

The Sustainability of Public Debt in Europe

Stefan Collignon

Susanne Mundschenk

The issue of budget discipline has always been crucial for European Monetary Union as it concerns both the functioning of EMU in stage 3 and the qualification to access it (Bini-Smaghi, Padoa-Schioppa, Papadia 1994). Yet, the purpose of the fiscal criteria is not uncontentious. The stumbling-bloc is not so much the objective of avoiding “excessive deficits”, but rather the need for binding rules contained in the Treaty on European Union (TEU). Recently, the issue of strictly interpreting the fiscal criteria for the selection of EMU-members in 1999 has also gained prominence. An overly restrictive interpretation could put the whole project at risk, while a lax application could threaten the long-term sustainability of the new currency.

Proponents of the fiscal criteria argue that countries have typical structural characteristics and that each country must therefore have produced evidence *before* joining EMU that it is capable of maintaining financial discipline. Issing (1996) went so far as to compare government extravagance with the addiction of alcoholics who have to prove that they have « kicked the habit ». Buiter and Kletzer (1991) saw this emphasis on binding fiscal rules, which was already apparent in the Delors report, as a « typical Pavlovian reflex reaction by fiscally conservative central bankers in the face of budget deficits of any description ».

Begg *et al.* (1991) argued that the position anyone adopted for or against binding rules was essentially determined by whether one placed greater emphasis on the stabilising effects of an active fiscal policy or the risks inherent in unsustainable positions with regard to indebtedness. T. Padoa-Schioppa (in Giovannini and Spaventa, 1991) made a logical distinction between the co-ordination of fiscal policies and the imposition of budgetary discipline. Nevertheless, there are certain overlapping areas in the sense that successful policy co-ordination may obviate the need for the *imposition* of budgetary discipline, though not for budgetary discipline as such.

In terms of the functioning of EMU, the effect of fiscal policies on price stability is, of course, dominant. This requires a co-ordination of fiscal and monetary policies (the optimal policy mix) for which the TEU only provides rudimentary institutional provision. However, this is a matter of day-to-day management in the future EMU. For the selection of participants in stage 3, the criteria must be whether the fiscal policies of member states are sustainable. From this point of view, the rationale for imposing effective upper limits on budget deficits of individual EU countries was found in the fear that "uncoordinated and divergent national budgetary policies would undermine monetary stability and generate imbalances in the real and financial sectors of the Community" (Delors, 1989). Originally, this meant to create "consistent and sound behaviour by governments", while "the situation of each member country might have to be taken into consideration". This thinking from the Delors Commission has been translated into art. 104c on the "avoidance of excessive deficits" in the Treaty on European Union (TEU). It also found its way into the "assessment of a high degree of sustainable convergence", necessary to move to stage III of EMU in art. 109j. According to art. 104c, avoiding excessive deficits means "identifying gross errors" (art. 104c, 7). Art. 109j defines "sustainability" as not having an "excessive deficits" as per art. 104c. Thus, this article does not take the famous reference values of 3 and 60 percent for the deficit and debt ratio to GDP as the binding criteria. In order to determine what "gross errors" are, one has to return to the concept of fiscal sustainability.

Subsequently we will try to assess the sustainability of fiscal developments in Europe. First we will discuss the concept of fiscal sustainability and then apply this reasoning to the EU member states. Finally, we will discuss whether the fiscal rules in the Maastricht Treaty are likely to guarantee the sustainability of public finances under EMU :

1. The concept of fiscal sustainability

Economic theory sees sustainability of the public financial position as "deficits which do not entail ever-increasing shares of debt and money to income" (Easterly et al. 1994). Such a definition does not only refer to a country's *ability to pay* (solvency) but also its *willingness* to

meet its debt obligations. If the government would allow the debt level to be forever increasing, it would be running a Ponzi-scheme¹ which might ultimately oblige it to repudiate its debt. McCallum (1984) has shown that under certain assumptions a deficit can be maintained permanently without inflation if it is financed by bonds and not by money. The stock of willingly held bonds could grow indefinitely if the growth rate of the debt/GDP ratio remains smaller than the rate of interest. However, given that a government's taxing capacity is not infinite, default incentives would also grow indefinitely. Repudiation can take different forms, directly through outright annulment of debt² or through interest rate taxes or indirectly through monetisation of debt à la Sargent and Wallace (1981) and inflation (Calvo, 1988). McCallum (1984) also points at tax evasion as a default incentive for households.

Bofinger in his paper to this working group has turned the question around by focusing on the government's *ability to finance*: are private savers willing to hold government debt titles? Consequently, greater attention has to be brought to the quality of public expenditure and the distribution of ownership of government bonds.

Either way, there is an element of "political economy" in the concept of debt sustainability which the TEU settles arbitrarily by giving the "reference values" of 3% for the deficit and 60% for the debt/GDP-ratio. These reference values were initially meant as a long-term equilibrium norm (the steady state) from which transitory deviations were acceptable (art. 104c, 2a), but beyond which the constraint on its rate of change becomes relevant (Bini-Smaghi et al., 1994). The conclusion of a Stability Pact in Dublin and Amsterdam³ has put further restrictions on these norms by making the 3 percent a maximum and reducing the steady state to a balanced budget.

Taking the political economy argument from a different point of view, Blanchard (1984) has defined sustainability by the *maximum level of debt* which the government can sell without

¹ Named after a Boston swindler, Mr. Ponzi who specialised in borrowing from A to pay B.

² Often this is part of a monetary reform as in Germany in 1948 (Roepfer, H. and W. Weimer, 1996). European Monetary Union, of course, is not a monetary reform and therefore a sustainable debt position is one necessary requirement for member countries to participate in stage 3.

having to repudiate (part of the) debt. Although this is conceptually attractive, yielding elegant mathematical solutions, it is operationally only applicable if one assumes this sustainability frontier to be constant (Mongelli, 1996). There is, however, evidence that acceptable deficits (and therefore primary surpluses) are subject not only to public preferences but also to institutional arrangements (Milesi-Feretti, 1997). For example, Italian voters may be more disposed to accept a high primary surplus in order to become members of EMU than they would be otherwise. For empirical work a weaker definition may therefore be warranted.

Sustainability can be defined more specifically as a policy stance whose "continuation in the infinite future does not violate solvency (budget) constraints" (Frenkel and Razin, 1996). An unsustainable situation entails then the need for a "drastic" policy shift such as a sudden fiscal tightening which might cause a recession, or even the inability to service the debt - which would hurt savers. These drastic shifts may be triggered by domestic or external shocks and are largely dependent on private agents' anticipation. If the government were running a Ponzi-game (borrowing to pay interest) it would increase its vulnerability to such shocks. Consequently, less drastic policy shifts such as gradual increases in taxes or reductions in expenditure would be called sustainable if they can be implemented without causing social and political upheaval. Sustainable fiscal policies under European Monetary Union would therefore ensure that at least the initial period of EMU, when the European Central Bank is building up its credibility to maintain price stability, will not be disturbed by the requirement of « drastic » policy shifts.

By taking the intertemporal budget constraint we can then propose conditions for weak and strong solvency requirements (Buiters and Patel, 1990). Weak solvency implies that the debt/GDP ratio is first difference stationary. Strong solvency requires weak solvency together with a stationary primary-surplus/GDP ratio (Luzenberger, Imbriani and Marini, 1994). In other words, weak solvency guarantees a stable debt/GDP ratio in the long run (steady state), while strong solvency also insists on stability of the policy stance, at least beyond a certain limit.

³Resolution of the European Council of 17 June 1997 on the Stability and Growth Pact. See also Buti, 1997 and Artis and Winkler, 1997.

We can formalise the intertemporal budget constraint (ex ante) of the public sector (which includes the central bank) as:

$$(1) \quad d_t = \frac{E(d_{t+1} + s_{t+1})}{(1 + r - y)}$$

where $E(.)$ is the expectations operator, d_t is the debt/GDP ratio (D/Y) at date t , s_t is the ratio of the primary surplus net of money creation to GDP, y is the real growth rate of the economy and r is the real interest rate⁴, both assumed constant for simplicity. This equation yields ex post:

$$(2) \quad \Delta d_{t+1} \equiv d_{t+1} - d_t = (r - y)d_t - s_{t+1}$$

The increase in the debt/GDP ratio depends on the balance between the growth adjusted debt service and the primary surplus. Equation (2) says that the debt ratio will be increasing indefinitely if the real interest rate r exceeds the growth rate y , unless the primary budget yields a sufficient surplus. We will call the relation of real interest rates and growth the « economic environment » and the level of the primary surplus the « fiscal policy stance ». An unsustainable position in public finances can be the result of a deterioration in the fiscal policy stance, say because of debt-financed expenditure or a tax cut; but it can also be induced by a change in the economic environment which would require a « drastic » policy change. Obviously in both cases fiscal adjustment is necessary to ensure sustainability, although by taking the environment variables into account, the adjustment is not exclusively focused on the primary surplus - provided, of course, economic policy can influence real interest rates and economic growth.

This is of crucial importance for the selection process of future members of EMU: if the environment is exogenously given, sustainability hinges exclusively on the fiscal policy stance. A strict application of the fiscal convergence criteria is then a precondition for a « high degree of sustainable convergence » (art.109j.1). If, however, the economic environment is affected by

⁴ $(r-y)$ is sometimes also called the growth-adjusted real interest rate.

EMU, say because real interest rates come down and growth improves under the new regime, then EMU may actually become a determinant in the fiscal adjustment process and one would have to give more weight to the margins of interpretation in the convergence criteria.

Note also that the absolute debt level D_t grows by the amount of the current deficit which consists of the primary deficit plus nominal interest charges.⁵ As a consequence, the deficit/GDP ratio is

$$(2a) \quad def_{t+1} = \Delta d_{t+1} + (y + \pi)d_t = (r + \pi)d_t - s_{t+1}$$

with π for inflation rate. Therefore, the deficit ratio is also growing indefinitely, if the debt/GDP ratio keeps increasing. However, a stable deficit ratio is sustainable, i.e. compatible with a stable debt ratio, if the deficit is just equal to a given nominal growth rate times the debt level. Consequently, the sustainable deficit ratio depends on the nominal growth rate if the debt ratio is stationary.

$$(2') \quad \Delta d_{t+1} = def_{t+1} - (y + \pi)d_t$$

It is sometimes argued that because of (2') the fiscal reference values in the Maastricht Treaty of 3% for deficits and 60% for the debt ratio are mutually consistent if one assumes a nominal growth rate of 5%. However, it is more appropriate to say that the reference values set an implicit minimum nominal growth rate compatible with the required debt ratio. If we assume 2% as the normative inflation rate compatible with price stability, then the economy has to grow at least by 3% p.a. in real terms in order to fulfil the requirements of the Maastricht Treaty. This has been the case in recent years for only very few countries, as we will see below.

Equations (2a) and (2') show that the question of fiscal sustainability boils down to the dynamics of debt levels and not of budget deficits. This is at variance with the public policy debate in

Europe which is preoccupied with meeting the 3% deficit target. Yet, the « sustainability of the government financial position » (art.109j) depends fundamentally on the government's solvability given the intertemporal budget constraint (1).

Weak solvability, i.e. a stationary debt/GDP ratio, implies that the debt service and the primary surplus evolve at a similar rate. Technically speaking it requires that $(r-y)d_t$ and s_t cointegrate with the cointegrating vector $(r-y, 1)$ ⁶. However, this allows for the possibility that debt could grow unbounded and still be consistent with solvency, provided the primary surplus increases at an appropriate rate.⁷ If the amount of primary surplus (tax income minus government services) has a ceiling because of political constraints, then there is a « natural » limit for the level of public debt and this imposes a strong solvency constraint. Blanchard (1984) has modelled such strong constraint for constant exogenous interest rates, Mongelli (1996) for endogenous interest rates reflecting a risk premium rising with the debt ratio. We will now analyse the evolution of the solvability of public debt in Europe.

2. Empirical findings on fiscal sustainability in Europe

In this section we will first look at the evidence of fiscal developments and then assess the likelihood that debt levels are sustainable in Europe. For this purpose indicators for weak and strong solvability will be constructed.

History

The substantial deterioration in public finances over the last two decades is apparent from Charts 1.a-d showing the evolution of the debt ratio. While it was below 40% for almost all 15 EU

⁵ In reality the debt level varies also because of stock-flow adjustments which encompass factors outside the government budget, such as revaluation of debt issued in foreign currency, proceeds from privatisations or debt take-overs from other sectors of the economy, accumulation of financial assets and statistical errors.

⁶ Trehan and Walsh, 1988

⁷ Both debt and primary surplus are integrated at the same order I (1). This condition is more easily fulfilled for absolute debt and primary levels, rather than ratios. The use of ratios is in this framework nevertheless necessary to allow for country comparisons.

members in the late 1970s, it has nearly doubled to date. The first group of countries (France, UK, Germany and Finland)⁸ have the lowest debt ratio around 60%, but all have a clear and unbroken trend of increasing debt levels. The second group (Austria, Portugal and Spain) seems to become stationary around 70%. Third, the moderately high debt countries Ireland, Sweden, Denmark and Netherlands are all exhibiting a tendency of falling debt (although this is less clear in the Netherlands). Finally, the most highly indebted countries Belgium, Italy and Greece are close to twice the Maastricht reference value although they are also slowly reducing their debt levels. Thus, the overall picture is one of slow convergence to levels well above 60%.

Although the developments are not uniform in all countries, there is a general increase in the debt ratio in the mid 1970s and a marked acceleration in 1980. This pattern coincides with two regime shifts in monetary policy: Real interest rates were low but positive in the 1960s and economic growth was high. Thus, the economic environment did not impose constraints on fiscal policy.⁹ Real interest rates turned negative in most industrialised countries after the first oil shock. Following determined anti-inflationary policies, they reached historical record levels in the early 1980s. The persistence of high real interest rates well into the 1990s, despite falling inflation, has been a puzzle that has intrigued many economists (Blanchard, 1984a). No doubt it has contributed to the slowdown of economic growth in major industrial countries (Cioccada and Nardozzi, 1996). As equation (2) shows, lower nominal growth and higher real interest rates automatically increase the debt ratio if fiscal policy does not react by raising the primary surplus. However, it is likely that policy makers will not adjust instantaneously and perfectly as there is an identification problem between a transitory slowdown which requires to make use of anticyclical automatic stabilisers and a permanently lower growth rate which requires « drastic » fiscal adjustment. It is common in the public debate to blame politicians for « excessive deficits » and rising debt levels. The perception is that with « sufficient efforts » the habits of the junkie will be overcome. Institutional constraints, like the Stability Pact or procedures to maintain balanced budgets are necessary to « tie politicians' hands ». What is generally missing from such

⁸ Luxembourg is excluded from our analysis, as it has no debt worth reporting.

⁹ The technical term for the 1960s and 70s is that of a « dynamically inefficient » environment. We will return to this below.

explanation is the consideration of the macroeconomic environment and its contribution to the debt dynamics.

Explaining the rising debt levels in Europe

The intertemporal budget constraint brings to fore that the debt/GDP ratio varies as a function of nominal interest rates, inflation, growth, and the fiscal policy stance. In order to show the impact of the different components that have contributed to the increase of the debt ratio in Europe we can rewrite equation (2) by taking the nominal interest rate and the rate of inflation explicitly into consideration.¹⁰

$$(3) \quad d_{t+1} = \frac{1+i}{1+y+\pi}d_t - s_{t+1} \quad \Rightarrow \quad \Delta d_{t+1} = \frac{i-\pi-y}{1+y+\pi}d_t - s_{t+1}$$

where i is the average nominal interest rate applying to public debt and π the rate of inflation. The specific effects of each of these factors can be calculated according to the nominal interest rate effect $\frac{i}{1+y+\pi}d_{t-1}$, the real growth effect $\frac{y}{1+y+\pi}d_{t-1}$ and the inflation effect $\frac{\pi}{1+y+\pi}d_{t-1}$ (Bundesbank 3/1997). The debt ratio will rise due to a (nominal) interest effect and when the primary surplus is negative (primary deficit). It will fall as a function of economic growth, inflation or because fiscal policies produce a primary surplus.

We have calculated these effects for each of the EU member states (see figures 2.a-1).

The most dominating feature is the high interest effect in all EU countries. In all the 12 countries analysed the *high interest burden is the principal cause for the rising debt ratio*. In nine countries (France, Austria, Spain, Sweden, Finland, Belgium, Italy, Netherlands and Germany) the interest rate effect has had a tendency to rise which in part reflects the rising debt ratio although the

deteriorating macroeconomic environment is mostly responsible for the increases in the interest burden effect¹¹. In the other countries the interest rate effect has been constant or falling like in the UK or in Denmark since 1982 and in Ireland since 1983. Essentially this has been the case when all the other components (fiscal policy, growth and inflation) have contributed to reducing the debt ratio. One may object that the indicator for the interest growth and inflation effect have a simultaneity bias, because they all contain the debt level at a given moment as an argument. The value in these indicators therefore lies in the relative comparability of the different effects. In principle, during periods of rising debt, the indicators should diverge; they should converge when debt is falling.

Fiscal policies in the narrow sense, i. e. the development of the primary budget position, have made a significant contribution to the rise in debt¹² only in Italy until 1991, in Ireland until 1987 and in Belgium until 1985. In Spain primary deficits prevailed between 1977 and 1986, although, thereafter the fiscal consolidation was very weak and in the 1990s primary deficits again contributed to a rising debt. In Germany the fiscal stance was loose between 1975 and 1983 and again to a small degree after unification. Thus, the relatively high debt levels in Belgium, Italy, Ireland and the strong increase in Spain are due to a mix of high interest rates and a persistent lack of fiscal discipline. Presumably political authorities resisted tight monetary policies in the 1980s. For the other countries this is less obvious. Deteriorations in their fiscal policy stance are transitory and quite often seem to follow a deterioration in economic growth. Thus, they have a strong anticyclical component. But there is little evidence that anticyclical policies, whether through automatic stabilisers or through discretionary policy (like in Austria), have significantly contributed to the rising debt ratios in Europe. This is, of course, what we would expect.

¹⁰ In fact, (3) is approximately equal to (2) given that for small values of y and π we have:

$\frac{(1+i)}{1+y+\pi} \approx (i-\pi-y) = (r-y)$. This fact allows us to use equation (2) for theory, but we need (3) for empirical purposes.

¹¹ Because of footnote 9, an increase in the debt ratio raises the interest effect, if $r > y$.

¹² The index is here shown in such a way that a primary surplus appears as a negative component of the debt increase.

In the 1990s, the negative primary budget positions are entirely due to the severe economic crises after the Gulf war and German unification (high interest rates). Structural primary surpluses have consistently risen in all EU countries with the exception of Austria and Ireland.¹³ Thus, in all these countries, a significant change in fiscal policies has taken place since the beginning of the 1990s. On the opposite side, the fiscally most conservative budgetary policies have been conducted in the Nordic countries (Sweden, Denmark and Finland) which all had significant primary surpluses in the 1980s. To a lesser degree this also applies to France after the first Mitterrand experiment in the early 1980s. The UK also had primary surpluses during the Thatcher era. However, all of these countries, maybe with the exception of Denmark, experienced an extremely serious downturn in economic activity in the early 1990s and responded with anticyclical policies which in most cases led to a primary deficit for four years. Only the Netherlands, Ireland, Belgium, Italy and Denmark kept their primary surpluses all through the crisis. Thus, for many European countries some degree of flexibility in fiscal policy was necessary during economic crisis. The Stability Pact has taken this fact into account by providing exception rules for excessive deficits, although one may doubt that they are sufficiently flexible.

A reduction in the debt ratio is not only caused by primary surpluses. It will also fall with economic growth because this increases the denominator in the debt/GDP ratio. In addition the primary surplus position may improve with higher fiscal revenue. The same applies for the inflation rate. As equations (2a) and (2') show, a reduction in the inflation rate has *ceteris paribus* the effect of increasing the debt ratio and lowering the sustainable deficit reference value, unless other policies adjust to the low-inflation environment. Therefore, participating in EMU does indeed require proof that the adjustment has taken place. With increasing convergence to the Maastricht criteria for price stability the inflation rate has had an increasingly lower impact on reducing the debt ratio in recent years. In Italy and Sweden this dampening of the inflation effect may have been more recent, but in nearly all other countries it has by now a sufficiently long history to be credible. Thus, using a surprise inflation in order to reduce government debt (which is equivalent to a debt repudiation) is becoming more and more unlikely in any of the European Union countries, even in marginal countries like Italy, Spain and Sweden. This result is

¹³ For a discussion and evidence of *structural* primary surpluses see graphic 10a-n in Collignon, 1996.

confirmed by the fact that the inflation effect has been simultaneously reduced with an increase in the primary surplus, while if the debt repudiation argument would apply, one would see an increase in the inflation effect simultaneously with a decrease in the primary surplus. We may therefore safely assume that there are no inflationary risks arising from debt developments in Europe. This has not always been the case as the contribution of inflation to the reduction in the debt ratio was relatively high in the 1970s in the UK, Italy, Ireland and Belgium and to a lesser degree in the Netherlands, France, Denmark and Spain. However, even if surprise inflation can be ruled out as an instrument to wipe out public debt, this is not a sufficient condition to ensure debt sustainability.

A more acceptable approach to lowering the debt ratio is the growth rate. However, here Europe's performance is disappointing. Average annual growth in Europe has fallen from 4.6% in the Golden Age (1950-73) to 2.0% in 1973-92 (Crafts and Toniolo, 1996). With the exception of Austria and Denmark all countries have experienced periods when lack of economic growth has actually contributed to an increase in the debt/GDP ratio. This is particularly obvious in the severe economic downturn between 1991 and 1994 subsequent to the Gulf war and the severe economic crisis after German unification and the high German interest rates which also led to the break-down of the EMS. Least affected by these developments have been Ireland and Denmark, although the effect is perceptible in these countries, too.

We may conclude from this analysis:

1. Fiscal policies by EU member states have become more disciplined in recent years. Although in most countries some amount of anticyclical variation is observable, this does not seem to have been a significant cause for rising debt levels.
2. The danger of using inflation in order to reduce government debt can be discarded. In this respect the figures reflect a profound cultural revolution in favour of price stability.
3. High interest payments on rising government debt are the dominant factor in the deterioration of government finances in Europe.
4. The increases in public debt/GDP ratios are due to a structural shift in the economic environment in the 1970s and 1980s and the low speed by which fiscal policy adjusted to this.

Economic growth has decelerated since the first oil crisis in 1973 and real interest rates have exceeded these growth rates since 1980. If EMU would contribute to higher growth and lower interest rates, it would significantly improve the economic environment in which fiscal policy takes place.

5. With the fall of growth rates the levels of sustainable deficits have also come down and consequently deficits have frequently become "excessive".

Given these explanations for the growth of the debt/GDP ratios in Europe, we would now like to know whether Europe's debt dynamics are sustainable or not. For this purpose we first look at weak solvency criteria and then try to find a way to estimate strong solvency.

Weak sustainability

Trehan and Walsh (1988) have first tested for weak solvency in the United States using cointegration methodology over a period covering 1890 to 1986. However, this approach is not useful for our purposes. Reasonable cointegration results require observations over a long period of time and may be distorted by structural breaks (Quintos, 1995). In view of the qualifying criteria of the Maastricht Treaty we are rather interested in medium-term policy adjustments. For this reason we adopt the methodology developed by Blanchard, Chouraqui, Hagemann and Sator (1990). We construct two fiscal sustainability indices. The first refers to the current period. We set the first difference of the debt ratio in equation (2) equal zero, so that we obtain the weak short-term sustainability condition.

$$(4) \quad s_{t+1} \geq (r - y)d_t$$

As long as the primary surplus is higher than the growth adjusted debt service¹⁴, the short-term situation is sustainable and, in fact, the debt ratio will fall. In the inverse case it will grow. Thus, the intuitive idea is simple: if a country is not able to pay the interest on its debt out of its net

¹⁴ We employ the term « debt service » here to the payment of interest rates net of the reduction of the debt/GDP ratio due to economic growth. It is therefore distinct from the microeconomic debt service concept which includes repayment of the principal.

return (primary surplus), then it has to borrow to pay its debtors and the debt ratio rises. This is not sustainable, as it violates the « No Ponzi game » condition. Failure of weak solvency does therefore not imply an immediate debt crisis, although ultimately this is unavoidable unless a « drastic » policy change takes place. This is also relevant to our discussion of public finances under monetary union. If strains and stresses are to be avoided, particularly in the initial period when the new European central bank is building up its reputation for price stability, then it is desirable that « drastic » policy changes are not required on the fiscal side.

The debt ratio does not have to be permanently zero. It may be reasonable to accumulate debt in a recession and to pay it back in the subsequent boom. Therefore, a medium-term sustainability index is constructed which should balance short term variations over time:

$$(5) \quad \sum_{t=0}^n \frac{S_{t+i}}{\prod_{i=1}^n (1+r-y)_{t+i}} \geq \sum_{t=0}^n \frac{(r-y)d_{t+i-1}}{\prod_{i=1}^n (1+r-y)_{t+i-1}}$$

This formula tells us whether the discounted expected future primary surpluses are sufficient in order to service the growth adjusted debt service. The results are shown in figures 3.a-z. We have used a forecast period $n = 5$ for the medium term, using European Commission (1997) data.

The index is constructed in such a way that a positive value indicates sustainability, i.e. the primary surplus is higher than the required debt service. A negative value indicates a violation of the No-Ponzi game condition. The scale of the index are percentage points of the GDP. Thus, a 10% index implies that the primary surplus is by 10 percentage points of GDP higher than the debt service requirement. In other words, over the given time period (1 year for the short-term, 5 years for the medium term index) the debt ratio will fall by the indicated index value if the underlying assumptions are fulfilled. If the index is negative, the debt ratio will rise.

First of all, we observe that all EU-countries have violated the No-Ponzi game condition at some stages in their development. They have borrowed to pay their debtors. But they also have

adjusted their policies, sometimes « drastically ». All countries have been negatively affected by the first oil crisis, although only in Austria, Belgium, Denmark, Germany, Ireland and Spain were fiscal policies unsustainable in the 1970s. The second shock to solvency came with the serious economic crisis in the early 1990s after the Gulf war and German interest shock. With the exception of Ireland all countries had sustainability problems in the early 1990s, due to the deep economic recession.

Italy is a special case as it starts violating the sustainability condition in 1979 (second oil shock and Volker interest shock in the US). It only undertakes a serious fiscal consolidation after signing the Maastricht Treaty. The underlying factors show that the reduction of the primary deficit has already started in the mid 1980s, but the burden of interest payments being even higher short term sustainability was only reached in 1996. The impact of fiscal consolidation is even more dramatic in the medium term analysis. However, what emerges clearly from our indicators is the importance of the macroeconomic environment for Italy in order to guarantee assurance of long-term fiscal sustainability. Clearly, in this respect, Italy has much to gain from being part of Monetary Union.¹⁵ In the case of Ireland, Netherlands and Denmark, high growth rates have been the crucial factor for the dramatic improvement of sustainability, although in the case of Ireland, high primary surpluses also helped. In Italy the positive growth rate after the exit from the ERM in 1992 has improved the situation, too.

In Portugal economic growth has picked up again in the mid 1990s and the primary surplus improved in parallel. However, there is little evidence of an improvement in the fiscal stance¹⁶. Portugal has regained sustainable public finances primarily because of a reduction in real interest rates and a return of growth. This makes it highly dependent on the economic environment and sustainable government finances are resting on fragile foundations. If economic growth collapsed, or interest rates rose again, Portugal's debt would not be sustainable.

¹⁵ Italy has already benefitted from these effects in 1997. But without any doubt, if it is not taking part of EMU in 1999, financial markets would create a damming backlast that would threaten its debt sustainability again.

¹⁶ This is also borne out by the structural primary surplus which has increased only marginally. See Collignon 1996

Germany stands out, together with Italy, as a country with low concern for fiscal solvency. In the 1970s after the first oil shock it ran a Ponzi game for nearly ten years. Since the early 1980s short-term sustainability seems to fluctuate around the zero-line while the medium-term perspectives were deteriorating rapidly after unification. They are, however, improving now. As the underlying sustainability factors for the medium-term show, the deterioration is more due to an increase in the debt service since German unification than to a lax fiscal stance as budget policy has yielded growing surpluses. Consequently, it is more the deterioration in the macroeconomic environment, and in particular the lack of economic growth in combination with fairly high levels of real interest rates, which is responsible for Germany's fiscal difficulties than the policy stance with respect to unification. If EMU would help to stimulate growth, it would also improve Germany's capacity to consolidate its public finances.

Austria also seems to be fluctuating around the sustainability-line but here medium- and short-term developments are both indicating a stationary tendency compatible with sustainability. This reflects Austria's rather unique policy mix of Austro-Keynesianism (Gnan, 1994).

For most of the other countries the medium- and short-term indicators diverge with long swings. This implies that deviations on short-term sustainability persists in those countries over longer periods of time and this effect accumulates in the medium-term indicator. Therefore, short-term violations of the weak sustainability condition can not really be interpreted in most EU-countries as a deliberate policy of anticyclical smoothing of the business cycle (with the exception of Austria). They should rather be interpreted as a rigidity or stickiness of fiscal policy adjustment to the macroeconomic environment. However, this also means that if European Monetary Union would improve the economic environment (reduction in interest rates, increase in growth rates) then, given the adopted fiscal policy stance, most European countries should be able to achieve long-term fiscal sustainability.

With respect to the Maastricht criteria doubts about the solvency of the present fiscal policy stance in the prevailing macroeconomic environment can be raised for Italy and Belgium - and in this order of urgency. Italy has just obtained a positive medium-term index for the first time since

1980, but short-term perspectives are less bright. Belgium has also improved its short-term sustainability index but its value remains low. The medium-term index is more favourable due to a high primary surplus. In Portugal the two sustainability indices have been improving in recent years, but primarily because of higher growth and lower interest rates. Very little efforts to improve the primary surplus have been made. In Germany the short-term indicator has again fallen below zero after one exceptional good year in 1994. The medium-term index returned back to a sustainable path presuming lower interest rates and higher growth rates in the following years as forecasted by the European Commission (1997) but this improvement is only half of France's. In France the short-term index has just reached its sustainability level for the first time since 1990 but the expected future surpluses improve the medium-term perspective. Finally, the Netherlands, Finland and Ireland and to some degree Sweden and Denmark have also benefited from improved macroeconomic conditions during the last few years and they have now reached sustainability - both medium- and short-term. In the UK, France, Spain and Austria the improvement in the sustainability index is more the consequence of shifts in fiscal policy stances.

In conclusion it appears that *while all countries would benefit from a better economic environment, the Gang of Four Italy, Belgium, Germany and Portugal need to make urgent further efforts in order to improve their primary balance.* Yet, the two highest indebted countries, Belgium and Italy, have already realised primary surplus ratios in excess of 4%, sometimes approaching even 6%. Hence, they may reach limits of the acceptable. The sustainability of their public finances depends therefore crucially on the macroeconomic environment. It is interesting that not one of the countries with a narrow sustainability index has made greater progress by fiscal consolidation than by an improved environment. Clearly, these countries would benefit from greater adjustment efforts. Table 2 condenses these results.

Table 2 : Prospects for medium term sustainability and its contributing factors

prospects for medium term sustainability due to :	narrow index < 0.045	medium 0.045 < index < 0.075	comfortable 0.075 < index
exclusively fiscal efforts			
Mix dominated by fiscal efforts $\sum_{t=1}^5 \Delta s > - \sum_{t=1}^5 \Delta(r - y)_i$			Austria France Spain United Kingdom
Mix dominated by macro environment $\sum_{t=1}^5 \Delta s < - \sum_{t=1}^5 \Delta(r - y)_i$	Portugal Belgium Germany Italy		Sweden Denmark
exclusively macro environment		Finland Netherlands	Ireland

The table shows the degree of medium term sustainability and its two main contributing factors, the expected improvement in the growth-adjusted real interest rate (environment) and fiscal efforts. Narrow sustainability is observed in Portugal, Belgium, Germany and Italy with a medium term sustainability index inferior to 4.5 %. Comfortable are counties with an index superior to 7.5 % and medium are those who find themselves in between.

It is interesting to note that not one of the countries was able to reach comfortable sustainability exclusively by fiscal efforts in the absence of a favourable environment. However, a friendly environment often helped. Especially Ireland and to a lesser extent Finland and the Netherlands seem safe without fiscal efforts. Some countries facing a friendly environment are nevertheless planning to run a primary surplus as to gain safer ground. France for example would have been sustainable only in the narrow sense without fiscal efforts.

Another approach to assessing the sustainability of fiscal policies can be derived by referring to art. 104c, 2 in the TEU which states that debt ratios must be « sufficiently diminishing and approaching the reference value at a satisfactory pace » in order to be acceptable. Table 1 shows how many years it would take the individual countries to return to the reference value of 60% given their respective sustainability indicators. It would appear that Denmark, Ireland, the Netherlands, Spain and Sweden are sufficiently close for the pace to be satisfactory beyond all doubts. In Austria the debt ratio is above 70% and it would take them between four and 17 years to come back to 60% which is slow but not unreasonable. By contrast, Belgium and Italy would require over forty years to come down from their very high ratios to the required 60%. Even if they are the two countries with the highest debt levels, this is a long process and hardly satisfactory. They need more fiscal consolidation and would benefit from a better macroeconomic environment and the institutional arrangements of the Stability Pact under Monetary Union. A similar argument can be made for Portugal. Germany, on the other hand, has only recently exceeded the 60% and given its present policy mix a return to the reference value is unattainable. We find here the same Gang of Four as in table 2, but with the perspectives of higher growth and lower interest rates as well as some additional fiscal effort, they can also reach a sufficient pace.

Strong sustainability

An alternative to weak solvency derives from Blanchard (1984). If there exists an absolute limit for extracting primary surpluses from the population for socio-political reasons; then this implies that there is also an absolute limit for sustainable debt. Blanchard obtained the sustainability condition from a policy rule for primary surpluses modelled as:

$$(6) \quad \Delta s_t \leq \alpha(\bar{s} - s_t)$$

where \bar{s} is the maximum surplus net of interest payments obtainable.

Together with our equation (2) this yields the sustainability condition

$$(7) \quad (r - y + \alpha)(d_t - \bar{d}) - (s_t - \bar{s}) \leq 0$$

Mongelli (1996) has taken this approach further by setting the interest rate endogenously as a positive function of debt. A loss of confidence in a country's fiscal and monetary management would raise the risk premium and reduce the scope for sustainable fiscal policies. This leads to endogenous fiscal discipline - in line with the philosophy of the Maastricht Treaty. However, at the inception of EMU, this endogenous discipline together with deepening integration are likely to reduce the maximum primary surplus. This is so because tax competition between countries limits the maximum amount of government revenue and subsequently cutting outlays on the provision of public goods may lead to a decline in output beyond a certain point. He then estimates equation (6) econometrically, obtaining values for α and \bar{s} which show the adjustment speed of fiscal policy and the maximum primary surplus. Based on these parameters he constructed maximum debt level indicators for 1995 for most EU countries. Mongelli obtains 4% as the maximum primary surplus for all sample countries, except for Belgium (6%) and Greece (4,5%). These values are lower than the peak values apparent in our figure 3, but he argues that these extrema were not maintained for many periods. Thus, his estimated values may be erring on the safe side.¹⁷

In order to obtain an impression of strong sustainability over a longer period, we have calculated his maximum sustainable public debt index by using the official data published by the European Commission. They are closer to the Maastricht criteria than the IMF data used by Mongelli, but we have used his values for \bar{s} and α . With this methodology, two problems arise: first, the

¹⁷ Mongelli did not provide estimates for Austria, Sweden and Finland. For consistency purposes we have left Sweden and Finland out from our analysis, but assumed values similar to Germany for Austria.

sustainable debt level is highly sensitive to the levels of interest and growth rates, as already noted by Blanchard (1984). We have therefore used the trend growth rates for GDP provided by the European Commission and taken a 2-year moving average for interest rates. Secondly, equation (6) is estimated by the OLS regression equation

$$(6') \quad \Delta s_t = a_0 + a_1 s_t + \varepsilon_t$$

where $a_1 = \alpha$ and $\bar{s} = \frac{a_0}{\alpha}$ and ε is white noise disturbance. But this implies that our estimates are likely to be distorted by structural breaks: a high policy adjustment speed coefficient α would imply a large a_0 , so that countries with high α 's have debt ratios far below the sustainable maximum. On the other side, if as a result of a structural break the maximum acceptable primary surplus (\bar{s}) would be increased we would need a higher intercept than the long period estimation would indicate. Given that our evidence on weak sustainability indicated that a structural shift in fiscal discipline has taken place in the 1990s, presumably in order to reach the Maastricht criteria for EMU, our estimates would yield maximum debt limits lower than reality. We therefore have to look at the figures in chart 4 with caution. The period covers the 1980s and 90s, as earlier years were « dynamically inefficient » with growth rates exceeding interest rates.¹⁸ The results are shown in figure 4.a-j.

It appears that most EU countries remain safely below the maximum ceiling for sustainable debt. Only Ireland, Denmark, Belgium and Italy have experienced episodes of unsustainability in their public finances. They then borrowed to pay their debtors, given that they could not extract larger surpluses from their population. But in all those cases measures were taken to improve the policy stance. This is very clear in Ireland and Denmark who have now attained very satisfactory margins of security. Time series data for Greece are not available but Mongelli's calculation for the year 1995, show Greece with the least satisfactory fiscal sustainability position. Germany, which we classified above in the Gang of Four required to make greater efforts in fiscal

¹⁸ On the concept of dynamic inefficiency see below.

consolidation, reveals now that it is not constrained by its maximum ceiling. Thus, the « effort » is a question of political will. Portugal came close to hitting the critical value in 1995, but since then interest rates have fallen and the maximum debt level has improved. In the other two, most highly indebted countries of the European Union, Belgium and Italy, the situation is uncertain. Belgium has oscillated around its maximum debt level since the early 1980s and seems to have a sustainable policy stance only since the signing of the Maastricht Treaty (1992).

Italy is the difficult candidate. By applying the same data as for the other countries, the Italian debt position appears to have been significantly higher than the estimated maximum from 1987 till today, although the gap has narrowed in the 1990s. On these grounds it would appear that Belgium is a safer bet for monetary union than Italy. However, our result is far more pessimistic than Mongelli's who showed a maximum debt limit at 174% of GDP and an actual debt ratio of 123%. Yet, even if our debt limits are biased downwards, they have the advantage of consistency in time and space. They may indicate that debt sustainability is a real concern in Italy. How should one interpret these data? As we have seen, Italy's debt evolution is highly dependent on the interest rate effect, as well as other factors in the macroeconomic environment. In order to evaluate the impact of Italian participation in EMU on its debt position, we have calculated several alternative scenarios.

Under scenario 1, the maximum acceptable primary surplus has been increased from 4% to 6%, an improvement that seems justified if one re-estimates α with data for the 1990s without the 1980s. The Italian debt is then sustainable and the safety margin increases in recent years.

Scenario 2 assumes German interest rates for the calculation of the maximal debt but all other variables remain unchanged. Again, sustainability improves, although less dramatically and some years appear very fragile. Thus, the reduction in Italian interest rates which would be a consequence of being part of EMU, does help Italy with its fiscal consolidation, but it is insufficient in itself to guarantee sustainability on its own.

Finally, in scenario 3 an improvement in economic growth would also help to regain fiscal sustainability from 1997 on, but the effect is least pronounced. It is clear that Italy would not be able to outgrow its fiscal problems, but it would benefit from a more favourable economic environment in EMU, provided the present high primary surplus is maintained for the foreseeable future.

We may conclude that the sustainability of Italy's debt position would be significantly higher inside monetary union than outside.

3. The Maastricht Rules on Fiscal Sustainability

Our analysis has so far tried to assess to what degree fiscal policies have been sustainable in the past. However, it seems reasonable to view European Monetary Union as a regime shift not only in monetary but also in fiscal policies, given the Treaty provisions and the agreements of the Stability Pact. The question therefore arises whether the Maastricht policy rules are sufficient to assure sustainable debt positions in Europe for the future. We will first check the theoretical consistency of the Maastricht Treaty provisions and then check the stability requirements empirically.

The Maastricht Fiscal Policy Rule

The essence of the Maastricht fiscal rules consists in the imperative to correct fiscal imbalances, once certain reference values have been exceeded. Given that a fiscal adjustment requires a variation of the primary budget surplus as the only discretionary policy variable, we can formulate the Maastricht fiscal rule as:

$$(8) \quad s' = \alpha_M (def - z_1) + \beta_M (d - z_2)$$

here s' is the increase in the primary surplus, z_1 and z_2 are the target reference values for the deficit and debt ratio (3% and 60%) and α_M and β_M are the policy adjustment speed coefficients

by which the government responds to the two policy objectives. Together with the intertemporal budget constraint, rewritten in continuous time form as

$$(2'') \quad d' = (r - y) d - s$$

equations (8) and (2'') constitute a system of two linear difference equations. It has the particular solution

$$(9a) \quad \begin{aligned} \bar{d} &= \frac{z}{\alpha(y + \pi) + \beta} \\ \bar{s} &= \frac{(r - y)z}{\alpha(y + \pi) + \beta} \end{aligned}$$

where $z = \alpha_M z_1 + \beta_M z_2$. The characteristic equation being

$$(10) \quad \lambda^2 + [\alpha - (r - y)]\lambda + \alpha(y + \pi) + \beta$$

the two characteristic roots turn out to be complex

$$(10a) \quad \lambda_{1/2} = \underbrace{-\frac{\alpha - r + y}{2}}_{=h} \pm \underbrace{\sqrt{\alpha(y + \pi) + \beta - \frac{(\alpha - r + y)^2}{4}}}_{=v} i$$

and the general solution is

$$(9b) \quad \begin{bmatrix} d \\ s \end{bmatrix} = e^{ht} \begin{bmatrix} (m_1 + m_2) \cos vt + (m_1 - m_2) i \sin vt \\ (n_1 + n_2) \cos vt + (n_1 - n_2) i \sin vt \end{bmatrix} + \begin{bmatrix} \bar{d} \\ \bar{s} \end{bmatrix}$$

The time path of the system will converge with damped fluctuations to the steady state if the real parts of the complex roots (h) are negative. Therefore the Maastricht stability condition for the sustainable debt path is:

$$(11) \quad \alpha_M > (r - y)$$

The policy reaction function under the Maastricht Treaty requires that in order to keep debt sustainable governments must increase their primary surplus by a fraction of the gap between the deficit and its reference value and this fraction has to be higher than the growth-adjusted real interest rate.¹⁹

If EU member states follow this rule - and it does not seem too difficult to achieve this - then the debt/GDP ratio and the primary surplus ratio will converge to their steady state values. If they do not follow the rule, debt levels explode and the policy is unsustainable, requiring « drastic » changes.

The stability conditions (11) and (9a) bring to light some interesting features. First, if the economic growth rate equals or exceeds interest rates ($y \geq r$), no fiscal adjustment is required to ensure sustainability of the public finances. In fact, running a deficit may even be recommendable: An economy where the steady state real rate of return is less than the growth rate of the economy is called « dynamically inefficient », because everyone's living standard (i.e. maximising steady state consumption) could be improved by reducing the capital stock (Blanchard and Fischer, 1989). Such an economy is overaccumulating capital. Yet, higher government purchases can lead to a lower capital stock and higher equilibrium real interest rates (Romer, 1996). Therefore, by using debt as well as taxes to finance purchases, the government

¹⁹ Effectively, this rule also assures that the growth rate of the debt/GDP ratio remains smaller than the (growth-adjusted) interest rate which is according to McCallum (1984) a necessary condition for sustainable, non-inflationary debt increases.

can prevent overaccumulation and ensure dynamic efficiency, even if growth rates exceed interest rates.²⁰

Dynamic inefficiency has been the dominant characteristic of the world economy in the 1960s when growth was high, and in the 1970s when high inflation made real interest rates negative. Consequently, deficits were not unsustainable in those years and debt ratios even fell in many countries.²¹ Not surprisingly, debt sustainability issues only emerged after 1980 when real interest rates exceeded growth rates and the intertemporal budget constraint became binding.

The question for the future of Europe is whether its economy will eventually approach the « golden rule »²² under EMU. This signifies that the rate of interest be equal to the growth rate, so that the long-run capital-labour ratio will remain Pareto-optimal²³. Since the early 1980s, this has hardly been the case anywhere in Europe, as the third picture in figures 3.a - 3.m show. But it is likely that with monetary union risk premia in Europe's interest rates will fall and that growth could increase. Therefore even if the golden rule is not attained, EMU would improve the economic environment and make fiscal policies more sustainable by lowering the right hand side in the equilibrium condition (11). This result is completely independent from the provisions of the Stability Pact which focus on the adjustment speed coefficient (α_M) on the left hand side and which are likely to raise α_M compared to the pre-Maastricht epoch. Therefore, even if Europe

²⁰ An alternative approach derives dynamic inefficiency from profit and investment shares in GDP (Phelps, 1961; Abel et al. 1989). At least under conditions of certainty, the condition ($r > y$) is equivalent to the statement that the profit share needs to exceed the investment share to guarantee dynamic efficiency. If this condition is not met, government transfers may re-establish it.

²¹ The debt ratio for G7-countries fell from 42.2% in 1970 to 40.9% in 1979; in France it fell from 53.1% to 31.4%; in the UK from 81.8% to 54.9% and in the USA from 45.4% to 37.2%. See Tanzi and Fanizza (1995).

²² The expression « golden rule » is here used in the sense of growth theory. Public finances also know the expression « golden rule » in the sense that new government debt must not exceed public investment.

²³ The "modified golden rule" (Blanchard and Fischer, 1989, p. 45) is the standard of efficiency for neoclassical economics. It remains, however, a puzzle why economics seem to do best when they are dynamically *inefficient*. One way out of the dilemma has been indicated by Schulmeister (1996): For neoclassical economics real interest rates are equal to the marginal product of capital and therefore the profit rate. But in reality interest rates on financial assets can deviate from profit rates. Dynamic efficiency requires that "one does not put more into the system than one get out of it". Hence the criterion for dynamic efficiency should be that the profit rate should not be higher than the growth rate. Periods of "economic miracles" may than be explained by a constellation where interest rates are smaller and profit rates larger than the growth rate. In Tobin's terminology we would have the condition $r < y < qr$.

may not return to a golden rule scenario, fiscal sustainability will improve under EMU with high probability.

Secondly, even if the debt dynamics of the Maastricht fiscal rules are likely to achieve stability and converge to a steady state, this equilibrium is in itself not constant.

Equation (9a) shows the debt and primary surplus values towards which the system converges. Under a golden rule regime ($r = y$) no primary surplus is required and if capital has been overaccumulated ($y > r$), a primary deficit is even recommended. Yet, more important for the current debate on debt and deficits is the fact that the equilibrium debt ratio is a function of the nominal growth rate ($y + \pi$). The lower this rate, the higher is the debt ratio towards which the actual rate will converge (with oscillations). This aspect is hardly present in the public debate about the Maastricht criteria. It is entirely possible - and has actually happened in Europe - that the debt ratio increases over the years, purely because nominal growth has fallen - and not because fiscal policies are unsustainable.

In fact, there are two reasons for this: first of all, a reduction in real economic trend growth has been observed since the oil first shock in the 1973. It can be argued that this reflected simply a return to a secular trend, the Golden Age (1950-73) being the exception (Crafts and Toniolo, 1996). But there is also evidence that this reduction in the trend growth rate has been related to the demise of Bretton Woods and the resulting change in exchange rate regimes (Eichengreen, 1996; Boltho, 1996). If this is true, EMU may contribute to a new era of growth at least in Europe. Secondly, inflation rates have come down to historic lows as a result of monetary policies in the 1980s and 1990s. However, the two are linked. There is some evidence that high long-term average inflation leads to lower growth rates (Fischer, 1993 and Barro, 1995), although this conclusion is less firm for moderate inflation rates (Romer and Romer, 1997). In order to re-establish long-term growth conditions and for many other good reasons (King, 1997), inflation has to be brought down. Yet, if anti-inflation policies rest exclusively on monetary policies by the central bank (high interest rates) the social cost of deficit finance can be high in terms of output and this will further aggravate the position of public finances. There are two approaches to

demonstrate this effect. Tobin (1986) has shown that if government bonds are net wealth and the central bank keeps the inflation rate constant while the government continues to accumulate debt (maintains a deficit), private investment will be crowded out. The cessation of gross investment will be followed by a decline first in the stock market (Tobin's q), then in GDP and consumption below their natural levels. Therefore, in this model, the fiscal policy stance is the prime cause of lower growth. However, in an interesting study Schulmeister (1996) has criticised this crowding-out approach for not taking into account that the debt dynamics of a negative economic environment ($r > y$) do not only apply to public debt but also to aggregate company debt. As a result enterprises will attempt to reduce their liabilities if interest rates are persistently high. This results in disinvestment, lower growth, increasing unemployment and causing the debt/GDP ratio to rise (and the sustainable deficit ratio to fall). Here, the macroeconomic environment, and in particular the high interest rate, is the cause for the deterioration in public finances. A vicious cycle starts when fiscal consolidation reduces growth in return because spending cuts fall primarily on capital spending, or because higher taxes create inefficiencies and distortions. Therefore, if high inflation sooner or later requires higher real interest rates to re-establish price stability²⁴, the disinflation process does not only lower growth, it also sets off the debt dynamics. Regardless of whether one uses the Tobin or the Schulmeister model, the debt dynamics contribute directly or indirectly to the cost of disinflation. This is maybe one of the most powerful arguments for maintaining price stability permanently²⁵.

Consequently in a period of disinflation and even for a while thereafter, it is unlikely that the economic environment will be determined by the golden rule. But even if monetary policy would ultimately be relaxed and real interest rates came down, growth rates remain low at first and consequently equilibrium debt ratios stay high. Even if fiscal policies are sustainable in the sense that debt levels do not explode, the steady state debt levels (and the required steady state primary surplus) would rise. But if governments have to aim for a constant reference value for debt (say 60%) which lies below the equilibrium level, then they will have to increase the speed by which

²⁴ Clarida and Gertler (1997) have shown that the Bundesbank follows exactly this policy behaviour - just as the Fed in the United States.

²⁵ Our analysis provides a corollate to Ball's (1997) analysis which links the persistent rise of unemployment to disinflation. Here the persistent rise of debt ratios is related to disinflation. See also Collignon (1996).

they will approach this reference value (i.e. raise β_M). This could reinforce an unduly restrictive fiscal policy stance when tight monetary policies have already caused a reduction in growth. This would make it more difficult to re-ignite economic activity. Alternatively, it could be that a significant debt reduction would lower interest rates and therefore stimulate economic growth (Giavazzi and Pagano, 1990 and 1995). However, as the IMF (1996) pointed out when reviewing such drastic fiscal consolidation packages: « It is difficult to reduce debt ratios in the midst of a global recession, especially if interest rates are increasing sharply at the time » (p. 58). Therefore, there is a strong case for applying a fairly generous interpretation to the debt ratio criterion in the Maastricht Treaty. But this would also require better co-ordination of monetary and fiscal policies in order to optimise the policy mix (Mélitz, 1997). This issue remains, for the time being, a gap in the Maastricht policy rules.²⁶

Third, it is also interesting that the speed-coefficient β_M for the reduction of the debt levels (« the satisfactory pace » according to § 104c) is not relevant as a stability condition for the debt dynamics, but only as a determinant for the equilibrium level. In fact β_M is necessary in order to prevent the steady state debt and primary surplus ratios from being undetermined under the Golden Rule, when $y = r$.

Academic literature has often emphasised the arbitrary nature of the fiscal reference values of 3% and 60%. This is underlined by equation (9a): there is no obvious reason why the equilibrium level for debt should be 60% of GDP. Some authors (like Gros and Thygesen, forthcoming) have insisted that at least the 3% and 60% are mutually consistent, if one assumes a real growth rate of 3% and an inflation rate of 2%. However, this is irrelevant for the sustainability of debt. All it allows to do is to derive a normative growth rate at which the debt level would stabilise at 60%²⁷. But given that nothing guarantees this rate in reality, it is wrong to conclude that « a country that

²⁶ The appropriate tool would be art. 103 TEU. The French government has recently requested that this article should be more clearly defined.

²⁷ Set $\Delta d_t = 0$ in equation (2') so that $(y + \pi) = \frac{def}{d} = \frac{0,03}{0,60} = 0,05$. There is, however, something magic about the 3 and 60 percent, for if we insert them together with $y + \pi = 0.05$ into (9a) they will yield a 60% steady state debt ratio, regardless of α and β ($\alpha, \beta > 0$).

observes the 3% deficit limit should under ordinary circumstances see its debt-to-GDP ratio declining automatically towards the 60% target », (Gros and Thygesen, forthcoming). In fact, this would only be the case, if the growth rate $(y + \pi)$ were constant at 5%. That this is not the case (the theoretical reasons in Tobin (1986) apart), can be seen from table 3. The nominal growth rate is never stationary in the strict sense and stationarity with a trend implies that the rate is not constant. Figure 5 shows how the debt/GDP ratio would have evolved in several countries purely as a function of observed real trend growth, assuming a constant 2 % inflation rate. In fact, the steady state debt level would be indeterminate when $(y + \pi) = 0$ and $\beta_M = 0$. Therefore, the Maastricht Treaty rightly complements the deficit rule $[\alpha_M (def - z_1)]$ by a debt rule $[\beta_M (d - z_2)]$. It may well be less binding - as the policy debate reveals - but it is necessary to close the system when the deficit rule is not operational.

Empirical estimates of the Maastricht fiscal rule

Given these theoretical considerations, we can now assess the likelihood of EU-countries to follow sustainable fiscal policies under EMU. For this purpose we will first estimate parameters for α_M and β_M and then try to deduct some propositions on steady state debt levels. With respect to the former, we will assume that the adjustment speed parameters will increase in monetary union, principally because of the Stability Pact. Therefore, the historic performance of individual countries over the last one and a half decades represent some kind of baseline scenario. If the policy parameters α_M and β_M indicate that the stability condition (11) has been fulfilled in the past, we can safely conclude that fiscal policies will also be sustainable under EMU. Furthermore, given certain assumptions about deficits, inflation and growth, we may also assess how far the steady state debt levels are at variance with the Maastricht reference values.

Our first task is to estimate equation (8). We transform this equation into

$$(8') \quad \Delta s_t = \alpha_M def_{t-1} + \beta_M d_{t-1} - z$$

where $z = \alpha_M z_1 + \beta_M z_2$. However, estimating this equation makes only sense under conditions of dynamic efficiency. As our previous analysis has revealed, this applies only to the period after 1980. If we include the European Commission forecasts up to the year 2001, this gives us 20 yearly observations per country which is not very satisfying when using the OLS method. Fortunately, we can improve the efficiency of our estimators by using the method of seemingly unrelated regressions (SUR) for the whole European Union. This procedure seems justified as we have the same variable set for each country and the high degree of integration between EU countries should lead to some correlation between the error terms of each country. This is confirmed by table 4. However, given that Sweden and Finland have joined the EU rather late, we estimated separately SUR for 11 and 13 countries. Austria is considered to be fully integrated, given its fixed exchange rate to Germany over the whole period. The results are shown in table 5. The improvements of OLS over SUR are obvious, although in a few cases SUR 11 obtain better results than SUR 13.

Most remarkable is the fact that there is no country where neither α_M nor β_M are statistically insignificant. Only in the UK, Spain and Sweden is the standard error of our estimate so large that the α_M range of 10-12% loses significance. However, in these three countries, β_M is significant so that the debt dynamics remains determinate. Furthermore, the values for β_M are fairly high, implying that the excess of the debt ratios return to target levels in four to eight years. It would therefore appear that in these countries debt level considerations have a greater impact on policy makers than deficits. Furthermore, the estimated coefficient value for α_M is between 3.7 and 5.4 times higher than the mean growth-adjusted real rate of interest ($r - y$). Therefore, there is little doubt that the debt dynamics in the UK, Spain and Sweden are sustainable with the policies of the Maastricht Treaty.

The same is true for Denmark, Ireland, France and the Netherlands. Here both coefficients α_M and β_M are statistically significant, although β_M has the wrong sign in the Netherlands. α_M is close to one third in Denmark, nearly one half in Ireland and not far from 1 in the Netherlands. In France it is 18%, but β_M is here the highest in the group and the second highest after Sweden for all significant values. In fact, it is close to zero while α_M is nearly 1, and given that the time trend

is positive and significant in the Dutch estimate, it is not surprising that the primary surplus increases while the debt ratio falls. The growth-adjusted real interest rate reached its maximum in Denmark with 8% which is significantly lower than α_M . Consequently, there is no doubt that fiscal policies are clearly sustainable in all four countries under the Maastricht regime.

Finally, there is the group of countries where α_M is significant, although not β_M . In Italy and Finland the coefficient is about one quarter. The maximum difference between interest and growth rates was 8% in Italy and 13% in Finland in the early 1990s although their means were below 3% and not markedly different from other countries. Given the standard errors of α_M , one cannot exclude that the equilibrium condition $\alpha_M > r - y$ may have been violated in the peak year, but even if that was the case, it is clear that in both countries the stability condition did hold over time. This is even more obvious for Germany (α_M exceeding two thirds), Belgium (α_M nearly three quarters) and Portugal (0,82). Therefore even the Gang of Four shows stable debt dynamics.

Austria is tricky, for here the α_M -coefficient is only significant in the SUR 11 estimate, and none of the other coefficients hold up to the usual statistical measures. However, with $\square_M = 0.46$ against a peak of $r - y = 0.04$, there is reasonable comfort that Austria's fiscal position fulfils the stability condition.

Portugal is the only country in our pool that initially covered 5 years with growth rates exceeding interest rates. That shows up in a negative mean for $r - y$, although in 1985 and again in the early 1990s the growth-adjusted interest rate peaked at 5%. All the more remarkable is the high adjustment speed to the deficit target: with 0.82 it is the second highest after the Netherlands in the group of significant α_M . However, we cannot exclude that this value is distorted by the earlier years when $r < y$. The fact that Portugal's primary surplus is still fairly low, also points into this direction.

The conclusion from these estimates is remarkably clear: with a Maastricht fiscal policy rule the debt dynamics are stable in all EU countries. Given that the provisions in the Stability Pact are intended to speed the correction of excessive deficits, α_M is likely to increase in member

countries of EMU. This will further strengthen the stability and sustainability of the government financial position.

However, we do not know whether the estimates in table 4 refer to the same objectives as the TEU reference values of 3% of GDP for deficits and 60% for the debt ratio. Nevertheless, we can deduct some inferences about implicit debt levels by making use of the intercept $z = \alpha_M z_1 + \beta_M z_2$. Furthermore, by assuming some realistic nominal growth rates we can also calculate the steady state debt levels from equation (9a).

The result is shown in table 6. The implicit debt target is calculated according to:

$$(11) \quad z_2 = \frac{z}{\beta} - \frac{\alpha}{\beta} z_1$$

Column 5 and 6 show what the debt ratio would have been if the authorities had a deficit objective of 2 and 3 percent, given their policy adjustment speed parameters. With negative values for β_M and z , we cannot apply the calculation of (11) to the Netherlands, France, Belgium and Finland. Furthermore, only in Denmark, Ireland and the UK are all three coefficients statistically significant. Our calculations for the other countries are therefore rough indications at best. It appears that Denmark, the UK, Spain, Austria, Sweden, France and Germany all had an implicit debt target that was below the Maastricht reference value of 60%. Only Italy, Ireland and Portugal (and possibly Belgium) had an implicit reference value for the debt ratio well above 100%. In other words, these countries had debt and deficit targets which were clearly much looser than what the Treaty requires. In all other member states the past fiscal policy stance is compatible with the requirements of the TEU and the Stability Pact.

Next, we would like to know the implied steady state levels of the past debt ratio. They are shown in column 7 and 8 in table 6. Their calculation is based on assumed nominal growth values of 4 and 5 percent. The most remarkable feature is their similarity with the implicit debt targets in column 5 and 6. In Denmark, UK, Sweden, Spain and France they are virtually identical. This

means that in those countries sustainable debt levels were the implicit target for fiscal policy. Only in Ireland, Portugal and Italy did authorities target levels above the steady state. Here, significant policy adjustments are required to ensure the long-term sustainability of public finances with the policy agreements under the TEU. Our previous analysis has shown that there are indications for such policy shifts after the signing of the Maastricht Treaty, although they are fragile and require perseverance. For Belgium a change in fiscal policies is also required, given that with their historic α_M and β_M the steady state debt ratio is above 450%. In other countries the fiscal policy behaviour has been compatible with the Maastricht requirements. We must, however, not draw the conclusion that Ireland, Portugal and Italy are to stay out of European Union, because the "avoidance of excessive deficits" procedure will change debt dynamics.

Equation (9a) was defined the steady state that would be the result from the Maastricht Treaty procedure. By making use of our estimates we can calculate the Maastricht steady state values towards which the system would converge. We assume two hypothesis: a nominal growth rate of 4 and 5 percent. Not surprisingly, at 5 % growth, the debt level is at the required 60 %. But even with a lower nominal growth rate of 4 % the steady state ratio do not go astray very far as, a comparison of column 9 and 10 reveals, (possibly) with the exception of Belgium.

More interesting is the fact that the steady state primary surplus is significantly lower than the 4 % maximum level, calculated by Mongelli (1996). Therefore, it is unlikely that the Maastricht fiscal rules would hit the absolute limits for extracting a primary surplus by increasing taxation or cutting public expenditure.

For under the Maastricht rules and with a nominal growth rate of 5%, the debt ratio in all countries would tend to 60%, as we have seen. Thus, the figures in table 6 do not preclude countries from joining EMU but they raise a warning: If Ireland, Portugal, Italy and Belgium join, their public finances need to be followed most carefully as they are the weak members in the chain. An improved economic environment under EMU would help the necessary adjustments. Germany, on the other hand, has a weakness in its fiscal policy stance, as we have seen before, but under assumptions of historical continuity its steady state perspectives are reassuring. That is,

of course, provided unification has not caused a structural break which would not show up in our calculations.

4. Conclusions

This chapter has looked at fiscal sustainability as a measure for the potential long-term risks that threaten the stability of the euro if « gross errors » were made by governments. It appears that Europe has indeed undergone a period of fiscal instability over the last 20 years. The reasons, however, were less « irresponsible policies » but serious negative effects resulting from the macroeconomic environment. Politicians are guilty of not reacting quickly enough to structural changes. But clearly, this has changed since the Maastricht Treaty was signed. Some countries, like Italy, Belgium and Greece are now facing a difficult inheritance, but signs of fiscal correction are visible everywhere. This is encouraging, for it should help to complete the fiscal adjustment over the medium term. This does not mean that the battle is over. Many EU member states (in particular Portugal, Germany, the Netherlands and Ireland) must still strengthen their primary fiscal surplus, given their high accumulated debt. But it does mean that EMU can be turned into a tool that supports the fiscal efforts by governments by improving the macroeconomic environment.

From the point of view of sustainability, most countries are safe in their fiscal position. There is no imminent danger of collapse which would require to blow the whistle when selecting the future members of stage 3. Italy is, not surprisingly, the most fragile candidate. But the progress achieved so far is encouraging and one must expect that being part of EMU would benefit Italy maybe more than most others. The crucial development will here be the continuity of the budgetary policies pursued in recent years. If Italy were not to join immediately in 1999, support measures are indispensable in order to prevent that a deterioration of the economic environment (higher interest and lower growth) would jeopardise the recent achievements. In Belgium, sustainable fiscal consolidation needs lower interest rates and higher growth to grow out of its high debt levels.

Portugal and Germany also need to pursue their fiscal consolidation with greater determination. All countries may benefit from a more growth friendly environment, but Finland, the Netherlands and Ireland have relied exclusively on growth and interest factors in their fiscal consolidation.

In other countries, no threat to the stability of the euro is perceivable. Thus, little stands in the way for starting EMU in 1999.

What will happen thereafter? To a large degree the answer depends on the evolution of the macroeconomic environment. There are good reasons to assume that real interest rates will fall in many countries when the exchange rate risk has disappeared and financial markets have become deeper and more liquid. Growth is also expected to improve with less uncertainty in the single market, a reduced degree of openness (only 10% of EU GDP), lower interest rates and fiscal policy co-ordination. Therefore, EMU is likely to provide a better macroeconomic environment than the present-day currency-Balkan. On the other hand, the speed of policy adjustment is likely to accelerate under the provisions of the Stability Pact. Our analysis has shown that the policy coefficients for the 1980-2000 period are consistent with stable government finances and sustainable budgetary positions. Once the Stability Pact is put into practice, the degree of sustainable convergence should rise even more.

Thus, the EU member states have made good progress in the fulfilment of their obligations regarding economic and monetary union according to art. 109j. From the point of view of fiscal policies, only Greece does not fulfil the necessary conditions for the adoption of the single currency.

---oOo---

References

Artis, I. M. and B. Winkler (1997): The Stability Pact: Safeguarding the Credibility of the European Central Bank. CEPR Discussion paper no. 1688.

Abel, A., N.G. Mankiw, L. Summers and R. Zeckhauser (1989): Assessing Dynamic Efficiency. Theory and Evidence, in: *Review of Economic Studies* 56, January

Ball, L. (1997) : Disinflation and the NAIRU ; in Romer and Romer, 1997

Barro, R. (1995): Inflation and Economic Growth; *NBER Working Paper* No. 5326

Bean, C.R. (1992): *Europe 1992: A Macroeconomic perspective*, mimeo (quoted in Anzenberger, Unbriani, Marini, 1994)

Begg, D., F. Giavazzi, L. Spaventa and Ch. Wyplosz (1991): European Monetary Union - the Macro Issues; in: CEPR: *Monetary European Integration - The Making of Monetary Union*. London, October

Bini-Smaghi, L., T. Padoa-Schioppa and F. Papadia (1994): The Transition to EMU in the Maastricht Treaty; in: *Essays in International Finance* no. 194, Department of Economics, Princeton University, Princeton, New Jersey, November

Blanchard, O. (1984): Current and Anticipated Deficits, Interest Rates and Economic Activity; in: *European Economic Review* 25, pp. 7-27

Blanchard, O., J.C. Chouraqui, R. Hagemann and N. Sator (1990): La soutenabilité de la politique budgétaire: nouvelle réponse ancienne, *Revue économique de l'OCDE* no. 15 automne 1990, pp. 7-38

Blanchard, O., and S. Fischer (1989): *Lectures on Macroeconomics*, MIT Press, Cambridge, Mass.

Blanchard, O., and L. Summers (1984): A Perspectives on High World Real Interest Rates; in: *Brooking Papers on Economic Activity*, No. 2

Boltho, A. (1996): Convergence, Competitiveness and the Exchange Rate; in Crafts and Toniolo (1996): *Economic Growth in Europe since 1945*, Cambridge University Press, Cambridge

Buiter, W.H., and K.M. Kletzer (1991): Government Solvency, Ponzi Finance and the Redundancy and Usefulness of Public Debt, *Working Paper* No. 4076, National Bureau of Economic Research (NBER), Cambridge

Buiter, W.H., G. Corsetti, N. Roubini (1993): Maastricht's fiscal rules; *Economic Policy*, April

Buiter, W.H. and Patel, U.R. (1992): Debt, Deficits and Inflation: An application to the Public Finances of India; *Journal of Public Economics*, Vol. 47, pp. 171-205

Bundesbank (1997) : *Monatsbericht März 1997*, Deutsche Bundesbank, Frankfurt, p. 24

Buti, M. D. And H. Ongena (1997): Budgetary Policies during Recession - Retrospective Application of the "Stability and Growth Pact" to the Post-War Period; European Commission, DG II Economic Papers no. 121, May.

Calvo, G. (1988): Servicing the Public Debt: The role of Expectations; *American Economic Review* 78, reprinted in G. Calvo: *Money, Exchange Rates and Output*; MIT Press Cambridge Mass. 1996

Cioccada, P., and Nardozi, G. (1996): *The High Price of Money. An Interpretation of World Interest Rates*; Clarendon Press Oxford

Clarida, R., and M. Gertler (1997): How the Bundesbank Conducts Monetary Policy; in Ch. Romer and D. Romer: *Reducing Inflation. Motivation and Strategy*, Chicago University Press, Chicago

Collignon, S. (1996) : *Geldwertstabilität für Europa*, Verlag Bertelsmann Stiftung, Gütersloh

Council of the European Communities/Commission of the European Communities (1992), *Treaty on European Union*, Office for Official Publications of the European Communities, Luxembourg

Crafts, N., and G. Toniolo (1996): *Economic Growth in Europe since 1945*, Cambridge University Press, Cambridge

Delors Report (Committee for the Study of Economic and Monetary Union), 1989: *Report on Economic and Monetary Union in the European Community*, Office for Official Publications of the European Communities, Luxembourg

Easterly, W., C.A. Rodríguez and K. Schmidt-Hebbel (1994): *Public Sector Deficits and Macroeconomics Performance*, The World Bank, Washington

Eichengreen, B. (1996): Institutions and Economic Growth: Europe after World War II; in Crafts and Toniolo (1996): *Economic Growth in Europe since 1945*, Cambridge University Press, Cambridge

European Commission (1997): *Medium Term Projections 1997 - 2001*, II/424/97, July, Brussels

Fischer, S. (1993): The role of macroeconomic factors in growth; *Journal of Monetary Economics*; 32,3; December 1993

Frenkel, J.A. and A. Razin (1996): *Fiscal Policies and Growth in the World Economy*, MIT Press, Cambridge

Giavazzi, F., and M. Pagano (1990): Can Severe Fiscal Contradictions be Expansionary? Tales of Two Small European Countries, *NBER Macroeconomics Annual*

Giavazzi, F., and M. Pagano (1995): Non-Keynesian Effects of Fiscal Policy Changes: International Evidence and the Swedish Experience, *NBER Working Paper 5332*, November

Gnan, E. (1994): Austria's Hard Currency Policy and European Monetary Integration; in: *De Pecunia*, Vol. II, No. 3, December

Giovannini, A., and L. Spaventa (1991): Fiscal Rules in the European Monetary Union. A No-Entry Clause; CEPR *Discussion Paper* no. 516, London

Gros, D. and N. Thygesen (1997): The relationship between economic and monetary integration: EMU and national fiscal policy; in: *European Monetary Integration*, Addison Wesley Longman, forthcoming

Hutchison, M., and K. Kletzer (1995): Fiscal Convergence Criteria, Factor Mobility and Credibility in Transition to Monetary Union in Europe; in: B. Eichengreen, J. Frieden, J. Von Hagen (eds.): *Monetary and Fiscal Policy in an Integrated Europe*, Springer Verlag Berlin/Heidelberg/New York

IMF (1996): *World Economic Outlook*, May

Issing, O. (1996): Gesunde Finanzen - Stabile Wahrung. Erfordernisse in Deutschland und Europa; in: Deutsche Bundesbank, *Auszuge aus Presseartikeln*, Nr. 19 v. 26. Marz, Frankfurt

King, M. (1997): Monetary Stability: Rhyme or Reason?; in: *Bank of England Quarterly Bulletin*, Feb. 1997, vol. 37, No. 1

Lamfalussy, A. (1989): Macrocourrelation of Fiscal Policies in an Economic and Monetary Union in Europe, annex to the Delors Report: *Report on Economic and Monetary Union in the European Community*, Office for the Official Publication of the European Communities, Luxembourg

Luzenberger, R. de, C. Imbriani and G. Marini, (1994): *Sustainability Issues in the Process of European Integration*

McCallum , B. (1984): Are Bond-financed Deficits inflationary? A Ricardian Analysis; in: *Journal of Political Economy*, vol. 92, no. II

Méltiz, I. (1997): Some Cross-Country Evidence about Debt, Deficits and the Behaviour of Monetary and Fiscal Authorities. *CEPR Discussion Papers* No. 1653; May 1997

Milesi-Feretti, G.M. (1997): Fiscal Rules and the Budget Process; *CEPR Discussion Paper* No. 1664, June, London

Mongelli, F. (1996): The Effects of European Economic and Monetary Union (EMU) on National Fiscal Sustainability; *IMF Working Paper* WP/96/72, July 1996, Washington

Phelps, E. (1961): The Golden Rule of Accumulation: A Fable for Growth men. *American Economic Review*, vol. 51

Quintos, C. (1995): Sustainability of the Deficit Process with Structural Shifts; *Journal of Business and Economic Statistics*, vol. 13, No. 4, October, pp. 409-417

Roeper, H. and W. Weimer (1996): *Die D-Mark. Eine deutsche Wirtschaftsgeschichte*; Societätsverlag, Frankfurt; p. 29

Romer, D. (1996): *Advanced Macroeconomics*; McGraw-Hill, New York, p. 86

Romer, Ch., and D. Romer (1997): *Reducing Inflation, Motivation and Strategy*; Chicago; University of Chicago Press

Sargent, T., and N. Wallace (1981): Some Unpleasant Monetarist Arithmetic, Federal Reserve Bank of Minneapolis, *Quarterly Review*, Fall, pp. 1-17

Schulmeister, S. (1996): *Zinssatz, Investitionsdynamik, Wachstumsrate und Staatsverschuldung*; Österreichisches Institut für Wirtschaftsforschung; September 1996 (an English version can be obtained by the author).

Trehan, B., and C.E. Walsh (1988): Common Trends, the Government's Budget Constraint and Revenue Smoothing, *Journal of Economic Dynamics and Control*, 12, pp. 425-444, North-Holland

Tanzi, V. and D. Fanizza (1995): Fiscal Deficits and Public Debt in Industrial Countries, 1970-1994. *IMF Working Paper* WP/95/49, May 1995

Tobin, (1986): The Monetary-Fiscal Mix: Long-Run Implications; in: *American Economic Review*, No. 76