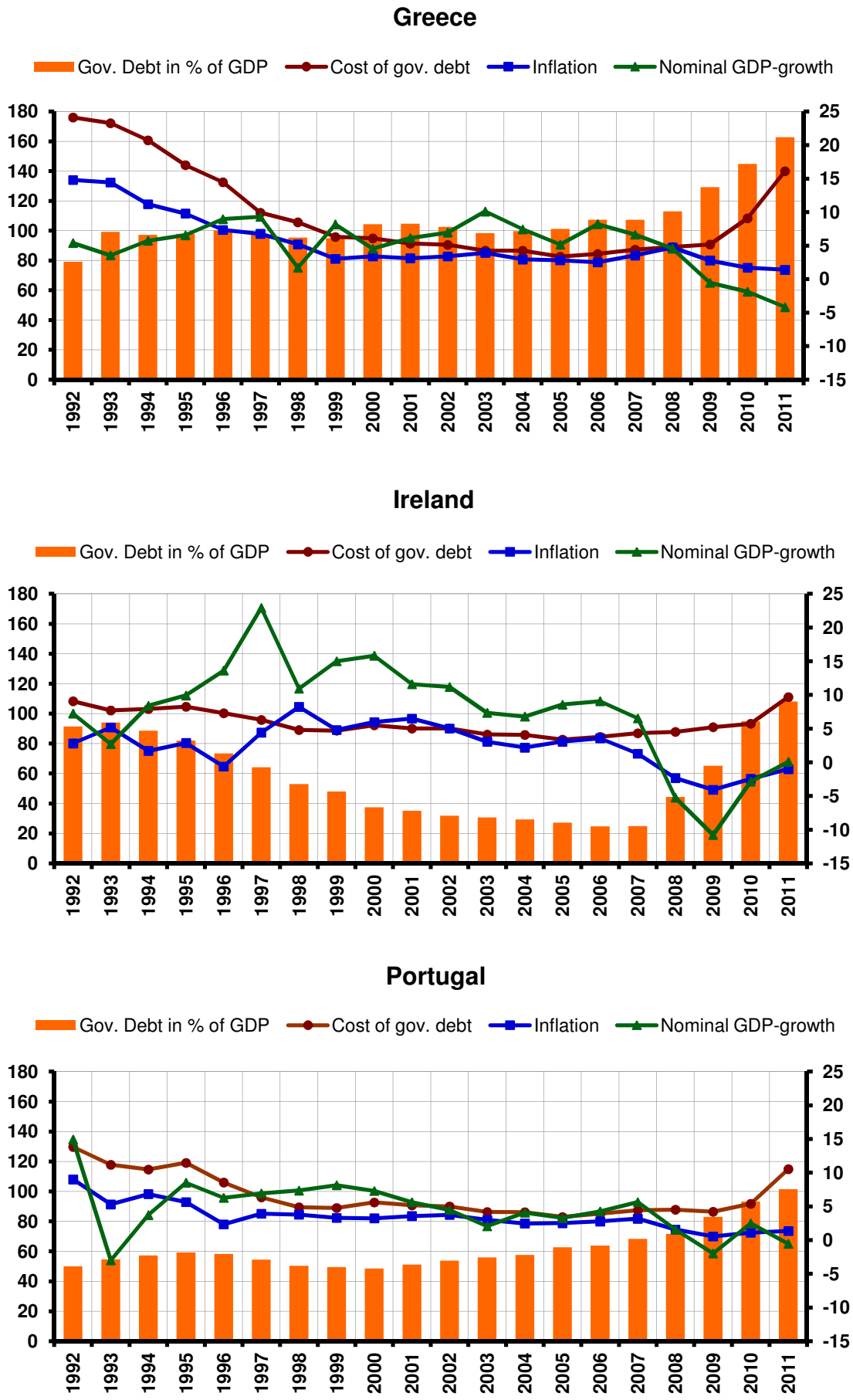
Table 1: Net lending in pre euro and euro times, general government and private sector in percent of GDP

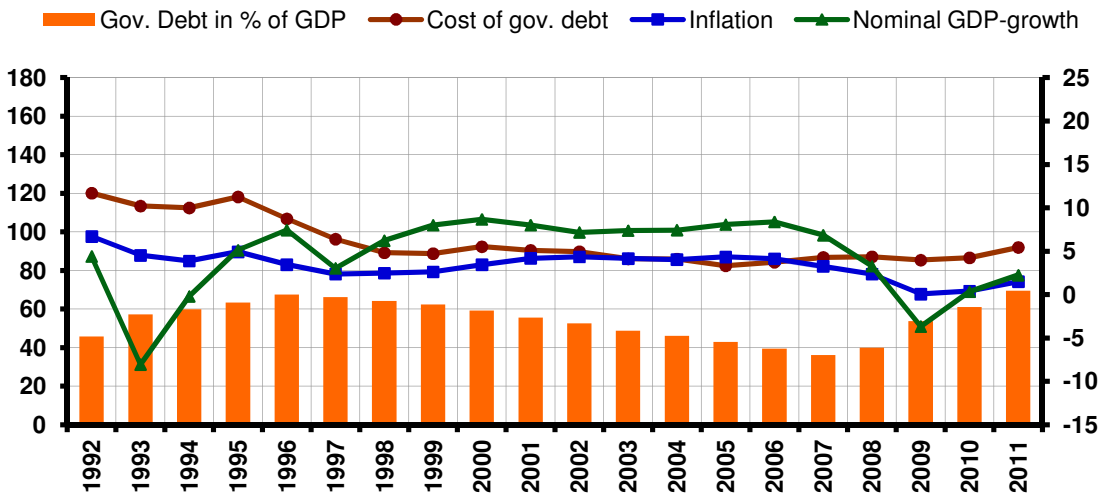
	Average 1990-1998		Average 1999-2006		2007		2008		2009		2010		2011		2012	
	Public	**Private**	**Public**	**Private**	**Public**	**Private**	**Public**	**Private**	**Public**	**Private**	**Public**	**Private**	**Public**	**Private**	**Public**	**Private**
Euro area	-4.26	NA	-2.12	1.99	-0.71	0.98	-2.14	0.54	-6.41	5.63	-6.25	5.21	-4.13	NA	-3.43	NA
Belgium	-5.20	8.59	-0.46	4.84	-0.32	3.89	-1.30	1.90	-5.85	6.20	-4.19	7.14	-3.66	5.88	-4.66	6.65
Germany	-3.57	2.57	-2.67	4.65	0.23	7.18	-0.06	6.17	-3.21	8.77	-4.28	9.88	-1.34	6.31	-1.04	5.37
Estonia	2.72	-9.32	1.05	-9.40	2.39	-18.30	-2.95	-5.25	-2.01	10.17	0.26	7.74	0.79	6.36	-1.74	6.77
Ireland	-1.30	NA	1.68	-5.20	0.06	-5.15	-7.34	0.81	-14.19	11.09	-31.31	38.84	-10.29	13.32	-8.60	12.66
Greece	-9.02	4.78	-5.44	-4.45	-6.80	-8.46	-9.91	-7.02	-15.79	2.30	-10.76	-0.04	-8.91	1.11	-6.98	1.50
Spain	-4.94	5.37	0.20	-4.28	1.92	-11.77	-4.49	-4.83	-11.18	6.60	-9.34	5.45	-6.65	3.81	-5.94	3.47
France	-4.16	4.78	-2.79	3.28	-2.75	1.45	-3.34	1.44	-7.57	5.43	-7.08	4.80	-5.85	2.69	-5.36	2.24
Italy	-8.06	8.99	-3.20	2.61	-1.59	-0.19	-2.67	-0.47	-5.36	3.28	-4.51	1.02	-3.84	0.29	-2.21	-0.69
Luxembourg	2.15	NA	2.13	0.71	3.68	5.64	3.02	-1.25	-0.90	1.27	-1.06	NA	-0.56	NA	-1.08	NA
Netherlands	-3.52	7.25	-0.73	6.86	0.16	7.91	0.49	3.97	-5.55	8.19	-5.00	9.65	-4.32	8.84	-3.13	9.58
Austria	-3.47	1.15	-1.81	2.90	-0.99	5.10	-1.00	5.86	-4.15	7.23	-4.38	8.00	-3.43	6.07	-3.08	6.03
Portugal	-5.38	1.11	-3.81	-4.01	-3.21	-5.90	-3.71	-7.95	-10.17	0.48	-9.79	1.48	-5.83	-0.20	-4.48	1.19
Slovenia	-3.53	2.93	-2.56	0.58	-0.05	-4.71	-1.86	-5.17	-6.08	4.85	-5.85	5.17	-5.75	4.93	-5.27	5.95
Slovakia	-6.24	-0.53	-5.44	-1.09	-1.81	-3.50	-2.09	-3.21	-7.98	5.49	-7.67	6.47	-5.84	7.30	-5.02	5.51
Finland	-2.85	2.78	3.79	2.81	5.18	-1.01	4.14	-0.98	-2.85	5.45	-2.76	5.64	-1.19	2.05	-0.89	1.80
United Kingdom	-4.30	2.99	-1.57	-0.95	-2.74	0.41	-4.98	3.36	-11.40	9.21	-10.28	6.64	-9.46	7.04	-7.75	7.04

Legend: Net lending is income minus consumption expenditure minus capital formation minus acquisition of non-financial non-produced assets plus net capital transfers, private in % of GNP, public in % of GDP. Private: Financial and non-financial corporations and households. Euro area definition: 16 countries.
Source: AMECO data base.

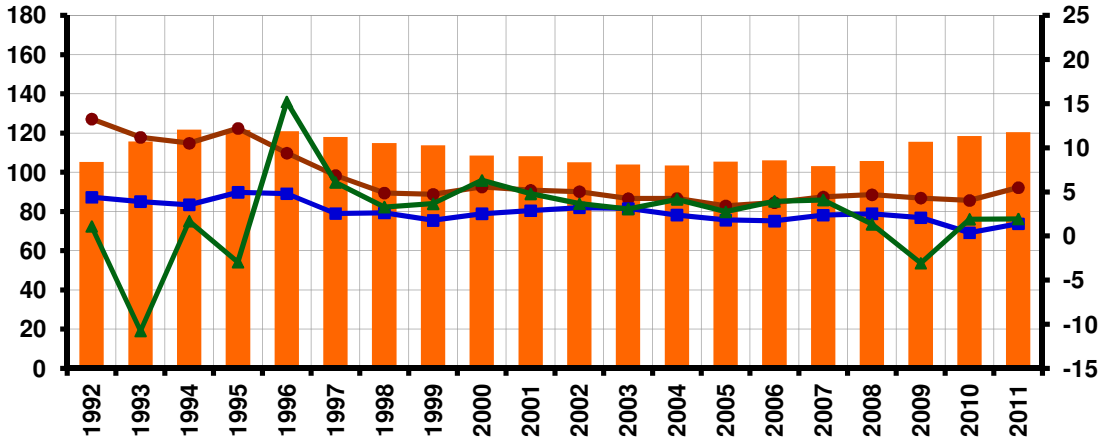
Figure 3: Debt accumulation, the cost of government debt, inflation and growth



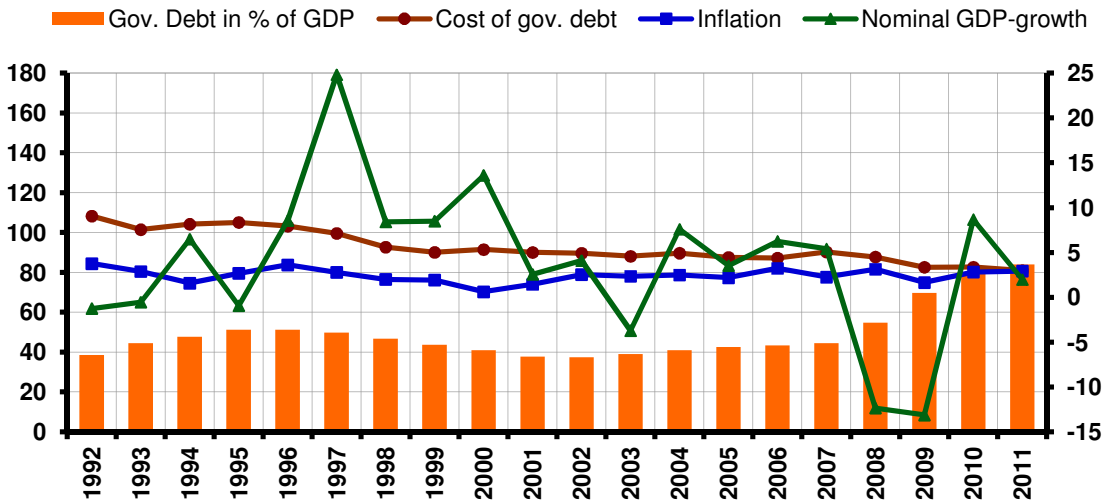
Spain



Italy



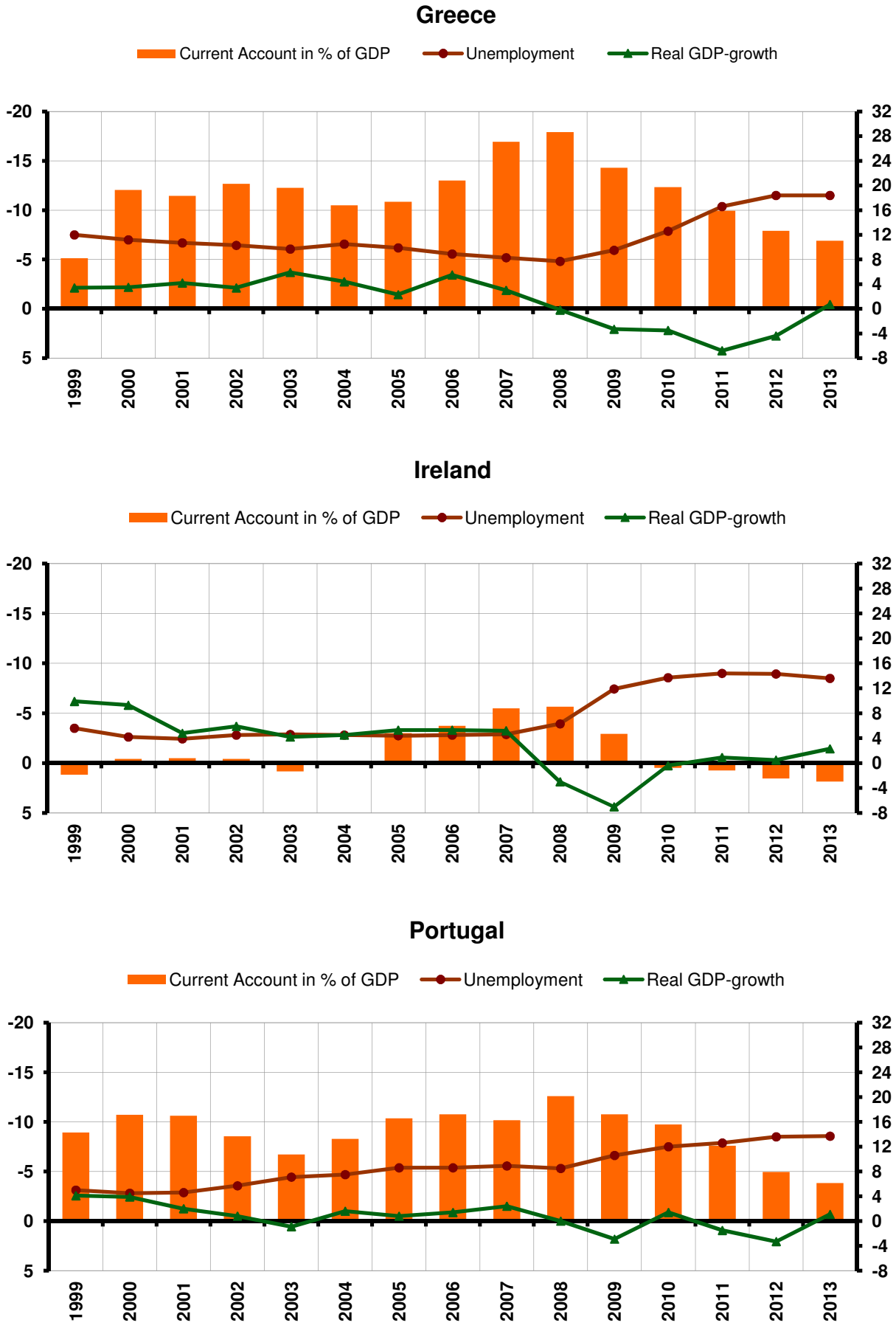
United Kingdom

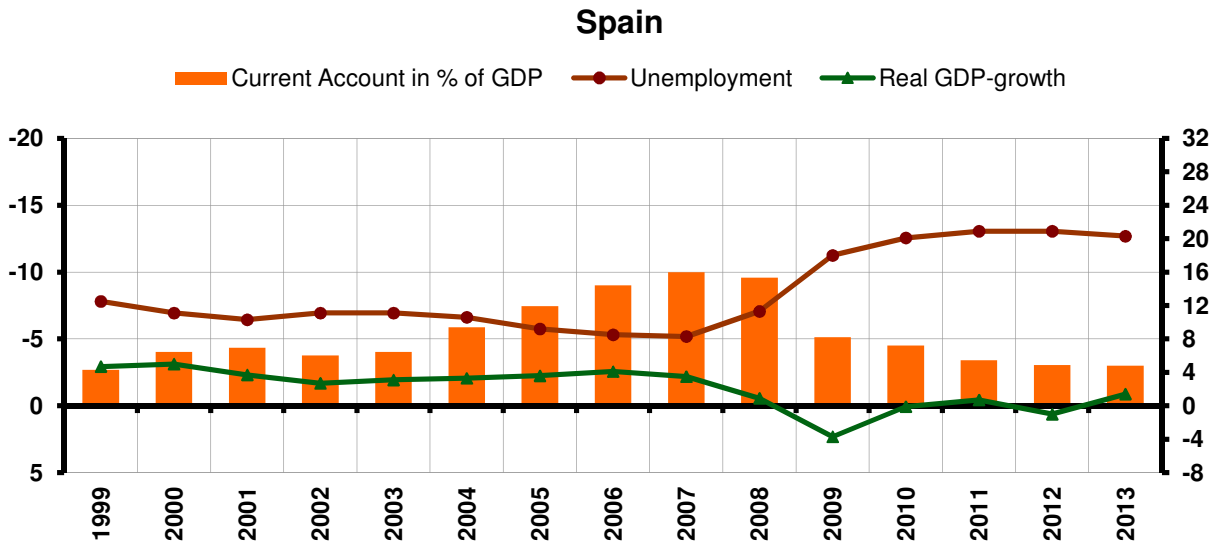


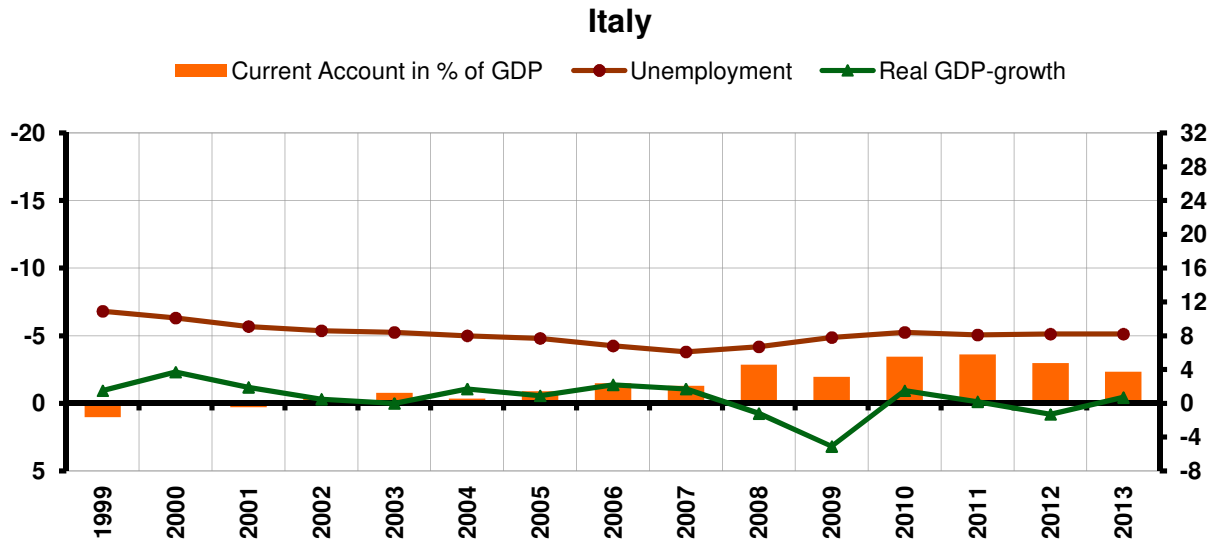
Legend: Government debt in % of GDP on the left axis, rest on the right axis.

Source: European Commission - AMECO data base , IMF- International Financial Statistics, ECB - Statistical Data Warehouse

Figure 4: External and internal imbalance in troubled euro countries







Legend: Current Account in % of GDP on the left axis, rest on the right.

Source: European Commission - AMECO data base

Table 2: Unit-labor cost misalignments in euro zone member countries

Towards non-euro-countries, using export ratio weights

	misalignment in			
	2007	2008	2009	2010
Austria	85.42	84.50	85.09	85.32
Belgium	95.08	94.92	94.18	95.06
Finland	91.50	93.71	98.01	97.65
France	97.70	96.71	95.21	96.79
Germany	79.34	77.71	79.16	78.30
Greece	97.74	98.81	99.09	100.45
Ireland	117.91	120.45	108.70	101.10
Italy	99.24	99.05	98.77	99.15
Netherlands	97.82	95.92	95.84	95.25
Portugal	102.79	101.88	99.51	98.78
Spain	104.92	104.96	101.26	98.66

Towards non-euro-countries, using nominal export weights

	misalignment in			
	2007	2008	2009	2010
Austria	88.02	87.93	89.68	90.68
Belgium	96.51	97.03	97.25	98.26
Finland	93.69	96.64	101.90	102.24
France	100.04	99.75	99.13	101.34
Germany	81.34	80.42	82.89	82.45
Greece	98.35	100.10	101.46	102.90
Ireland	120.03	123.58	112.97	105.65
Italy	101.80	102.49	103.42	104.48
Netherlands	99.78	98.72	99.30	98.75
Portugal	104.59	104.41	103.18	102.71
Spain	108.10	109.39	106.28	104.05

Towards other euro-countries, using export ratio weights

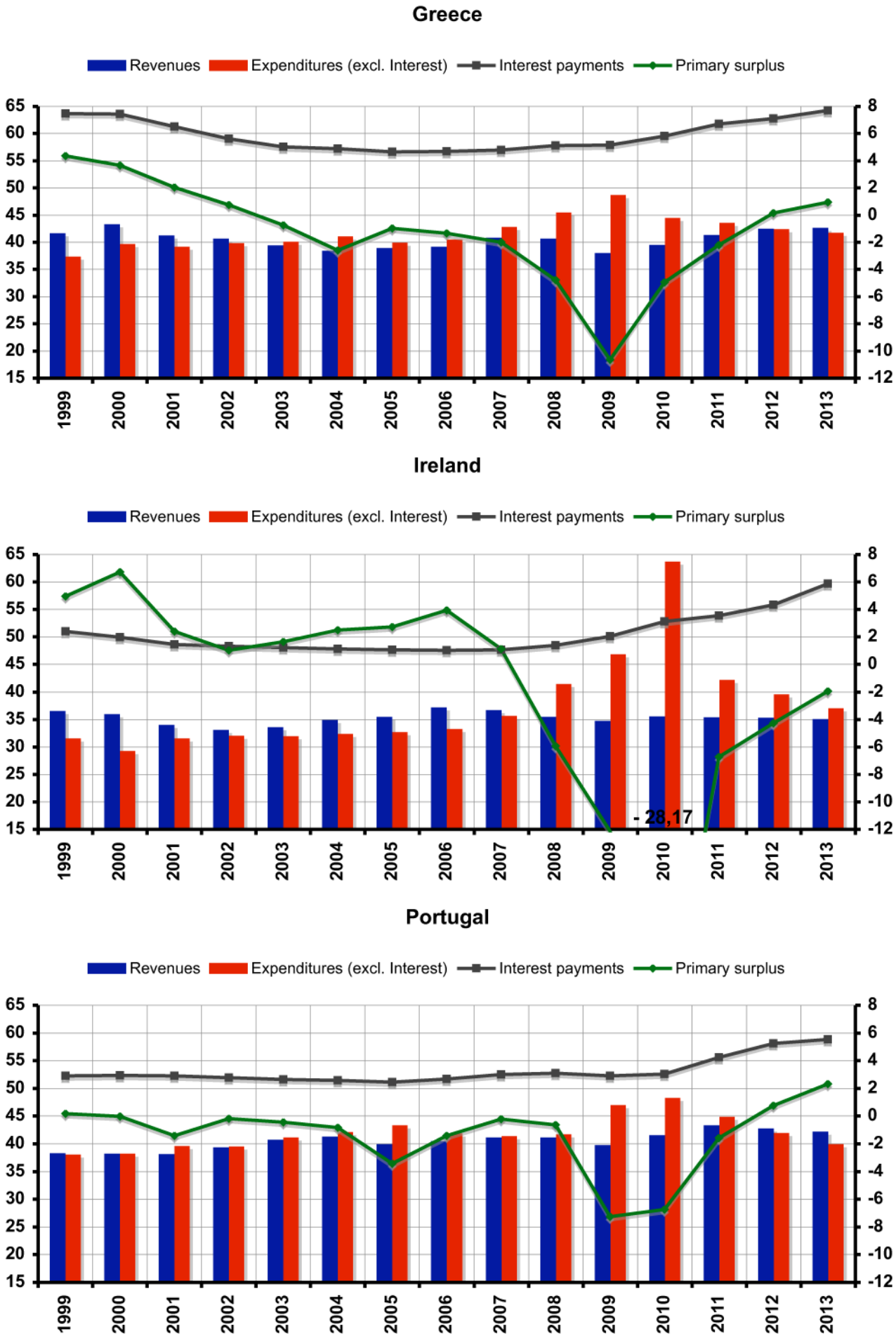
	misalignment in			
	2007	2008	2009	2010
Austria	93.61	93.39	93.60	94.27
Belgium	99.39	100.01	99.69	101.18
Finland	95.61	98.80	104.00	103.58
France	100.65	99.78	98.93	100.80
Germany	83.92	82.63	84.48	83.54
Greece	101.14	102.57	103.53	105.47
Ireland	123.92	127.01	115.09	107.03
Italy	104.48	104.64	104.64	105.12
Netherlands	104.79	103.30	103.85	103.62
Portugal	103.68	102.81	102.03	102.01
Spain	108.05	109.48	107.08	105.38

Towards other euro-countries, using nominal export weights

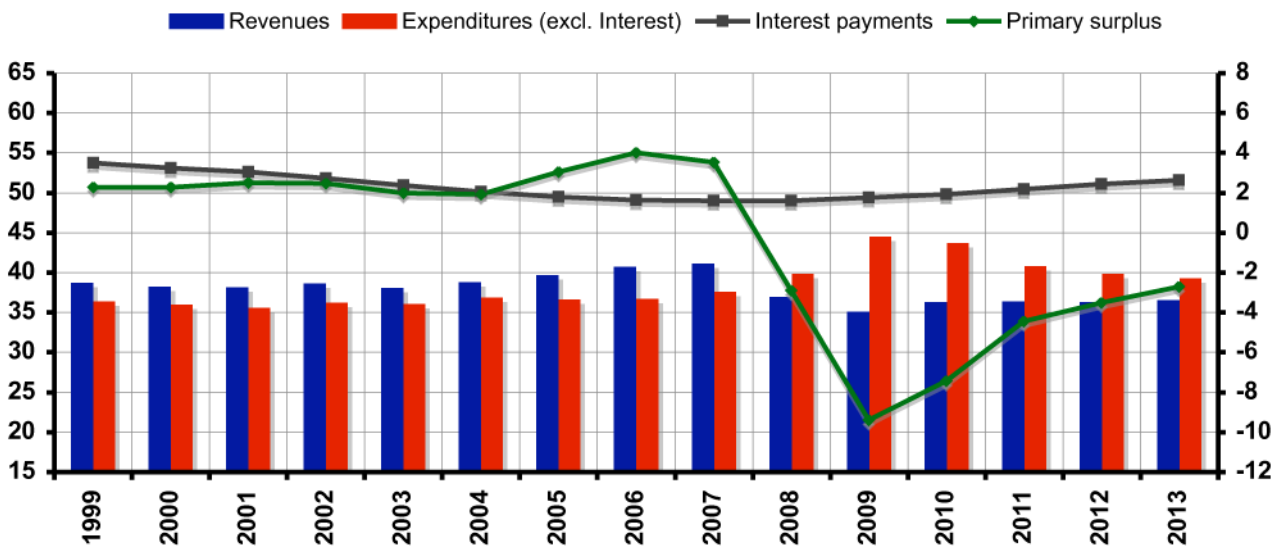
	misalignment in			
	2007	2008	2009	2010
Austria	99.07	99.49	99.15	100.02
Belgium	103.74	104.83	104.17	105.44
Finland	100.40	104.15	108.87	108.60
France	104.42	103.96	102.51	104.76
Germany	82.00	80.90	83.13	82.00
Greece	102.20	104.13	104.70	106.48
Ireland	126.10	129.73	117.50	109.64
Italy	107.87	108.69	108.54	109.14
Netherlands	110.38	109.65	109.52	109.56
Portugal	105.76	105.28	104.40	104.32
Spain	113.23	115.11	111.80	109.47

Legend: The numbers give unit-labor cost relative to a weighted average of other countries, whereby 1999=100. For Greece, we set 2001=100. Export ratio weigts use export ratios as appearing in gravity equations. **Source:** OECD.STAT for unit-labor cost and IMF-DOTS for trade. For trade ratio weights, see Hogrefe et al. (2012).

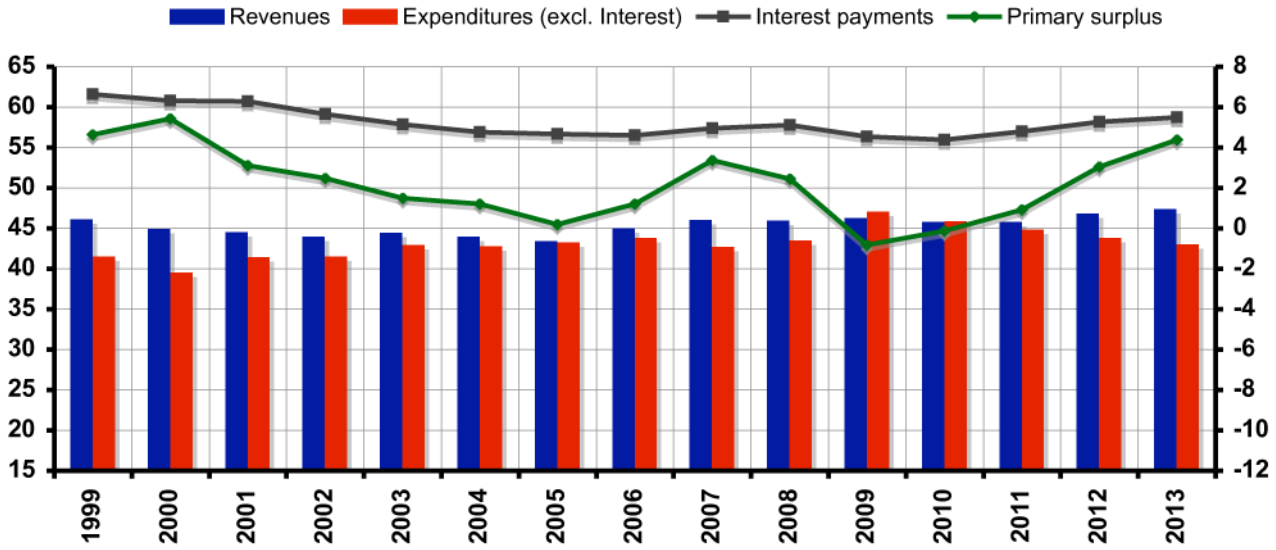
Figure 6: Austerity in troubled euro zone countries



Spain



Italy



Legend: Revenues and Expenditures (excl. Interest) on the left axis, Interest payments and Primary surplus on the right.

Source: Ameco Database.