Can Austerity Be Self-defeating?

With European governments cutting back on spending, many are asking whether this could make matters worse. In the UK for instance, recent OECD estimates suggest that "austerity" will lead to another recession, which in turn may lead to a higher debt-to-GDP ratio than before. As the debate heats up, the following two articles attempt to provide some cool economic logic.

Daniel Gros

Credible Austerity Plans Are Required

Could austerity be self-defeating? Could a reduction in government expenditure lead to such a strong fall in activity that fiscal performance indicators actually deteriorate? It is sometimes argued that a cut in expenditure (or an increase in taxes) would be self-defeating because it would reduce demand by such a degree that tax revenues would fall so strongly that the end result would actually be to increase the deficit. In standard models this kind of Laffer curve effect is actually not possible. Moreover, if it were true, it would follow that an increase in expenditure could actually lead to lower deficits because higher growth could increase tax revenues so much that they outweigh the increase in expenditure. This proposition has been tested several times in the USA and always found failing.[1]

In Europe the concern today is focused instead on the debt/GDP ratio. It is argued that "austerity" that does reduce a deficit might be self-defeating, in the sense that the resulting loss of output is so large that the debt/GDP ratio increases. Given that the ratio of (public) debt to GDP is often taken by financial markets as an indicator of sustainability, it could thus be the case that a lower deficit actually worsens the tension in financial markets if it results in a higher debt/GDP ratio. This brief article shows that this might indeed be the case, but only in the short run. Over the medium to long run, the debt/GDP ratio must improve, even if deficit-cutting reduces GDP.

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[1] See for instance the report by the US-based Center of Budget and Policy Priorities (A. Aron-Dine, R. Kogan, C. Stone: How Robust Was the 2001-2007 Economic Expansion?, 29 August 2008, available at http://www.cbpp.org/cms/?fa=view&id=575) on the expansionary policy of 2001-2007. P. Krugman: Self-defeating Austerity, New York Times column, 7 July 2011, http://krugman.blogs.nytimes.com/2010/07/07/self-defeating-austerity/, provides an example of "self-defeating austerity", but it is based on the assumption that a loss of demand has external effects (loss of human capital of the unemployed).

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In a standard model like the one presented below, a fiscal adjustment can be self-defeating in the short run if the product of the starting debt/GDP ratio and the multiplier (of fiscal policy on output) exceeds one. This condition might be satisfied for countries with debt/GDP ratios higher than 100% if one believes the more Keynesian macroeconomic models, which have fiscal multipliers in the literal meaning of the word: the impact of higher expenditure on output is larger than the amount of expenditure itself. However, in most neo-Keynesian models, the "multipliers" are often considerably lower than unity. If these models provide a better depiction of reality, it is unlikely that austerity could be self-defeating even in the short run.

A simple calculation can illustrate how the short-run self-defeating mechanism could work in reality. Assume Italy, which has a debt/GDP ratio of 120%, reduces public expenditure by enough to reduce the deficit by 1% of GDP. If the multiplier were equal to 1.5, this austerity measure should lead to a fall in GDP of 1.5%. Such a fall in GDP would then on its own tend to increase the debt/GDP ratio by 1.8 percentage points, which is more than the reduction in the debt achieved directly by the cut in expenditure. It is shown below that this calculation is roughly correct even when taking into account that what matters for the debt/GDP ratio is nominal GDP.

The Long Run

There are two reasons for the general result that a fiscal adjustment cannot be self-defeating in the long run:

First, most models assume that a cut in expenditure lowers demand in the short run but that the economy recovers after a while to its previous level, i.e. in the long run even fiscal policy has no lasting impact on demand and output. This already implies that any negative short-run impact of lower demand on the debt/GDP ratio should be offset later (in the medium to long run) by the rebound in demand which brings the economy back to its previous level of demand and GDP. It follows that any short run increase in the debt/GDP ratio due to the short-run drop in demand must be fully compensated in the long

run and that the long-run impact of a lower deficit on the debt/GDP ratio will therefore just be equal to the reduction of the deficit itself.

Second, even assuming that the impact of a (permanent) cut in public expenditure on GDP is permanent, this lower GDP level remains a one-off effect – whereas the lower deficit continues to have an impact year after year – thus making it certain that any initial increase in the debt ratio will be reversed over time.

The key question in the context of the current euro area crisis is thus whether financial markets focus on the short or long run. Prospective buyers of Italian 10-year bonds should look at the longer run impact of deficit cutting on the debt level, which is pretty certain to be positive. Of course, if markets are not rational and react only to the short-run effect, the result might be different.

Simple Formal Analysis

The usual equation describing the dynamics of the debt/GDP ratio is derived from the budget constraint which says simply that the debt at the end of the present period is the sum of the deficit and the debt level at the end of the previous period.

$$B_t = Def_t + B_{t-1} \tag{1}$$

This is then divided by GDP to yield:

$$\frac{B_t}{Y_t} = \frac{Def_t}{Y_t} + \frac{B_{t-1}}{Y_{t-1}}\left(\frac{Y_{t-1}}{Y_t}\right) \tag{2}$$

where B stands for public debt (bonds), Def for the deficit and Y, as usual, for GDP. Denoting the GDP ratios by lower case letters (b = debt/GDP and def = deficit/GDP) and g as the growth rate as usually defined $g_t = \frac{Y_t}{Y_{t-1}} - 1$, this can be rewritten as:

$$b_t = def_t + b_{t-1}\left[1 + g_t\left(def_t\right)\right]^{-1} \tag{3}$$

where the notation $g_t\left(def_t\right)$ indicates that the growth rate is a function of the deficit, with a higher deficit assumed to lead to higher growth. The magnitude of the first derivative of $g(def)$ is usually called the fiscal multiplier.

The impact of a deficit on the debt ratio is thus given by:

$$\frac{\partial b_t}{\partial def_t} = 1 - b_{t-1}\left[1 + g_t\left(def_t\right)\right]^{-2}\frac{\partial g_t}{\partial def_t} \tag{4}$$

The sign of the impact of a lower deficit on the debt ratio thus depends on the magnitude of the starting debt/GDP ratio and the magnitude of the fiscal multiplier.

If one uses the approximation that $\left[1 + g_t\left(def_t\right)\right]^{-2} = 1$ (which is a good approximation with growth rates of only a few percentage points), this can be rewritten as:

$$\frac{\partial b_t}{\partial def_t} = 1 - b_{t-1}\, multiplier \tag{5}$$

It follows that a lower deficit will not improve the debt ratio if:

$$1 \leq b_{t-1}\, multiplier$$

This condition would be satisfied at typical European (or US) debt ratios if the multiplier exceeds unity. For example, it would be satisfied for a country with a starting debt ratio greater than one (such as Italy's 120%) and assuming that the fiscal multiplier is also at least equal to one.

What would be a typical value for the multiplier in reality? It turns out that it is difficult to determine a range given that there is little agreement in the literature on the magnitude of even the short-run multipliers. More Keynesian models tend to have larger multipliers, often higher than one. More forward-looking models tend to have lower multipliers, because agents in these models tend to lower expenditure already in the present in anticipation of the higher taxes they will have to pay in future.

One additional problem neglected here is that the debt/GDP ratio is obtained by dividing the nominal debt by nominal GDP, whereas most macroeconomic models are constructed in real variables. However, given the (persistently) low level of inflation at present in the euro area, this should not affect the results if all the variables are interpreted as deviations from a baseline. However, the short-run multiplier should be larger if one looks at the impact of a cut in expenditure on nominal GDP (as opposed to real GDP).

To analyse the longer run, one has to go beyond the current period. One could consider the current period as the short run and the next period the long run. The long-run debt would thus be given by the sum of the debt at the end of the current period and next period's deficit:

$$B_{t+1} = Def_{t+1} + B_t = Def_{t+1} + Def_t + B_{t-1} \tag{6}$$

It is somewhat more difficult to rewrite this in terms of the habitual ratios to GDP. The resulting expression now contains of course two growth rates: current (short-run) and future (long-run).

$$\frac{B_{t+1}}{Y_{t+1}} = \frac{Def_{t+1}}{Y_{t+1}} + \frac{Def_t}{Y_t}\left(\frac{Y_t}{Y_{t+1}}\right) + \frac{B_{t-1}}{Y_{t-1}}\left(\frac{Y_{t-1}}{Y_t}\right)\left(\frac{Y_t}{Y_{t+1}}\right) \tag{7}$$

Clearly the future debt/GDP ratio depends on future deficits and growth rates. Two simple cases are of interest:

a) A temporary cut: the current deficit is cut, but the future deficit returns to baseline. In this case GDP should also return to baseline (i.e. $Y_{t+1} = Y_{t-1}$). This implies that a temporary cut in the deficit must improve the long-run debt/GDP ratio – regardless of any deterioration in the debt ratio that might have materialised in the short run. Setting the baseline deficit at zero, the long-run increase in the debt ratio can be written as:

$$B_{t+1} - b_{t-1} = def_t [1 + g_{t+1}(def_t)]^{-1} \cong def_t \qquad (8)$$

A temporary cut in the deficit should thus reduce the long-run debt ratio by approximately the amount of the deficit reduction, regardless of what happens to the debt ratio in the short run. The (short-run) multiplier does not matter for the long run.

b) A permanent cut in deficit (i.e. $def_{t+1} = def_t$). In this case one could discuss whether GDP returns to baseline or not. In most macro models, this would be the case, but it is useful to consider the case when a permanent reduction in the deficit leads to a permanent drop in activity (i.e. $Y_{t+1} = Y_t$).

In this case equation (7) collapses to:

$$\frac{B_{t+1}}{Y_{t+1}} = \frac{Def_{t+1}}{Y_{t+1}} + \frac{Def_t}{Y_t} + \frac{B_{t-1}}{Y_{t-1}}\left(\frac{Y_{t-1}}{Y_t}\right) \qquad (9)$$

With the deficit ratio constant, this implies:

$$\frac{\partial b_{t+1}}{\partial def_t}\Big|_{t=t+1} = 1 + def_t - b_{t-1}[1 + g_t(def_t)]^{-2}\frac{\partial g_t}{\partial def_t}$$

$$= 1 + 1 - b_{t-1}\ multiplier \qquad (10)$$

This shows that the condition for fiscal adjustment to be self-defeating is now less likely to be satisfied, since the product of the multiplier and the starting debt/GDP ratio must now exceed two.

Conclusion

So what should governments do? Abandon austerity because financial markets might be short-sighted? This would only delay the day of reckoning, as debt ratios would increase in the long run. A country which enters a period of heightened risk aversion with a debt overhang has only bad options from which to choose. Implementing credible austerity plans constitutes the lesser evil, even if this aggravates the cyclical downturn in the short run. It is thus difficult to argue[2] that the peripheral countries in the euro area should abandon attempts to reduce their deficits because the results will arrive only in the long run.

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2 See P. d e G r a u w e: Who cares about the survival of the eurozone?, Centre for European Policy Studies, CEPS, http://www.ceps.eu/book/who-cares-about-survival-eurozone.

Rainer Maurer

Why Austerity Can Become Self-defeating for Member States of a Currency Union

Despite all efforts to reduce government budget deficits, debt-to-GDP ratios in crisis-hit member states of the Economic and Monetary Union (EMU) are still growing faster than expected. At the same time, GDP growth performance is poor and, according to most forecasts, is likely to worsen. These developments increase concerns over whether these countries will be able to pay back their outstanding debts. These concerns are empirically measurable by the correlation between interest rate spreads on government bonds and government debt-to-GDP ratios[1] (Figure 1). This correlation has not always been as strong as it currently is. Table 1 shows that the degree of correlation has been growing since the financial crisis of 2008.

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1 Debt-to-GDP ratio spreads are calculated as follows: the spread of country j relative to Germany is equal to the debt-to-GDP ratio of country j minus the debt-to-GDP ratio of Germany. Consequently, the data point for Germany appears at the origin of the diagram.

De Grauwe and Ji[2] cannot reject the hypothesis of a structural break around the year 2008. Before 2008, the explanatory power of the debt-to-GDP ratios had been much lower and only marginally significant.[3]

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2 P. D e G r a u w e, Y. J i: Mispricing of Sovereign Risk and Multiple Equilibria in the Eurozone, CEPS Working Document, No. 361, Brussels 2012.

3 This is in line with results by L. S c h u k n e c h t, J. v o n H a g e n, G. W o l s w i j k: Government Bond Risk Premiums in the EU Revisited: the impact of the financial crisis, ECB Working Paper No. 1152, M. A r g h y r o u, A. K o n t o n i k a s: The EMU sovereign-debt crisis: Fundamentals, expectations and contagion, Cardiff Economics Working Papers, E2010/9, University of Cardiff, 2010; V. B o r g y, T. L a u b a c h, J.-S. M e s o n n i e r, J.-P. R e n n e: Fiscal Policy, Default Risk and Euro Area Sovereign Bond Spreads, mimeo, Banque de France, 2011; and H. G i b s o n, G. H a l l, G. T a v l a s: The Greek Financial Crisis: Growing Imbalances and Sovereign Spreads, Working Paper, Bank of Greece, Athens, March 2011.

Figure 1

Interest Rate Spread of Ten-Year Government Bonds vs. Debt-to-GDP Ratio Spread in Relation to Germany, EMU Member States, 2011
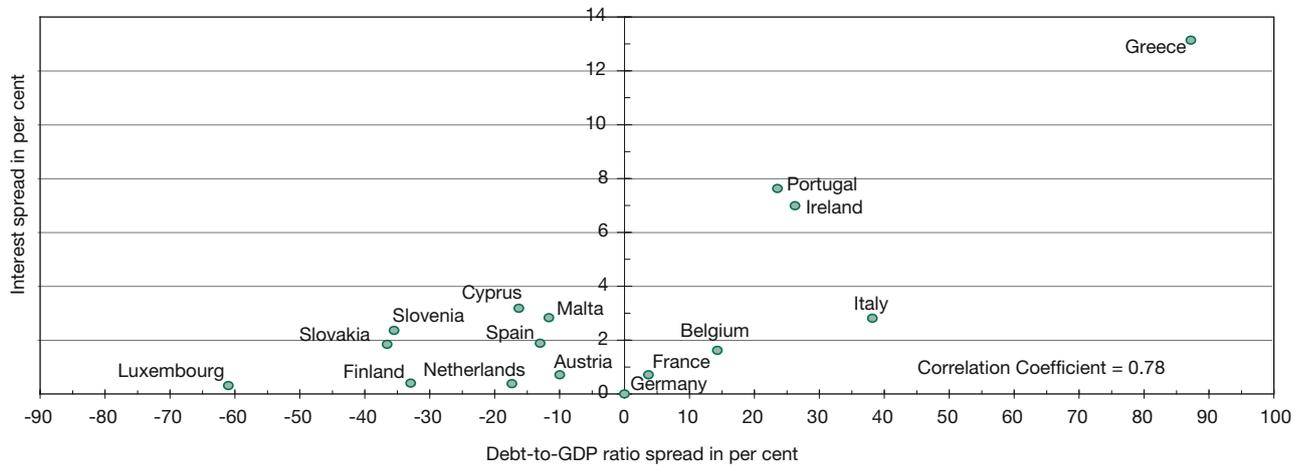
Sources: Eurostat, AMECO, own calculations.

However, Table 1 also shows that there is a strong and growing correlation between interest rate spreads and GDP growth gaps[4] relative to Germany. Figure 2 displays the corresponding diagram for the year 2011. It seems that markets do not only care about different debt-to-GDP ratios but also about different degrees of GDP growth performance.

A common explanation of the importance of GDP growth for the ability of governments to service their debts lies in the fact that GDP represents the tax base of the government. If the tax base grows rapidly, it is easier for a government to service outstanding debt. This becomes obvious in the formula for the primary surplus of the government budget which is necessary to keep the debt-to-GDP ratio constant[5]:

$$\hat{p}_t = (i_t - g_t) \cdot b_t$$

where $\hat{p}_t$ represents the primary surplus-to-GDP ratio for period t necessary to keep the debt-to-GDP ratio for period t constant (in the following "debt-to-GDP ratio stabilising primary surplus"), i_t is the average nominal interest rate the government has to pay on its outstanding debt, g_t stands for the nominal growth rate of GDP and b_t represents the debt-

to-GDP ratio. The higher the debt-to-GDP ratio stabilising primary surplus $\hat{p}_t$, the more difficult it is for a government to keep its debt-to-GDP ratio constant and hence the higher the risk of a government default on its debt. The formula clearly shows that the lower the nominal GDP growth rate g_t and the higher the interest rate for the debt service i_t are, the higher will be the debt-to-GDP ratio stabilising primary surplus. If the GDP growth rate g_t is higher than the interest rate i_t, the government will be able to run a primary budget deficit $\hat{p}_t < 0$ and nevertheless stabilise its debt-to-GDP ratio. If, however, the GDP growth rate g_t is smaller than the interest rate i_t, a government must run a primary budget surplus $\hat{p}_t > 0$ to stabilise its debt-to-GDP ratio. In this case, the government must use the primary budget surplus to buy back debt. Consequently, a higher debt-to-GDP ratio b_t will only cause a need for a higher primary budget surplus if the GDP growth rate is smaller than the interest rate.

Figure 3 shows the average interest rate for the debt service i_t for each of the crisis-hit eurozone countries and Germany, measured by the ratio of total government interest payments

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4 Where the "growth gap" of country j relative to Germany is equal to the German GDP growth rate minus the GDP growth rate of country j. Growth rates are calculated on a nominal basis, since nominal rates are needed in the following to calculate debt-to-GDP stabilising primary surpluses. Real GDP growth gaps display a similar strong correlation with interest rate spreads, however.

5 W. H. Buiter, K.M. Kletzer: Government Solvency, Ponzi Finance and the Redundancy and Usefulness of Public Debt, NBER Working Papers, No. 4076, 1992. The primary surplus equals the total surplus minus interest payments on outstanding debt. The formula follows from setting the time derivative of the debt-to-GDP ratio $b_t = B_t / GDP_t$ equal to zero: $\partial b_t / \partial t = -p_t + (i_t - g_t) \cdot b_t = 0$, where by definition P_t / GDP_t and $\partial B_t / \partial t = -P_t + i_t \cdot B_t$.

Table 1

Correlation Coefficient with Interest Rate Differentials[1]

Year	2008	2009	2010	2011
Debt-to-GDP ratio differential[1]	0.16	0.13	0.64	0.78
Nominal GDP growth gap[1]	-0.39	0.08	0.66	0.89
Debt stabilising primary surplus gap[1]	-0.28	0.26	0.87	0.95

[1] "Gaps" and "differentials" relative to Germany.

Sources: Eurostat, AMECO, own calculations.

Figure 2

Interest Rate Spread of Ten-Year Government Bonds vs. Nominal GDP-Growth Gap in Relation to Germany, EMU Member States, 2011
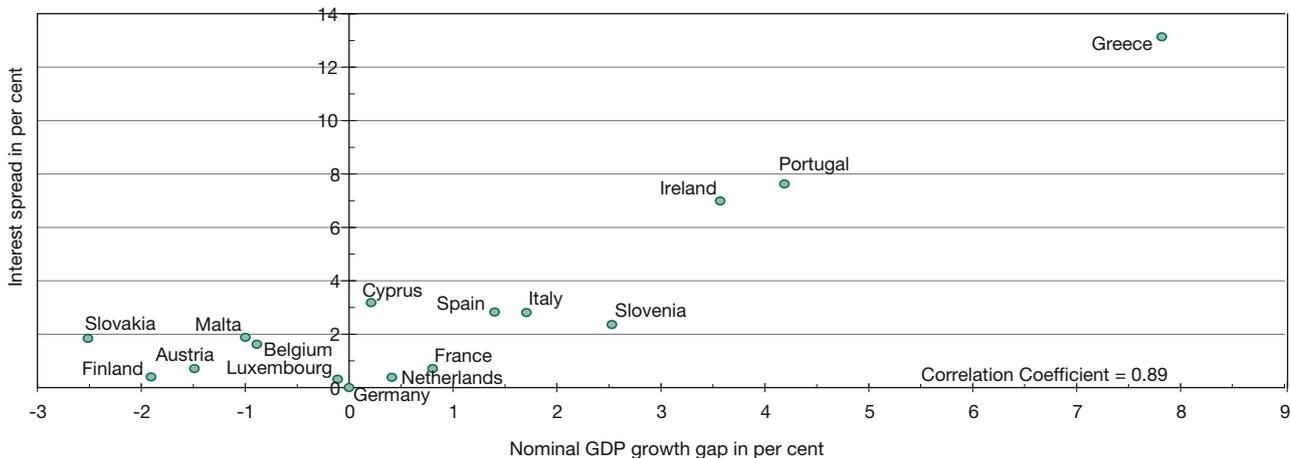
Sources: Eurostat, AMECO, own calculations.

to the level of outstanding government debt for the previous year, as available from the AMECO database.[6]

It is obvious that the interest differentials on outstanding debt compared to Germany are not yet extremely large. If the nominal GDP growth rate of these countries were 4% (say 1% real growth and 3% inflation), Ireland and Spain could stabilise their debt-to-GDP ratios, even with a small primary budget deficit (-0.3% and -0.2% respectively). Greece, Portugal and Italy would need only relatively small surpluses (0.9%, 0.5% and 0.3% respectively) despite their relatively large debt-to-GDP ratios. However, given their actual much lower growth performance, significantly higher primary budget surpluses are necessary to stabilise their debt-to-GDP ratios (Ireland 4.0%, Spain 1.0%, Greece 14.2%, Portugal 5.1%, Italy 2.8%).

If one calculates the debt-to-GDP ratio stabilising primary surpluses for the eurozone member states according to the above formula and subtracts from these values the corresponding value for Germany ("debt stabilising primary surplus gaps" in the following), the differences are large. As Figure 4 shows, the resulting debt stabilising primary surplus gaps also display a very strong correlation with the current interest rate spreads on ten-year government bonds. The correlation is even stronger than that for the debt-to-GDP ratio spreads (Figure 1) and for GDP growth gaps (Figure 2). As Table 1 shows, this correlation has also been growing since 2008.

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6 European Commission: AMECO database 2012, http://ec.europa.eu/ economy_finance/ameco/user/serie/SelectSerie.cfm, 2012. Interest payments of general government including flows on swaps and forward rate agreements (UYIGE) divided by general government consolidated gross debt (UDGG) of the previous year from the AMECO database as available on February 2012 (last update 10 November 2011). Values for 2011 are forecasts of the EU Commission.

It seems that current interest rate spreads are not only influenced by debt-to-GDP ratios; economic growth also has a very strong impact. The strongest correlation results are for debt stabilising primary surplus gaps – a value that combines debt-to-GDP ratios and GDP growth rates in a meaningful way. Thus, economic policy strategies to fight the European debt crisis must consider their consequences for economic growth, too. The following section will show that policies focusing on a mere reduction of government budget deficits are likely to be counterproductive.

The Perils of Pure Deficit Reduction

Deficit reduction policies can affect the debt-to-GDP ratio stabilising primary surplus via two channels, as the formula $\hat{p}_t = (i_t - g_t) \cdot b_t$ shows: via the direct impact on the growth

Figure 3

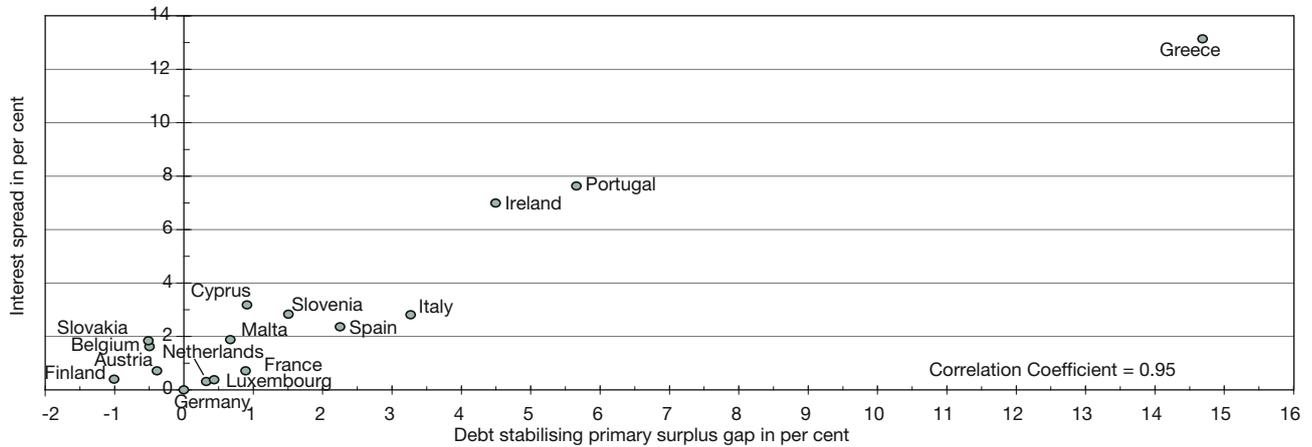**Average Interest Rates on Outstanding Government Debt[1]**
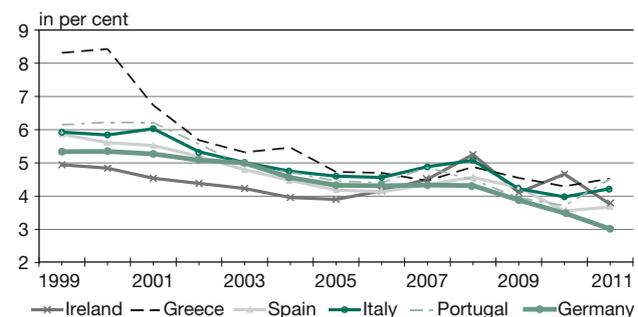
[1] Yearly government interest payments (UYIGE) in per cent of outstanding government debt of previous year (UDGG).

Sources: AMECO.

Figure 4

Interest Rate Spread of Ten-Year Government Bonds vs. Debt-Stabilising Primary Surplus Gap in Relation to Germany, EMU Member States, 2011

Sources: Eurostat, AMECO, own calculations.

rate $\partial g_t/\partial def_t$ and via the impact on the debt-to-GDP ratio $\partial b_t/\partial def_t$. The average interest rate i_t on outstanding debt is determined by the past and will not change immediately. The derivative of the debt-to-GDP ratio stabilising primary surplus $\hat{p}_t$ with respect to the government deficit ratio $def_t = Def_t/GDP_t$ then equals:

$$\frac{\partial \hat{p}_t}{\partial def_t} = -\left(\frac{\partial g_t}{\partial def_t}\right) b_t + \frac{\partial b_t}{\partial def_t}(i_t - g_t)$$

A negative value of this derivative means that a reduction of the government deficit leads to the need for a larger government primary surplus to stabilise the current debt-to-GDP ratio, i.e. $\partial \hat{p}_t \uparrow /\partial def_t \downarrow < 0$. The immediate impact of a reduction of government spending on GDP growth is typically negative from an empirical point of view, i.e. $\partial g_t \downarrow /\partial def_t \downarrow > 0$.[7]

Consequently, the first component of the derivative is negative. The sign of the second component is less obvious. In Daniel Gros's[8] article on pages 175-177 of this issue, he derives a formula for this equation based on the identity which relates the outstanding debt levels of two different periods to each other:

$$B_t = Def_t + B_{t-1}$$

Dividing this equation by GDP at time t and taking the first derivative with respect to the deficit ratio yields the following equation[9]:

$$\frac{\partial \hat{p}_t}{\partial def_t} = 1 - b_{t-1}\frac{\partial g_t}{\partial def_t}\frac{1}{(1 + g_t)^2}$$

Gros simplifies this equation by approximating $(1 + g_t)^2 = 1$. From this, we obtain the condition for a reduction of the debt-to-GDP ratio in case of a reduction of the deficit ratio:

$$\frac{\partial b_t}{\partial def_t} > 0 \quad <=> \quad 1 > b_{t-1}\frac{\partial g_t}{\partial def_t}$$

This condition shows that a reduction of the deficit ratio is likely to cause an increase of the debt-to-GDP ratio if the debt-to-GDP ratio is larger than 100%, b_{t-1} is greater than 1, and the fiscal multiplier $\partial g_t/\partial def_t$ is not less than 1. By the end of 2011, the following crisis-hit countries experienced debt-to-GDP ratios larger than 100%: Greece (163%), Ireland (108%), Portugal (102%) and Italy (120%). In these countries, using

7 For example, recent papers by A. A c c o n c i a, G. C o r s e t t i, S. S i m o - n e l l i: Mafia and Public Spending Evidence on the Fiscal Multiplier from a Quasi-Experiment, CEPR Discussion Paper No. 8305, 2011; G. C h o - d o r o w - R e i c h, L. F e i v e s o n, L. L i s c o w, W. W o o l s t o n: Does State Fiscal Relief During Recession Increase Employment? Evidence from the American Recovery and Reinvestment Act, in: American Economic Journal, forthcoming 2012; J. C l e m e n s, S. M i r a n: The Effects of State Budget Cuts on Employment and Income, Working Paper, Harvard University, 2011; L. C o h e n, J. C o v a l, C. M a l l o w: Do Powerful Politicians Cause Corporate Downsizing?, in: Journal of Political Economy, Vol. 119, No. 6, 2011, pp. 1015-1060; P. F i s h b a c k, V. K a c h a n o v s k a y a: In Search of the Multiplier for Federal Spending in the States During the New Deal, NBER Working Paper No. 16561, 2010; E. N a k a m u r a, J. S t e i n s s o n: Fiscal Stimulus in a Monetary Union Evidence from US Regions, NBER Working Paper No. 17391, 2011; D. S h o a g: The Impact of Government Spending Shocks Evidence on the Multiplier from State Pension Plan Returns, Working Paper, Harvard University, 2011; and D.J. W i l s o n: Fiscal Spending Jobs Multipliers Evidence from the 2009 American Recovery and Reinvestment Act, Working Paper, Federal Reserve Bank of San Francisco, 2011, find fiscal multipliers with values between 1.5 and 2.5.

8 D. G r o s: Can Austerity be Self-defeating?, in: Intereconomics, Vol. 47, No. 3, 2012, pp. 175-177.

9 Technical details are available in an appendix at http://www.rainer-maurer.com/mediapool/Self-defeating%20Austerity/Technical%20Appendix-Why%20Austerity%20can%20be%20Self-defeating.pdf.

the approximation that $(1 + g_t)^2 = 1$, a fiscal multiplier not less than 1 is sufficient to cause an increase of the debt-to-GDP ratio in case of a reduction of the deficit ratio. Note that the approximation used by Gros is not harmless and favours a positive value of the derivative when GDP growth is negative. In Greece, for example, $g_{2011} = -5.5\%$ such that the factor $1/(1 + g_t)^2$ equals 1.12.

Consequently, in the short run both components of the derivative of the debt-to-GDP ratio stabilising primary surplus with respect to a reduction of the government budget deficit are most likely negative. Thus a reduction of the deficit ratio increases the debt-to-GDP ratio stabilising primary surplus $\partial \hat{p}_t \uparrow / \partial def_t \downarrow < 0$.

An interesting question is, of course, what happens in the longer run? Gros complements his short-term analysis with a long-term analysis, which leads him to the conclusion that the probability of self-defeating deficit cuts gets smaller in the long run, even in "the case where a permanent reduction in the deficit leads to a permanent drop in activity."[10] Here Gros takes the derivative of the debt-to-GDP ratio with respect to the deficit ratio over a time span of two periods:

$$B_{t+1} = Def_{t+1} + Def_t + B_{t-1}$$

Under the assumption that the reduction of the deficit ratio is permanent, $def_t = def_{t+1}$, and that it leads to a permanent reduction of economic growth, $\partial g_t / \partial def_t = \partial g_{t+1}/\partial def_{t+1}$, and using the approximation $(1 + g_t) = (1 + g_{t+1}) = 1$, the following derivative results according to Gros[11]:

$$\frac{\partial b_{t+1}}{\partial def_t} = 1 + 1 - b_{t-1} \frac{\partial g_t}{\partial def_t}$$

This expression leads Gros to the conclusion that "the condition for fiscal adjustment to be self-defeating is now less likely to be satisfied, since the product of the multiplier and the starting debt/GDP ratio must now exceed two."[12] However, this conclusion is based on an algebraic flaw. I presume that the reason for this flaw is that Gros uses the assumption $1/(1 + g_{t+1}) = Y_t/Y_{t+1} = 1$ before he takes the derivative. In the technical appendix[13], I provide a detailed formal and graphi-

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10 D. G r o s, op. cit., p. 177.
11 Gros's (D. G r o s, op. cit., p. 177) original formula is $= \frac{\partial b_{t+1}}{\partial def_t} = 1 + def_t$ $- b_{t-1} [1 + g_t (def_t)]^{-2} \frac{\partial g_t}{\partial def_t} = 1 + 1 - b_{t-1} \cdot$ multiplier, where the term "multiplier" stands for $\partial g_t / \partial def_t$ (see my technical appendix).
12 D. G r o s, op. cit., p. 177.
13 Available at http://www.rainer-maurer.com/mediapool/Self-defeating%20Austerity/Technical%20Appendix-Why%20Austerity%20can%20be%20Self-defeating.pdf.

cal interpretation of Gros's procedure. Under the above assumptions, the correct formula is[14]:

$$\frac{\partial b_{t+1}}{\partial def_t} = 2 - (def_t + 2 b_{t-1}) \frac{\partial g_t}{\partial def_t}$$

Consequently, the probability that the derivative of the debt-to GDP ratio in period t+1 with respect to the deficit ratio in period t is positive, i.e. that

$$\frac{\partial b_{t+1}}{\partial def_t} > 0 \iff 2 > (def_t + 2 b_{t-1}) \frac{\partial g_t}{\partial def_t}$$

is not necessarily higher than in the above short-term analysis. The decisive point is that in the corrected formula the factor 2 appears in front of the debt-to-GDP ratio b_{t-1}. As a result, the likelihood of the derivative having a positive value becomes higher than in the short-term analysis only if the deficit cut is large enough to cause a budget surplus, i.e. $def_t < 0$. However, for debt-to-GDP ratio b_{t-1} greater than 1, relatively high budget surpluses are necessary to ensure a positive sign of the derivative. If governments are – e.g. for political reasons – not able to turn their budget deficits into surpluses, and the debt-to-GDP ratios are large enough, the derivative will remain negative. As the following section shows, this is the scenario for all crisis-hit eurozone countries – with the exception of Spain, where the debt-to-GDP ratio was still close to 70% by the end of 2011.

Consequently, extending the derivative $\partial b_{t+n} / \partial def_t$ over n periods does not increase the likelihood of a positive value and thus a possible decrease of the debt-to-GDP ratio stabilising primary surplus $\partial \hat{p}_t \downarrow / \partial def_t \downarrow > 0$.[15] If capital markets respond to a higher debt-to-GDP ratio stabilising primary surplus, as Figure 4 suggests, with a demand for higher risk premiums on government bonds, the average interest rate for the service i_t of outstanding government debt (Figure 3) will rise from period to period, making it more and more difficult for governments to reach the growing debt-to-GDP ratio stabilising primary surplus. In such a scenario, austerity policy can in fact become self-defeating.

To overcome such a situation, a temporal shift in the fiscal multiplier $\partial g_t / \partial def_t > \partial g_{t+n} / \partial def_{t+n}$ is necessary but not sufficient. A temporal shift of the sign $\partial g_t / \partial def_t > 0 > \partial g_{t+n} / \partial def_{t+n}$ would be sufficient. It is quite possible to construct theoretical models where such shifts take place within a couple of periods, and the economy recovers after a while to its previous

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14 Ibid.
15 My technical appendix also shows the result for $\partial b_{t+3} / \partial def_t$.

Figure 5

Current Account Surpluses and Inflation Differentials of EMU Founding Member States, 1999-2011

Current Account Surpluses

Per cent of GDP

■ Germany ■ The Netherlands ■ Luxembourg □ Finland □ Belgium □ Austria ■ France ■ Italy ■ Ireland ■ Spain ■ Portugal □ Greece

Inflation Differentials[1]

Per cent

■ Germany ■ The Netherlands ■ Luxembourg □ Finland □ Belgium □ Austria ■ France ■ Italy ■ Ireland ■ Spain ■ Greece □ Portugal

[1] In relation of the inflation average of EMU founding member states.

S o u r c e : Eurostat.

path. However, there is reason to be sceptical that the assumptions of these kinds of models are fulfilled for member states of a currency union with over-indebted private sectors. Some empirical arguments for why it may take much more time for the economies of such countries to recover – possibly too much time from a political point of view – are provided below.

The Development of Sectoral Balances in Crisis-Hit Eurozone Countries

To assess the consequences of austerity policies on the growth performance of crisis-hit EMU countries, it is useful to take a look at the debt history of these countries. From the beginning of the EMU until the outbreak of the financial

crisis in 2008, "northern" member states with below average inflation rates experienced current account surpluses, while "southern" member states with above average inflation rates experienced current account deficits (Figure 5).[16] As a conse-

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16 Luxembourg is a significant exception to this rule. Since the beginning of the EMU, Luxembourg experienced above-average inflation rates but displayed relatively high current account surpluses nevertheless. This is most likely due to the special fiscal incentives that helped to transform its economy into a leading European financial market centre. Since 1999, its current account surplus in services has quadrupled, mainly due to the strong increase in the surplus in financial and insurance services. At the same time, its current account deficit of trade in goods has nearly more than doubled (Eurostat: Balance of payments by country [bop_q_c], http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/search_database, 2012, Last update: 27.2.2012).

Figure 6
Sectoral Savings and Real GDP Growth

Greece

Real GDP growth in per cent   Sectoral savings in per cent of GDP

□ Real GDP growth (left scale)   ■ Private sector savings (right scale)
Government savings (right scale)   ✕ Foreign country savings[1] (right scale)

Portugal

Real GDP growth in per cent   Sectoral savings in per cent of GDP

□ Real GDP growth (left scale)   ■ Private sector savings (right scale)
Government savings (right scale)   ✕ Foreign country savings[1] (right scale)

Spain

Real GDP growth in per cent   Sectoral savings in per cent of GDP

□ Real GDP growth (left scale)   ■ Private sector savings (right scale)
Government savings (right scale)   ✕ Foreign country savings[1] (right scale)

Ireland

Real GDP growth in per cent   Sectoral savings in per cent of GDP

□ Real GDP growth (left scale)   ■ Private sector savings (right scale)
Government savings (right scale)   ✕ Foreign country savings[1] (right scale)

Italy

Real GDP growth in per cent   Sectoral savings in per cent of GDP

□ Real GDP growth (left scale)   ■ Private sector savings (right scale)
Government savings (right scale)   ✕ Foreign country savings[1] (right scale)

Germany

Real GDP growth in per cent   Sectoral savings in per cent of GDP

□ Real GDP growth (left scale)   ■ Private sector savings (right scale)
Government savings (right scale)   ✕ Foreign country savings[1] (right scale)

[1] Foreign country savings = Inverse current account balance.

Source: AMECO.

quence, northern member states built up net wealth positions, while southern member states built up net debt positions. One explanation for this development lies in the fact that the nominal interest rates of EMU member states converged with the beginning of the monetary union. In the presence of diverging inflation rates, this implies higher real interest rates in northern, low inflation member states and low real interest rates in southern, high inflation member states. Following standard microeconomic theory, this should have resulted in an incentive for northern member states to save and for southern member states to spend.[17]

Despite the common trend of growing national indebtedness, sectoral net saving patterns of crisis-hit eurozone countries have been quite different. As Figure 6 shows, in Greece and Portugal current account deficits (light green line) accompanied the negative net savings of the private (dark green line) and government sectors (grey line) until the year 2008.[18] In Ireland and Spain, however, the government sector did not accumulate large amounts of debt until the crisis year 2008. In these countries the current account deficit was accompanied instead by the growing indebtedness of the private sector – in Spain, of course, significantly more so than in Ireland. In Italy, on the contrary, the private sector accumulated positive net savings, while the government sector did ran into debt. Consequently, with the exception of Italy, these countries entered 2008 with over-indebted private sectors.

The increased uncertainty and reduced credit supply at the start of the financial crisis caused households and companies in these countries to start a process of deleveraging which still persists, as Figure 6 shows. It is very likely that the private sectors of these crisis-hit eurozone countries will try to further reduce their outstanding debt in the coming years. At least, households and companies will not be able to run the same deficits as in the past.

Consequently, domestic private demand for goods and services will be lower than before. Therefore, it is simply not plausible to assume that the private sector will be able to stabilise total demand as soon as governments reduce their deficits. This is typically the case in standard business cycle models. But the assumptions on which these models are based do not apply to the present situation in the crisis-hit eurozone countries. Urging the governments of these countries into a period of sustained austerity will therefore most likely deepen the recession over the next few years and could lead to unforeseeable political consequences.

The "silver bullet" to cope with these problems would of course be a stimulation of demand by an increase of exports. This would generate current account surpluses necessary to pay back outstanding debts. However, to make goods and services of the crisis-hit eurozone countries internationally competitive, their prices must fall. In countries with their own currencies, a reduction of domestic demand would trigger a devaluation of the domestic currency, which would reduce export prices. For countries which are members of a currency union, this path is blocked. Instead, they must try to devaluate their real exchange rates, i.e. lower their production costs compared to their creditor countries. This is certainly not an easy task vis-à-vis creditor countries like Germany. At least, it should be plausible to assume that under such circumstances, a successful real devaluation will take much more time than a nominal devaluation by countries with their own currencies.

In the meantime, a surplus in the current account balance – which, as shown in Figure 6, is necessary for a settlement of sectoral balances if governments are urged to lower their deficits – will only be possible if domestic incomes fall further, causing a sufficient decrease of import demand. Hence under such circumstances a deepening of the current recession is necessary to balance the current accounts of the crisis-hit eurozone countries. This, however, means that a temporal shift in the sign of the fiscal multiplier $\partial g_t / \partial def_t > 0 > \partial g_{t+n} / \partial def_{t+n}$, which is, according to the analysis presented here, necessary to cause a reduction of the debt-to-GDP ratio $\partial b_{t+n} \downarrow / \partial def_t \downarrow > 0$ and, as a result, a decrease in the debt-to-GDP ratio stabilising primary surplus $\partial \hat{p}_t \downarrow / \partial def_t \downarrow > 0$ is very unlikely under the present circumstances. There is therefore good reason to doubt that the attempts to reduce government deficits in the crisis-hit eurozone countries will be successful in the near future. The danger that austerity may become self-defeating under these circumstances is evident.

17 As argued in R. M a u r e r: The Eurozone Debt Crisis – A Simple Theory, Some Not So Pleasant Empirical Calculations and an Unconventional Proposal, Working Paper, 2010, http://ssrn.com/abstract=1621828 or http://dx.doi.org/10.2139/ssrn.1621828, this can lead to self-enforcing debt spirals: if a significant fraction of all goods bought by high inflation countries with credits received from low inflation countries is non-tradable (e.g. real estate, local services, etc.), these credits will cause excess demand for goods in high inflation countries and excess supply of goods in low inflation countries. As a consequence, inflation differentials will not disappear and will give rise to further credit flows from low inflation countries to high inflation countries.
18 According to an identity which can be derived from the expenditure account of Gross National Product, the sum of all sectoral savings of an economy must always equal zero (see section 5 of the technical appendix). The data for Figure 6 are from the AMECO database of the European Commission. "Government savings" equal net savings of all government institutions (UBLG in AMECO); "Private Sector Savings" equal net household savings (UBLH in AMECO) plus net corporate savings (UBLC in AMECO); "Foreign Country Savings" equal the inverse current account balance (UBLA in AMECO).

The debate will be continued at
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