by just a few percentage points. As a result, a joint budget of more than €800 billion was created. It was called the NextGenerationEU programme (NGEU). This programme makes financial resources available to countries that have been hardest hit by the pandemic. Half of these are in the form of transfers that do not have to be repaid; the other half is in the form of loans. The budget is financed by the joint issue of bonds, which means that member countries are jointly responsible for the service of the debt. The European Commission will create new sources of revenue to help repay the €800 billion of outstanding bonds (digital taxes, financial transactions tax, carbon border taxes). For more information, see European Commission (2021*b*).

The NGEU is supposed to be temporary, i.e. when the bonds come to maturity no new bonds are to be issued. However, it is doubtful whether it will remain temporary; it is more likely to become permanent.

## 11.2 Sustainability of government budget deficits

The major problem with the previous analysis is the underlying assumption that governments can create budget deficits to absorb negative shocks without leading to problems concerning the sustainability of these deficits. As many western European countries found during the 1980s and the 1990s, however, government budget deficits can lead to such problems.

The sustainability problem can be formulated as follows. A budget deficit leads to an increase in government debt, which will have to be serviced in the future. If the interest rate on the government debt exceeds the growth rate of the economy, a debt dynamic is set in motion that leads to an ever-increasing government debt relative to gross domestic product (GDP). This becomes unsustainable, requiring corrective action.

This debt dynamics problem can be analysed more formally starting from the definition of the government budget constraint (see Box 11.2 for more explanation):

$$G - T + rB = \frac{dB}{dt} + \frac{dM}{dt} \tag{11.1}$$

where G is the level of government spending (excluding interest payments on the government debt), $T$ is the tax revenue, $r$ is the interest rate on the government debt, $B$, and $M$ is the level of high-powered money (monetary base).

The left-hand side of equation (11.1) is the government budget deficit. It consists of the primary budget deficit $G - T$ and the interest payment on the government debt ($rB$). The right-hand side is the financing side. The budget deficit can be financed by issuing debt ($dB/dt$) or by issuing monetary base ($dM/dt$). In the following we represent the changes per unit of time by putting a dot above a variable, thus:

$$dB / dt = \dot{B} \text{ and } dM / dt = \dot{M} \tag{11.2}$$

As is shown in Box 11.2, the government budget constraint (11.1) can be rewritten as:

$$\dot{b} = -s + (r - g)b - \dot{m} \tag{11.3}$$

where $s$ = is the primary budget surplus as a percentage of GDP, $b$ is the debt-to-GDP ratio, $g$ is the growth rate of GDP and $\dot{m} = \dot{M} / Y$.

Equation (11.3) can be interpreted as follows. When the interest rate on government debt exceeds the nominal growth rate of GDP, the debt-to-GDP ratio will increase without bounds. The dynamics of debt accumulation can only be stopped if the primary budget (as a percentage of GDP) turns into a surplus ($s$ must be positive). Alternatively, the debt accumulation can be stopped by a sufficiently large revenue from money creation. The latter is also called 'seigniorage'. It is clear, however, that the systematic use of this source of finance will lead to inflation.

The nature of the government budget constraint can also be made clear as follows: one can ask under what condition the debt-to-GDP ratio will stabilize at a constant value. Equation (11.3) gives the answer. Set $\dot{b} = 0$. This yields:

$$(r-g)b = s + \dot{m} \tag{11.4}$$

Thus, if the nominal interest rate exceeds the nominal growth rate of the economy, it is necessary either for the primary budget to show a sufficiently high surplus ($s > 0$) or for money creation to be sufficiently high to stabilize the debt-to-GDP ratio. The latter option was chosen by many Latin American countries during the 1980s, and by some eastern European countries during the early part of the 1990s. It has also led to hyperinflation in these countries.

The important message here is that, if a country has accumulated sizeable deficits in the past, and if $r > g$, it will now have to run correspondingly large primary budget surpluses in order to prevent the debt-to-GDP ratio from increasing automatically. This means that the country will have to reduce spending and/or increase taxes. If $r < g$, as has been the case during the last few years, this constraint is less binding. In that case the underlying dynamics are for the debt-to-GDP ratio to decline automatically without the need to produce a positive primary balance. It should be noted that the fiscal rules were instituted during a period when $r$ tended to exceed $g$ systematically.

## BOX 11.2 Debts and deficits

In this box we derive the relation between debts and deficits. Let us start from the government budget constraint:

$$G - T + rB = \frac{dB}{dt} + \frac{dM}{dt} \tag{11.5}$$

where $G$ is the level of government spending (excluding interest payments on the government debt), $T$ is the tax revenue, $r$ is the interest rate on the government debt, $B$, and $M$ is the level of high-powered money (monetary base).

The left-hand side of equation (11.5) is the government budget deficit. It consists of the primary budget deficit ($G - T$) and the interest payment on the government debt ($rB$). We can write $G - T = -(T - G)$. We define $S = (T - G)$ and call $S$ the primary budget surplus. We will use the notion of primary budget surplus further on. Note that when S is negative we have a primary budget deficit. The right-hand side is the financing side. The budget deficit can be financed by issuing debt ($dB/dt$) or by issuing high-powered money ($dM/dt$). We will assume, however, that the monetary financing constitutes such a small part of the financing of the government budget deficit in the European countries that it can safely be disregarded. (In

the following we represent the changes per unit of time by putting a dot above a variable, thus $dB/dt = \dot{B}$). It is convenient to express variables as ratios to GDP. Let us therefore define:

$$b = \frac{B}{Y} \tag{11.6}$$

where $Y$ is GDP, so that $b$ is the debt-to-GDP ratio.

This allows us to write:

$$\dot{b} = \frac{\dot{B}}{Y} - B\frac{\dot{Y}}{Y^2} \tag{11.7}$$

or to use (11.6) and manipulating:

$$\dot{B} = \dot{b}Y + b\dot{Y} \tag{11.8}$$

Substituting (11.8) into (11.5) yields:

$$\dot{b} = -s + (r - g)b \tag{11.9}$$

where $s$ is the primary surplus as a percentage of GDP, $g$ is the nominal growth rate of GDP.

This equation defines the dynamics of debt. It says that in a world where the nominal interest rate, $r$, exceeds the nominal growth of the economy, $g$, the government must make sure that the primary budget shows a surplus. If not, i.e. if $s$ is negative, the debt-to-GDP ratio will increase without limit. This must surely lead to a default on the government debt. We can therefore impose a necessary condition for solvency, i.e.:

$$b = 0 \text{ or } (r - g)b = s \tag{11.10}$$

To give an example: assume $b = 1$ (the debt is 100 per cent of GDP). If $r - g = 2$ (the interest rate is 2 percentage points higher than the growth rate of GDP), then we need a primary surplus of at least 2 per cent of GDP to stabilize the debt-to-GDP ratio.

Note that this is a necessary condition. It may not always be sufficient. For example, the government debt ratio, $b$, may be stabilized at too high a level, so that when a large shock occurs the government may become unable (or unwilling) to continue to service the debt.

Another way to interpret this condition is as follows. Let us go back to equation (11.9). Assume that the primary budget balance is equal to zero. In that case, one can say that the government uses its tax revenues to finance spending, excluding spending on interest. This means that interest spending is not covered by taxation. As a result, the government is financing its interest payments by issuing new debt. We can now see that this will be explosive if $r > g$. In the latter case the debt (the numerator) is increasing at the rate $r$, while GDP (the denominator) increases at the lower rate, $g$. Thus the debt-to-GDP ratio increases without bound. In order to stop this 'Ponzi game',[4] the government will have to produce a surplus on the primary balance so that at least part of the interest payments is financed by taxes and not by issuing new debt.

It may be interesting to look at the interest rate – growth differential ($r - g$) in the Eurozone. We do this in Fig. 11.2. This shows the differential before and after the financial crisis. We observe something remarkable. Before the crisis Ireland, Spain, and Greece experienced a substantial negative differential ($r - g < 0$) while Italy and Germany had significant positive differentials ($r - g > 0$). This implied that the former countries could stabilize their debt-to-GDP ratios without being forced to create a surplus on their primary government balance; the latter countries could stabilize their debt-to-GDP ratio only by austerity, i.e. by producing a surplus on their primary balance. After the crisis several countries shifted position quite

*(Continued...)*

[4] 'Ponzi game' refers to a Mr Ponzi, who was operating in Boston in 1920 and attracted investors promising large rates of return. When these investors withdrew their money, Ponzi had to find new investors to finance these withdrawals because he did not make profitable investments himself. The scheme ultimately collapsed and Mr Ponzi was sent to jail.

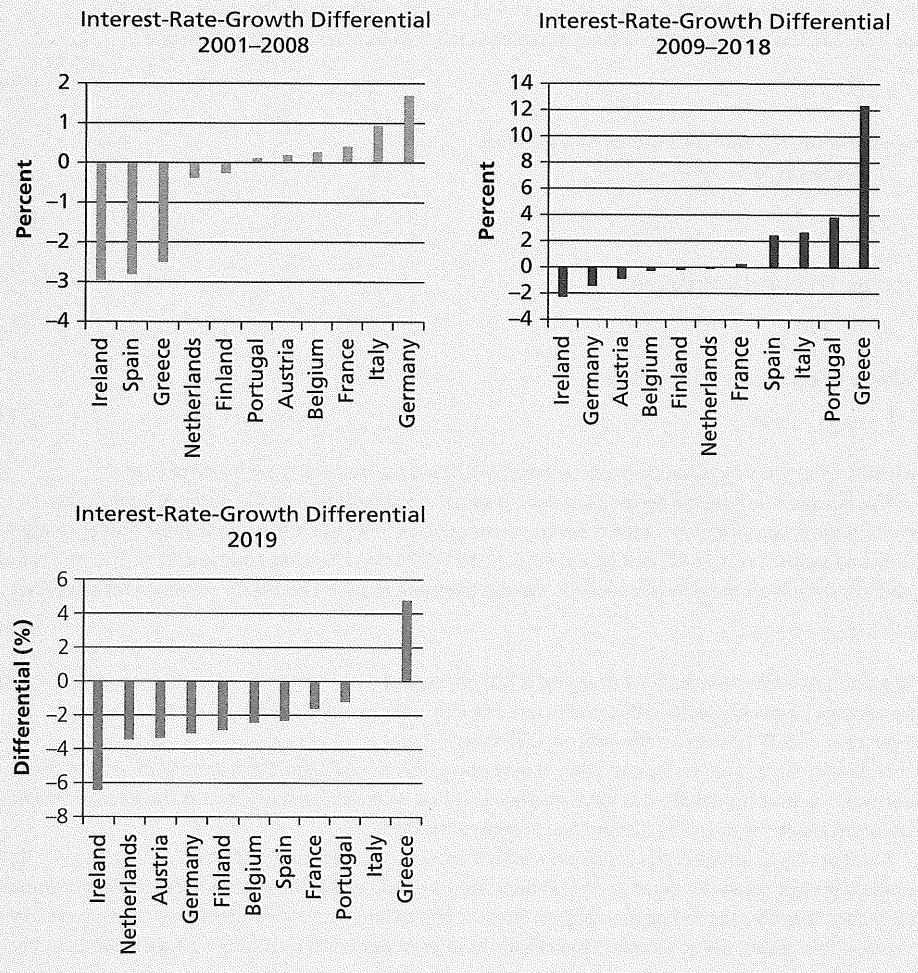


**Figure 11.2** Interest rate – growth differentials ($r - g$).
*Source:* Eurostat.

dramatically (Spain, Greece, Germany). In the post-crisis period we see that Ireland, Germany, Austria, Belgium, and Finland can stabilize their debt-to-GDP ratios without having to produce a surplus on their primary balances. This is not the case with Spain, Italy, Portugal, and Greece. We note, however, that more recently all countries, except Greece, have moved to the regime where $r - g < 0$, allowing them to stabilize the debt-to-GDP ratio without having to impose austerity (a surplus on the primary balance). Note also that in 2019 countries like Ireland, Netherlands, Austria, and Germany could run budget deficits exceeding 3 per cent of GDP while at the same time stabilizing their debt-to-GDP ratio. This had everything to do with the fact that GDP was growing much faster than the interest these countries paid on their debt.

The preceding discussion also makes clear that fiscal policies are not the flexible instrument that the optimum currency theory has led us to believe. The systematic use of this instrument leads to problems of sustainability when $r > g$, which forces countries to run budget surpluses for a number of years. Put differently, having used them once, it will not be possible to use these fiscal policies again until many years later.

This analysis of the sustainability of fiscal policies has led to a completely different view of the desirable fiscal policies of member states in a monetary union. This view found its reflection in the Maastricht Treaty, which defines budgetary rules that countries have to satisfy in order to enter the EMU (the 3 per cent deficit and the 60 per cent debt norms).[5] It also found expression in the so-called 'Stability and Growth Pact' that the European Union (EU) heads of state, at the insistence of Germany, agreed would have to be implemented after the start of the EMU. This Pact is quite important as it is supposed to guide national budgetary policies in the EMU. Its main principles are described in more detail in Box 11.3.

First, countries will have to aim to achieve balanced budgets over the medium run (i.e. over the business cycle). This is quite a formidable change compared to the Maastricht Treaty's 60 per cent debt norm. It means that countries should not add new debt over the business cycle. Another way to interpret this balanced budget requirement is that the SGP forces countries to bring down their debt-to-GDP ratio to 0 per cent (in the long run). Surprisingly, this fundamental change in the objectives of fiscal policy was little noticed at the time the SGP was signed. Second, countries with a budget deficit exceeding 3 per cent of GDP will be subject to fines. These fines can reach up to 0.5 per cent of GDP.

The application of fines is the result of a long process, during which countries are first warned by the European Commission and then given the chance to redress their budgetary situation. If all else fails, fines can be imposed, but these fines can only be decided upon by a qualified majority of the Council of Ministers of Finance.

As a result of the sovereign debt crisis, the voting procedure was changed. From now on a 'reverse majority voting' procedure will be used. This means that the Commission's proposals to apply fines will be accepted unless a qualified majority in the Council opposes it. This new voting procedure should make it easier to apply sanctions. In general, since the eruption of the sovereign debt crisis, the SGP has been considerably tightened. For more detail, see Box 11.3.

### BOX 11.3 The Stability and Growth Pact: some institutional detail

The Stability and Growth Pact (SGP) consists of two parts: a surveillance part and a dissuasive part.[6]

The *surveillance* part lays down an early warning system, the objective of which is to prevent countries from producing excessive budget deficits. Its main features are the following:

- Members of the Eurozone have to submit Stability Programmes, which focus on public finance and which aim to bring about 'a budgetary position close to balance or in surplus and the adjustment path towards this objective'.
- These programmes are examined by the Council, which formulates its opinion (based on a recommendation of the Commission) on whether the countries' budgetary programmes have sufficient safety margins to avoid excessive deficits.
- These programmes are monitored by the Council, which can formulate a recommendation to take the necessary adjustment measures if a country's budgetary position deviates significantly from the medium-term objective.

*(Continued...)*

[5] The drafters of the Maastricht Treaty were very much influenced by the Delors Report, which was the first to express the need for strict rules on budgetary policies.

[6] The description of the SGP in this box is based mainly on Cabral (2001).

The *dissuasive* part is triggered when the surveillance part does not produce results, or when excessive deficits emerge unexpectedly. The main aspects of the dissuasive part are the following:

- There is first the definition of the excessive deficit. This definition is based on Article 104 of the Maastricht Treaty, which defines a budget deficit as excessive if it exceeds the reference value of 3 per cent of GDP, 'except if it is exceptional and temporary and the deficit ratio remains close to the reference value'. The treaty, however, does not define what is exceptional. The Pact gives content to the notion of exceptional deficit in the following way.
- A budget deficit in excess of 3 per cent can be considered exceptional if: (i) it results from an unusual event outside the control of the member state (e.g. a natural disaster); or (ii) it results from a severe economic downturn. The latter is defined as an annual decline of GDP of at least 2 per cent. In this case, the Council decides that there is no excessive deficit and the procedure is stopped. If the annual fall in real GDP is between 0.75 per cent and 2 per cent, the member state in question can present arguments justifying the excess deficit. If the decline in real GDP is less than 0.75 per cent, then the country involved should not invoke the exceptionality of the deficit.
- After a recommendation by the Commission, the Council decides whether or not there is an excessive deficit. If the Council decides that an excessive deficit exists, it makes a recommendation to the member state to take effective action within four months to correct its deficit. If the member country fails to comply, then the Council sends a notice giving another two months to comply. If this does not lead to corrective action, then sanctions are imposed within two months. (The whole procedure is a lot more complicated than the summary given here. The interested reader can consult Cabral 2001.)
- If the Council decides to impose a sanction, the country involved will have to make a non-interest-bearing deposit. The amount of this deposit (*Dep*) is given by the formula: $Dep = 0.2 + 0.1(Def - 3)$, where *Def* is the deficit. All the variables are expressed as percentages of GDP. To give an example: if a country has a deficit of 4 per cent, then the deposit is: $Dep = 0.2 + 0.1(4 - 3) = 0.3$. It will have to make a deposit equal to 0.3 per cent of GDP. The maximum amount of the deposit is set at 0.5 per cent.
- If, within two years, the excessive deficit has not been corrected, then the deposit is turned into a fine. If, however, before these two years have elapsed, the Council considers that the excessive deficit has been corrected, the deposit is returned to the country in question.

Up to now, these sanctions have never been applied. The reader will be surprised at so much political *naïveté* from the drafters of the SGP when they believed that such sanctions could ever be enforced on sovereign nations.

Since the eruption of the sovereign debt crisis in the Eurozone, some of the provisions of the SGP have been tightened. The aim is to prevent future unsustainable increases in government deficits and debts. The main new provisions are:

- The sanctioning procedure has been made more automatic by a change in the voting procedure. When the European Commission issues a warning or a sanction against a particular country, this will be accepted automatically by the Council unless a qualified majority can be found to block it.
- National governments will have to present national budgets to the Commission before these are presented in national parliaments, giving the Commission a chance to make an assessment and formulate recommendations. This is called the 'European Semester'.
- The Commission will have more power to obtain information from national governments.
- A fine of 0.2 per cent can be imposed on countries that are found to have falsified statistics on deficits and debts.

At the start of the pandemic in 2020, the European Commission invoked the escape clause of exceptional conditions to suspend the fiscal rules of the SGP. It is unclear at the time of writing when they will be reinstated again. All this has led to a lot of discussion on whether or not these rules should be reformed. We will come back to this issue.

A third aspect of the SGP is that the fines will not be applied if the countries in question experience exceptional circumstances, i.e. a natural disaster or a decline of their GDP of more than 2 per cent during one year. In cases where the drop in GDP is between 0.75 per cent and 2 per cent, the country involved can make its case before the Council of Ministers, invoking exceptional circumstances that justify the excess deficit. Countries that experience a drop in their GDP of less than 0.75 per cent have agreed not to invoke exceptional circumstances.

The Maastricht Treaty and even more so the SGP take the view that fiscal policies in a monetary union should be subjected to rules. Let us evaluate the arguments for rules on government budget deficits in a monetary union.

## 11.3 The argument for rules on government budget deficits

The basic insight of this view is that a country that finds itself on an unsustainable path of increasing government debt creates negative spillover effects for the rest of the monetary union. A country that allows its debt-to-GDP ratio to increase continuously will have increasing recourse to the capital markets of the union, thereby driving the union interest rate upwards. This increase in the union interest rate in turn increases the burden of the government debts of the other countries. If the governments of these countries choose to stabilize their debt-to-GDP ratios, they will be forced to follow more restrictive fiscal policies. Thus, the unsustainable increase in the debt of one country forces the other countries to follow more deflationary policies. It will therefore be in the interest of these other countries that a control mechanism should exist restricting the size of budget deficits in the member countries.

There is a second spillover that may appear here. The upward movement of the union interest rate, following the unsustainable fiscal policies of one member country, is likely to put pressure on the European Central Bank (ECB). Countries that are hurt by the higher union interest rate may pressure the ECB to relax its monetary policy stance. Thus, unsustainable fiscal policies will interfere with the conduct of European monetary policy. Again, it may be in the interest of the members of the union to prevent such a negative spillover from occurring by imposing limits on the size of government budget deficits.

These arguments based on the spillover effects of fiscal policies appear reasonable. They have, however, been subjected to criticism.[7] The criticism has been twofold. One aspect is theoretical and concerns the role of capital markets. The second has to do with the enforceability of such rules.

1. *The efficiency of private capital markets.* Implicit in the spillover argument, there is an assumption that capital markets do not work properly. Let us now suppose that capital markets work efficiently, and ask what happens when one country, say Italy, is on an unsustainable debt path. Does it mean that the union interest rate must increase, i.e. that the interest rate to be paid by German, Dutch, or French borrowers equally increases? The answer is negative. If capital markets in the monetary union work efficiently, investors recognize that the debt problem is an Italian problem. The market then attaches a risk premium to Italian government debt, reflecting a higher risk of default. The German government is not affected by this. It is able to borrow at a lower interest rate, because the lenders recognize that the

[7] See e.g. Buiter and Kletzer (1990); Van der Ploeg (1991); Von Hagen (1991*a*); and Wyplosz (1991).