

# ***Public Investment, the Stability Pact and the ‘Golden Rule’***

FABRIZIO BALASSONE and DANIELE FRANCO\*

## ***Abstract***

The fiscal rules set in the Treaty of Maastricht and in the Stability and Growth Pact have sometimes been criticised as an excessively binding constraint for appropriate counter-cyclical action. The risk that the rules may permanently reduce the public sector’s contribution to capital accumulation has also been pointed out. In this framework, the adoption of a ‘golden rule’ has been suggested. Starting from the recent debate, this paper tackles two questions: (a) the implications of the Pact for public investment and (b) the pros and cons of introducing a golden rule in EMU’s fiscal framework, given the objectives of low public debts and adequate margins for a stabilising budgetary policy. The analysis suggests that the rules set in the Treaty and in the Pact may negatively influence public investment spending. However, the golden rule, although intuitively appealing, does not seem to be an appropriate solution to the problem.

*JEL classification:* H54, H6, E61.

## **I. INTRODUCTION**

The slowdown in growth in 1998 and its possible implications for the level of unemployment raised worries and doubts concerning the fiscal rules set in the Treaty of Maastricht and in the Stability and Growth Pact. It has been argued that these rules may represent an excessively binding constraint for appropriate counter-cyclical action and that the attempt to reach rapidly a budget position ‘close to balance or in surplus’ may worsen the slowdown. The risk that the rules

---

\*Research Department, Banca d’Italia.

The views expressed in this paper are those of the authors and do not commit the Banca d’Italia. The authors wish to thank Marc Robinson and two anonymous referees for helpful comments and for suggesting improvements. All remaining mistakes are their own.

may permanently reduce the public sector's contribution to capital accumulation has also been pointed out.

In this framework, the adoption of a 'golden rule' has been suggested. The rule would exclude investment spending from the computation of the fiscal parameters relevant to the Excessive Deficits Procedure.<sup>1</sup> In the opinion of those supporting the amendment, this would allow EU Member States to loosen their fiscal stance while positively affecting long-run growth: debt finance would thus not harm future generations.

Underlying the debate, there are several issues. It is important to separate problems concerning the current economic situation from those concerning the design of the EMU's fiscal constitution *per se*. The solution to the potential conflict between the objective of moving towards a close-to-balance position and the need to avoid a worsening of short-term economic prospects may not require changes to the rules set in the Treaty and in the Pact. Furthermore, the risk that a revision of the rules could harm the credibility of the commitment to fiscal sustainability, which in turn may prevent the adoption of the appropriate policy mix, must be taken into account.

Also, the need to allow more room for counter-cyclical budgetary action and the need to increase public investment should be dealt with separately. As to the public sector's contribution to capital accumulation, one cannot simply assume that an increase in public investment spending is always superior to a cut in taxes, an increase in outlays for human capital formation or a reduction in the deficit.

Finally, it is necessary to evaluate whether the golden rule is consistent with the objectives underlying present European fiscal rules.<sup>2</sup> These rules aim to reduce the risk that unbalanced budgets in some Member States may harm other members of the Union, and even endanger EMU, through financial instability and inflationary pressures. The rules also aim to allow countries to adopt the appropriate policy mix when dealing with both symmetric and asymmetric shocks. The reduction of deficits and debts, necessary for reaching both objectives, may find an obstacle in the golden rule, depending on the way the rule is implemented.

Starting from the recent debate, this paper tackles two issues: (a) the implications of the Pact for public investment and (b) the pros and cons of introducing a golden rule in EMU's fiscal framework, given the objectives of low public debts and adequate margins for stabilisation policy. The analysis suggests that the rules set in the Treaty and in the Pact may negatively influence

---

<sup>1</sup>This point of view is taken by Modigliani et al. (1998). Opinions in favour of some kind of golden rule have also been expressed by European Commissioner Mario Monti. It should be noted that, when defining an 'excessive deficit', the Treaty does not discriminate between current and capital outlays; however, it provides for the Commission's Report on Excessive Deficits to take into account a list of relevant factors and, among those, 'whether government deficit exceeds government investment expenditure' (article 104c(3)).

<sup>2</sup>See, for example, European Commission (1997).

public investment. However, the golden rule, although intuitively appealing, does not seem to be an appropriate solution to the problem.

The paper is organised as follows. Section II examines the implications of a balanced budget for public investment both in the long run, when the debt reaches the new equilibrium level, and during the transition towards such equilibrium. Section III reviews the empirical evidence on the link between fiscal consolidations and reductions in public investment. Section IV reviews the literature on the effects of public investment on growth in order to assess the possible consequences of a reduction in investment spending. Section V highlights the difficulty in reconciling different specifications of the golden rule with EMU's fiscal framework. Section VI summarises the main conclusions.

## **II. THE STABILITY AND GROWTH PACT AND PUBLIC INVESTMENT**

The achievement of budget positions 'close to balance or in surplus' implies that most capital expenditure will have to be funded from current revenues. Hence it will no longer be possible to spread the cost of an investment project over all the generations of taxpayers who benefit from it. This has two main implications which are analysed below:

- there is a disincentive to undertake large projects producing deferred benefits and entailing a significant gap between current revenues and current expenditures;
- the disincentive will be stronger while the deficit is being reduced:<sup>3</sup> the above-mentioned gap will grow if the flow of investment stays unchanged; the gap will remain larger than the initial level until the decline in interest expenditure induced by the reduction of the debt equals the decline in the deficit.

Concerning the first consequence, in Balassone and Franco (1999), we show how the introduction of a deficit ceiling can imply a reduction in investment in a two-period model where a policymaker with a finite horizon maximises disposable income and the latter is positively affected by investment with a lag. The finite horizon suggests a political economy interpretation of the result. Without a ceiling, the policymaker, who cares about economic performance only when he or she is in power, can run deficits and invest in the first period without reducing disposable income. With a ceiling, investment will reduce disposable income in the first period, and the policymaker invests less.

---

<sup>3</sup>The idea that investment is reduced more than other items during fiscal consolidations is largely shared in the literature. For example, Oxley and Martin (1991) point to 'the political reality that it is easier to cut back or postpone investment spending than it is to cut current expenditure' (p. 161); De Haan, Sturm and Sikken (1996) argue that investment '[is] the least rigid component of expenditure' (p. 108).

However, the introduction of a ceiling implies a reduction of investment also in the case of a benevolent planner aiming to maximise social welfare. In Barro (1979), given an expenditure profile, the efficiency loss caused by distortionary taxation is minimised if the tax rate is constant (tax-smoothing). If a budget constraint is introduced, indivisible investment projects may have welfare costs (the tax profile is no longer smooth); if the expenditure profile is not given, these costs may induce a reduction in investment.

Finally, since investments produce deferred benefits, the means of financing them (tax rather than debt) also affect intergenerational equity. Tax financing implies a welfare loss for the current generation and favours future ones: the former fully pays for a project whose benefits will partly accrue to the latter. When a budget constraint is introduced, it is then possible that voters will prefer a reduction in capital expenditure to an increase in taxes or a reduction in current outlays (from which they fully benefit).

The disincentive would mainly apply to projects with very uneven cost distributions. With a homogeneous expenditure flow, the difference between tax and debt financing is limited:<sup>4</sup> only those generations living when the earliest projects are undertaken suffer a loss under tax finance; future generations will have to pay more or less the same, be it to finance interest on past debt (while new projects are financed via new debts) or to finance new projects (while past ones have already been paid for by past generations).

The transition to a lower deficit level is equivalent to an expenditure peak. If the flow of investment is unchanged, current generations will have to pay part of the new projects (the whole if the budget is balanced) while also paying interest on debts: taxes will have to be raised or current expenditures cut. For these generations, the transition would be less burdensome if the level of investment (producing deferred benefits) were reduced, so that a smaller tax increase (or current outlays reduction) would be needed.<sup>5</sup>

The problem can easily be seen with reference to the budget constraint:

$$(1) \quad T + B = G = C_p + I(D) + K \quad \Rightarrow \quad T - C_p = K + I(D) - B$$

where  $T$  is taxes,  $B$  the deficit,  $G$  overall outlays (made up by interest  $I$ , other current outlays  $C_p$  and investment  $K$ ). The burden for current generations is

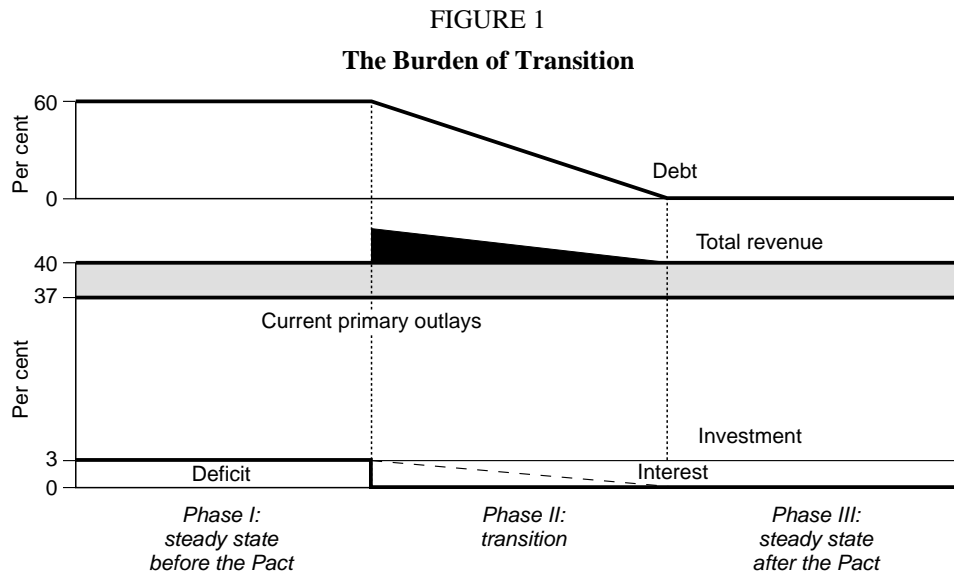
<sup>4</sup>Let us express all variables in real terms and assume that the deficit is equal to investment expenditure ( $I$ ) and constant as a ratio to GDP ( $Y$ ):  $I_t/Y_t = i_t = i \forall t$ . If  $i$  is such that the debt ( $D$ ) to GDP ratio converges (i.e. if  $i = \{g/(1+g)\}d$ , where  $d = d_t = D_t/Y_t \forall t$  and  $g$  is the growth rate of GDP), then since taxes ( $T$ ) must equal interest outlays ( $rD_{t-1}$ , where  $r$  is the interest rate) plus primary current expenditure ( $C$ ), we have  $T_t/Y_t = rD_{t-1}/Y_t + C_t/Y_t = rD_{t-1}/\{(1+g)Y_{t-1}\} + C_t/Y_t = \{r/(1+g)\}d + c_t \forall t$ , where  $c_t = C_t/Y_t$ . If the same level of  $i$  were to be financed by taxes, we would have  $T_t/Y_t = i + c_t = \{g/(1+g)\}d + c_t$ . The difference between the two cases once the debt ratio is stable would then be negligible if  $r \cong g$  (i.e. if the real interest rate were close to the real GDP growth).

<sup>5</sup>See Kitterer (1994) for an analysis based on an overlapping-generations general-equilibrium model. The Central Planning Bureau of the Netherlands estimates that the shift from deficit to tax finance would entail a welfare loss for current generations equal to 34 per cent of GDP (van Ewijk, 1997).

$T - C_p$ , since they give up resources ( $T$ ) in excess of the transfers and services that they receive ( $C_p$ ). This burden is compensated by the flow of services produced by investment projects that were undertaken in the past and financed by deficit. The burden is a positive function of interest payments (and hence of past debt,  $D$ ) and of present investment spending; it is reduced by the deficit, so that the transition to a lower deficit implies an increase in the burden, which is higher the higher are  $K$  and  $D$ ; *ceteris paribus*, it will be higher in those countries where deficit finance has also been used to pay for current expenditures.

The double burden issue is exemplified in Figure 1, which is drawn assuming both nominal GDP growth rate and nominal interest rate at 5 per cent, and an initial debt to GDP ratio at 60 per cent of GDP. The initial deficit ratio is 3 per cent of GDP; thereafter, a balanced budget is attained. Three phases can be identified:

1. The first, labelled 'steady state before the Pact', is a situation in which the overall deficit is constant at 3 per cent of GDP; this implies a balanced primary budget and a constant debt to GDP ratio. The primary balance is assumed to result from a 40 per cent revenue to GDP ratio, a 37 per cent current primary expenditure ratio and a 3 per cent capital expenditure ratio. There is a 3 per cent of GDP gap between revenues and current primary expenditures (the light-shaded area), which is assumed to be balanced by the flow of services produced by past public investments.



2. The second phase ('transition') opens with the abrupt reduction of the deficit to zero. This is obtained via an increase of 3 percentage points of GDP in the revenue ratio (a reduction in current primary outlays would have the same effect<sup>6</sup>). The gap between revenues and current primary outlays doubles. As the debt ratio gradually declines, so do interest expenditures, and the revenue ratio can slowly move back to 40 per cent. The additional burden induced by the reduction of the deficit during the transition phase corresponds to the dark-shaded triangle.
3. The third phase ('steady state after the Pact') begins when the debt ratio and interest expenditures are nil. The gap between revenues and current primary outlays is again at 3 per cent, balanced again by the flow of services produced by past investments.

The problems involved in the transition from deficit to tax financing of public investment are similar to those involved in the transition from a pay-as-you-go to a funded pension scheme.<sup>7</sup> In both cases, the burden on current generations depends on the speed of the transition and on the stock of debt. In countries where a shift to funded schemes is under way, the burdens determined by the two transitions will be summed.

### **III. FISCAL CONSOLIDATION AND INVESTMENT REDUCTION: THE EMPIRICAL EVIDENCE**

The link between fiscal consolidation and cuts in capital spending is confirmed by the experience of EU countries. In 1992, the year of the Treaty, the deficit ratio exceeded 3 per cent in nine countries. In 1997, for all these countries but Greece the ratio was at or below the threshold; all had reduced the investment to GDP ratio; all but Greece and the Netherlands had lowered the investment to primary outlays ratio (Table 1). Over the same period, investment ratios increased in three of the six countries that met the deficit criterion in 1992.

In some countries, the reduction of investment may reflect the privatisation process or changes in the classification of public utilities and other units (from general government to the private sector); for Austria, the latter factor accounts for half of the reduction between 1993 and 1997. In the UK, the use of 'public finance initiatives' (involving private capital in the realisation of projects of public interest) may explain about one-third of the reduction in public investment expenditure between 1993 and 1997. The contribution from sales of public real estate, which are recorded as negative investment outlays by general government, appears less relevant.

---

<sup>6</sup>If capital expenditures were reduced, the burden of transition would be shifted on to future generations who would suffer from the lower accumulated stock of public capital.

<sup>7</sup>Budgetary problems involved in this second transition are analysed in Holzmann (1997).

TABLE 1  
**Deficit and Investment in EU Countries**

	Deficit (% of GDP)		Investment (% of GDP)		Investment (% of primary outlays)	
	1992	1997	1992	1997	1992	1997
Italy	9.6	2.7	3.0	2.4	6.8	5.7
France	3.9	3.0	3.5	3.1	6.9	6.1
Germany	2.6	2.7	2.8	1.9	6.1	4.3
UK	6.2	1.9	2.1	1.1	5.2	3.0
Spain	3.8	2.6	4.1	3.1	9.7	7.9
Belgium	6.9	2.1	1.5	1.4	3.4	3.2
Denmark	2.1	-0.7	1.7	1.8	3.2	3.4
Greece	12.8	4.0	3.5	3.3	10.1	10.2
Ireland	2.5	-0.9	2.0	2.2	5.9	7.1
Luxemburg	-0.8	-1.7	5.4	4.9	n.a.	n.a.
Netherlands	3.9	1.4	2.1	1.9	4.2	4.2
Portugal	3.0	2.5	3.8	4.3	10.7	10.9
Austria	2.0	2.5	3.3	2.6	6.9	5.3
Finland	5.9	0.9	3.5	2.7	6.0	5.5
Sweden	7.7	0.8	2.7	2.4	4.3	4.2

Source: ESA79 data.

Similar evidence emerges when considering data from the last two decades. Between 1980 and 1997, we identify 32 episodes of lasting and significant budget consolidation in EU countries: in 25 cases, the ratio of investment to GDP decreased; in 23, the ratio of investment to primary outlays decreased (Table 2).<sup>8</sup>

With the exception of Greece, Portugal and Spain, which, however, benefited from particular conditions (for example, EU support for infrastructure development), the ratios of investment to GDP and to primary outlays decreased in the EU between the first half of the 1980s and the 1995–97 period. With the exception of Greece, the larger reductions occurred in high-debt countries (Belgium, Ireland and Italy), where the investment to GDP ratio declined from an average of 3.7 per cent in 1980–84 to 2.3 per cent in 1995–97; at the same time, the deficit to GDP ratio decreased from 9.8 per cent to 4.2 per cent. In the rest of the EU, while the deficit decreased from 3.9 per cent to 3.4 per cent of GDP, investment was reduced from 3.2 per cent to 2.6 per cent (Figure 2). A similar picture emerges for the investment to primary outlays ratios (Figure 3).

<sup>8</sup>By 'lasting and significant improvement', we mean a reduction of the deficit ratio for at least two years and by at least 1.5 percentage points of GDP. Luxemburg is not included in the analysis. Similar evidence is also reported by Roubini and Sachs (1989) and by De Haan, Sturm and Sikken (1996) with reference to different time-spans and using a sample of OECD countries.

The growth of deficit and investment in low-debt countries in the first half of the 1990s may reflect expansionary policies implemented in response to a cyclical downswing: this opportunity was not available to countries where fiscal consolidation was still under way. During the 1990s, the investment to GDP ratio was significantly lower in high-debt countries than in low-debt countries.

TABLE 2  
**Deficit Reduction and Changes in Investment in EU Countries, 1980–97**

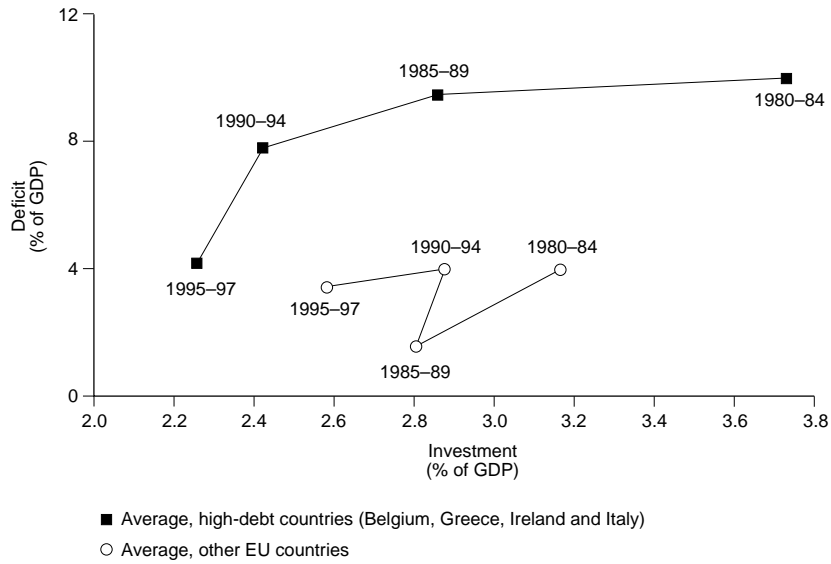
	<i>Period</i>	<i>Deficit improvement</i>	<i>Change in ratio of investment to GDP</i>	<i>Change in ratio of investment to primary outlays</i>
Italy	1985–89	2.5	–0.4	–0.9
	1990–97	8.4	–0.9	–1.7
France	1985–89	1.7	0.2	0.8
	1994–97	2.8	–0.1	–0.1
Germany	1981–85	2.5	–0.6	–1.4
UK	1984–89	4.9	–0.3	0.0
	1993–97	6.0	–0.8	–1.7
Spain	1985–87	3.8	–0.3	–0.4
	1995–97	4.7	–0.7	–1.2
Belgium	1983–85	2.6	–0.8	–1.2
	1986–90	3.7	–1.0	–1.7
	1993–97	5.0	–0.2	–0.4
Denmark	1982–86	12.5	–0.8	–1.7
	1994–97	3.5	0.0	0.3
Greece	1985–87	2.0	–1.0	–2.4
	1995–97	6.3	0.0	0.7
Ireland	1982–84	3.8	–1.2	–2.4
	1985–89	8.9	–2.0	–3.5
	1995–97	3.1	0.0	0.4
Netherlands	1982–85	3.0	–0.6	–0.8
	1995–97	2.6	–0.1	0.0
Portugal	1985–89	4.1	0.6	1.8
	1993–97	3.6	0.3	0.3
Austria	1983–85	1.5	–0.2	–0.6
	1987–90	1.8	–0.2	–0.1
	1995–97	2.7	–0.2	–0.2
Finland	1983–86	2.4	–0.5	–1.6
	1987–89	5.3	–0.7	–1.1
	1993–97	7.1	–0.1	0.6
Sweden	1982–84	4.1	–0.5	–1.0
	1985–87	8.0	–0.5	–0.1
	1993–97	11.4	1.3	–0.9

Source: ESA79 data.



FIGURE 2

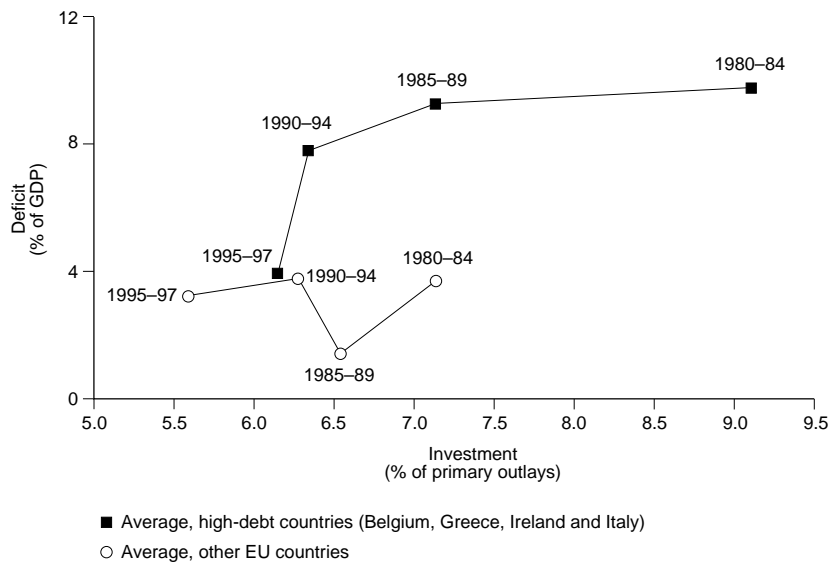
**Investment and Deficit as Percentages of GDP: EU Countries**



Source: ESA79 data.

FIGURE 3

**Deficit as a Percentage of GDP and Investment as a Percentage of Primary Outlays: EU Countries**



Source: ESA79 data.

#### IV. THE EFFECTS OF A REDUCTION IN PUBLIC INVESTMENT EXPENDITURE

The reduction in public investment is a problem if, as implicitly assumed in the previous sections, it reduces the productive and growth potential of the economy. However, the empirical evidence on the effects of public investment is not unequivocal.<sup>9</sup>

Various techniques have been used to measure the impact of public capital. Direct estimation of a production function dates back to Mera (1973) and Ratner (1983).<sup>10</sup> Using this approach, Aschauer (1989) revived the debate. He found that non-military public capital is a significant input to a national production function for the US and that the implied marginal product of public capital is high; he argued that the slowdown in public capital growth in the US during the 1970s and 1980s explains the decline in productivity growth that occurred over the same period. Aschauer's work spurred a literature aimed at refining his method and results (see the reviews in Eberts (1990), Munnell (1992) and Gramlich (1994)). Many studies initially confirmed (in sign if not in value) Aschauer's results also using US state-level panel data. However, subsequent efforts have found that, when controlling for state fixed effects, the positive infrastructure–output link found in OLS and random effects models disappears (Holtz-Eakin, 1994; Garcia-Milà, McGuire and Porter, 1996; Kelejian and Robinson, 1997); similar results have been obtained by Evans and Karras (1994) using a panel of seven OECD countries.<sup>11</sup>

The statistical measurement of the effect of public capital on private production encounters several problems: the causality direction is difficult to assess, there is potential endogeneity of inputs and outputs, time-series may not

---

<sup>9</sup>The implications of deficit financing of public investment also raise doubts from a theoretical point of view. Among the relevant issues, the possibility of crowding-out should be mentioned. A review of the theory is provided by Dalamagas (1995).

<sup>10</sup>Cost function estimations have also been used (see the references in Dalenberg, Partridge and Rickman (1998)). In Dalenberg et al. (1998), the analysis focuses on the relationship between public infrastructure and private employment using a labour demand function: 'public highway capital is significantly related to state employment growth in all specifications' (p. 46). Also, the effects of public investment on private investment have been investigated: Erenburg (1993) finds a significant positive relationship between the two variables at state level for the US. Overall, the results are ambiguous.

<sup>11</sup>The production function method is based on an aggregate production function where public capital ( $G$ ) is a factor of production ( $Q$ ) together with private capital ( $K$ ) and labour ( $L$ ):

$$Q = MFP \times f(K, L, G)$$

where  $MFP$  (multifactor productivity) is the residual after subtracting from the growth in total output the direct contributions from capital and labour. Subsequent to the specification of the function (usually a Cobb–Douglas) and of the error term (a typical structure for a panel would be  $\varepsilon_{it} = f_i + g_t + m_{it}$  where  $f$  is a country-specific effect,  $g$  is a time-specific component and  $m$  is an identically and independently distributed error), a regression analysis is conducted to check whether the coefficient of  $G$  is positive and significant. The literature shows that the results of the analysis are strongly dependent upon the assumptions concerning  $f$  and  $g$ ; specifically, the presence of significant productivity effects from public capital seems to depend on the hypothesis that  $f = 0 \forall i$ .

be stationary, the proper treatment of fixed and random effects is an unsettled issue, and the measurement of the stock of public capital or of the net addition to the stock generated by the annual flow of public investment is often inadequate (see the review in Hurst (1994)).

To this effect, the Italian experience clearly indicates that the ratio of investment to GDP is not a good indicator of variations in the stock of public capital: the Italian ratio has long been among the highest in western countries without improving Italy's relative position in terms of infrastructures.<sup>12</sup> Besides the obvious issue of amortisation, the result may also reflect improper management or any other source of inefficiency. Furthermore, a large part of the infrastructures presumably affecting productivity and growth is not included among general government investment as the institutions responsible for such infrastructures are not part of general government (this is frequently the case for energy, telecommunications and railways).

Hence, while there is a consensus that private sector production of goods and services depends crucially upon an adequate infrastructure of roads, electricity, telecommunications, water and other similar facilities, the public investment to GDP ratio cannot be the sole indicator of year-to-year changes in the stock of public capital.

The problem of efficiency of public investment is also stressed by Girard, Gruber and Hurst (1994 and 1995), who argue that 'the different quality of investment has played a significant role in the different economic growth experiences of the EU, Japan and USA' (1995, p. 731) and by Girard and Hurst (1994), who argue that a suboptimal public capital stock is consistent with a too-high rate of public capital accumulation, i.e. 'that there is some maximum rate at which viable projects can be prepared' (p. 53).<sup>13</sup>

## **V. WHICH 'GOLDEN RULE' FOR THE MONETARY UNION?**

The usefulness of a dual budget has been long debated, since the 1930s, when a dual budget was proposed in order to foster the acceptance of using public debt to finance investment. It is still an unsettled issue, which has been tackled in different ways in different countries and at different times.<sup>14</sup> Sweden, for example, introduced the dual budget in 1937 and suppressed it in 1980.

---

<sup>12</sup>Comparative analyses show that the stock of infrastructure in Italy is currently 10 per cent lower than the EU average; a similar gap was estimated for the mid-1980s. See, for example, Pontolillo (1998).

<sup>13</sup>De la Fuente (1997), using a sample of OECD countries, finds that the elasticity of GDP with respect to investment expenditure decreases rapidly as outlays increase and can even assume negative values as a consequence of distortions and crowding-out induced by public intervention.

<sup>14</sup>Proposals to exclude capital outlays from the operating budget and to include depreciation of government capital stock date back at least to Musgrave (1939). The issue is reviewed, for example, in Goode and Birnbaum (1955), Steve (1972), Premchand (1983), Poterba (1995) and Robinson (1998 and 1999).

The separation of current and capital operations is attractive in various respects. One of its main advantages is the possibility of spreading the costs of durables over the years during which they will be used. However, it has been noted that it is necessary to be careful about which expenditures should be included in the capital account, otherwise the dual budget would result ‘... in a preference for expenditures on physical assets rather than greater spending for intangibles such as health or education’ (Colm and Wagner, 1963, p. 125). Clearly, there are current expenditures, such as those increasing human capital, that can give a relevant contribution to growth.<sup>15</sup> Moreover, the possibility of borrowing, without strict limits, in order to finance investments can lower the attention paid when evaluating the costs and benefits of each project. Contrary to what happens in the private sector, there would be no mechanism to penalise public institutions investing in low-revenue projects.

Besides taking into account the above-mentioned aspects, the proposal to introduce such a rule in EMU’s fiscal framework must be evaluated with regard to its consistency with the objectives of EMU’s fiscal rules and to its impact upon the effectiveness of the surveillance procedure set to safeguard their enforcement.

The reference values and the targets defined in the Maastricht Treaty and in the Stability and Growth Pact do not distinguish between current and capital outlays. The latter are only mentioned among the other relevant factors for evaluating excessive deficits (article 104c(3)); investment expenditure must be specified in the Convergence Programmes that each Member State will submit annually to the Council and the European Commission.

The objectives of the Treaty and the Pact are a sound fiscal stance (to this end, quantitative limits are set for the deficit and the debt to GDP ratios) and sufficient room for counter-cyclical action (to this end, given the above-mentioned limits, a medium-term target of a budget position close to balance or in surplus is set).<sup>16</sup>

The Ecofin Council has subsequently made clear that the medium-term target is to be obtained ‘over the cycle’; in other words, it may be thought of as applying to structural budgets, around which automatic stabilisers will be operating and, if necessary, discretionary interventions will be made.<sup>17</sup> The lower

---

<sup>15</sup>The inclusion in the capital account (which can be debt-financed) of all expenditures contributing to human capital accumulation would imply high levels of deficits and pose serious classification problems. One should also take into account that part of expenditures replaces existing capital. Modigliani and Padoa Schioppa Kostoris (1998) estimate that, in Italy, gross public expenditure for ‘development’ amounts to 15 per cent of GDP; the corresponding net figure would be 5 per cent.

<sup>16</sup>For a review of the justifications put forward for the Pact and for an analysis of its potential macroeconomic implications, see European Commission (1997), Artis and Winkler (1997) and Eichengreen and Wyplosz (1998).

<sup>17</sup>This interpretation is supported by the Council Resolution of 16–17 June 1997, by the Council Regulation no. 1466/97 of 7 July 1997 and by the Opinion of the Monetary Committee of 12 October 1998 as endorsed by the Council.

this budget balance with respect to the 3 per cent threshold, the wider the margins for counter-cyclical policy. The actual value set by each country for the medium-term target depends on three elements: the size of foreseeable recessions; the elasticity of the budget to the cycle; and the size of discretionary interventions that may be needed to supplement automatic stabilisers.<sup>18</sup> Countries with debt ratios above 60 per cent of GDP should also take into account the need to decrease this ratio, at a satisfactory pace, towards the threshold. Moreover, an increase in the debt ratio during recessions should be avoided.<sup>19</sup>

Some indications can be drawn from the analysis of past output gaps. According to the European Commission's estimates, over the period 1960–97, the maximum output gap among EU Member States was, on average, 4 percentage points. Budget elasticity ranged from 0.4 for Greece to 0.9 in Sweden; on average, it was 0.6. For output gaps no larger than in the past, in most EU countries, a cyclically adjusted budget between 0 and 1 per cent of GDP would allow full operation of automatic stabilisers with no risk of breaching the 3 per cent threshold (Buti, Franco and Ongena, 1997 and 1998). Countries with cycles of lower amplitude and lower budget elasticity could stay closer to the upper part of this 'safety zone'.

A stylised version of the EMU fiscal constitution can be drawn as follows. The reference parameter is general government deficit ( $DEF$ ); the parameter is subject to an upper ceiling (3 per cent of GDP) and to a medium-term objective of a position close to balance or in surplus (to allow stabilisation policy without breaching the upper ceiling):

$$(2) \quad \begin{aligned} (DEF/GDP)_t &\leq 0.03 \quad \forall t \\ (DEF_s/GDP)_t &\in (0.00, 0.01) \quad \forall t \end{aligned}$$

where  $DEF_s$  is the structural deficit and the medium-term objective of a position close to balance or in surplus is operationalised in terms of the 'safety zone' defined above.

This characterisation allows us to distinguish three ways to introduce the golden rule:

---

<sup>18</sup>We follow the definitions of the IMF, the OECD and the European Commission: structural is synonymous with cyclically adjusted and only automatic reactions to the cycle (i.e. those induced by existing legislation) are considered (see Banca d'Italia (1999) for a review of methodologies and practices). It is common in the literature to term 'elasticity' rather than 'semi-elasticity' the relation between point changes in the deficit to GDP ratio and percentage changes in output.

<sup>19</sup>Article 104c of the Treaty says that, when the ratio is above 60 per cent of GDP, it must 'diminish sufficiently' and approach 60 per cent 'at a satisfactory pace'. If the ratio increases, the Excessive Deficits Procedure begins. It should be noted that, while the Treaty allows exceptions to the 3 per cent deficit criterion, it does not for the criterion concerning the debt ratio. The implications for stabilisation policy of the interaction between the deficit and the debt rule are analysed in Balassone and Monacelli (1999). Other relevant issues concerning the stabilisation function of fiscal policy in EMU are discussed in European Commission (1997).

- changing the reference parameter;
- changing the upper limit;
- changing the medium-term objective.

For each option, both the kind of investment outlays considered and the time-span to which one refers need to be specified.

The implications of the three types of reform can be explained by looking at solutions already adopted in some countries or proposed in the debate:

- The proposal made by Modigliani et al. (1998), suggesting the use of a deficit net of net investment, represents a reform of the first type.
- In Germany (article 115 of the Constitution), yearly deficits are allowed up to the level of gross investment in the federal budget (this includes items that differ from those considered in the National Accounts<sup>20</sup>); the adoption of this solution at EMU level would represent a reform of the second type.
- In the UK, public borrowing cannot exceed the level of net investment over the cycle (HM Treasury, 1997); the adoption of this solution for EMU member countries would represent a reform of the third type.

To evaluate the consistency of each solution with the objectives of the Treaty and the Pact, it is useful to refer to Figure 4, where the effects of each proposal on the structural deficit and on the margins for stabilisation policy are stylised. The curves show the level of the balance; they are traced assuming a 4 per cent of GDP difference between the position at the top of the upswing and the position at the bottom of the downswing (this is assumed to be sufficient for stabilisation purposes). The straight lines show the limits set to the deficit. Figure 4(a) depicts the present situation. The two curves refer to a balanced structural budget and a 1 per cent structural deficit. To simplify the analysis in the following subsections, reference is made only to the latter situation.

### *1. Proposal of Modigliani et al.*

Changing the reference parameter as proposed by Modigliani et al., the conditions in (2) would change to

$$(3) \quad \begin{aligned} \{[DEF - (INV-AMM)]/GDP\}_t &\leq 0.03 \quad \forall t \\ \{[DEF_s - (INV-AMM)]/GDP\}_t &= 0.01 \quad \forall t \end{aligned}$$

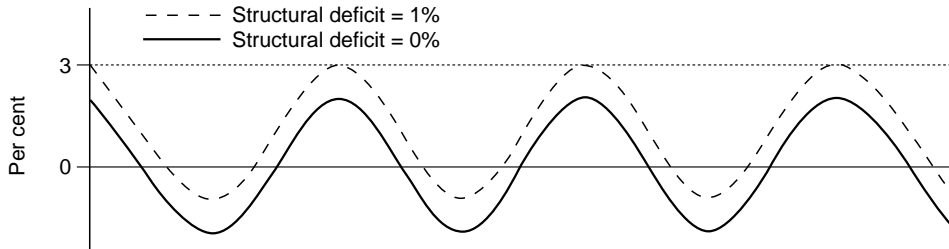
where *INV* and *AMM* are gross investment and amortisation respectively. These conditions amount to an increase in the upper limit and the medium-term

---

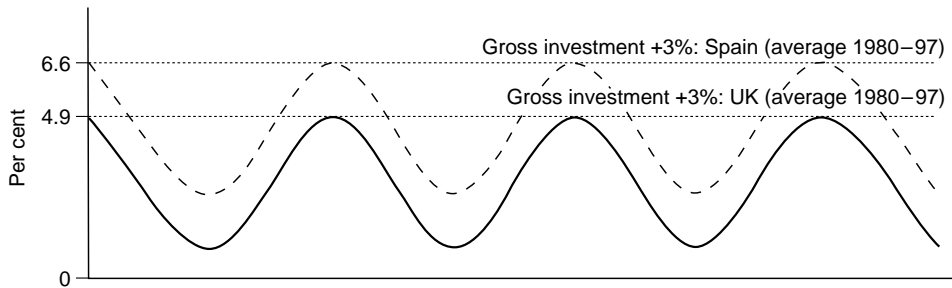
<sup>20</sup> 'Borrowing cannot exceed the total investment expenditure in the budget; exceptions are only allowed to avoid disturbances to the overall economic equilibrium'.

FIGURE 4

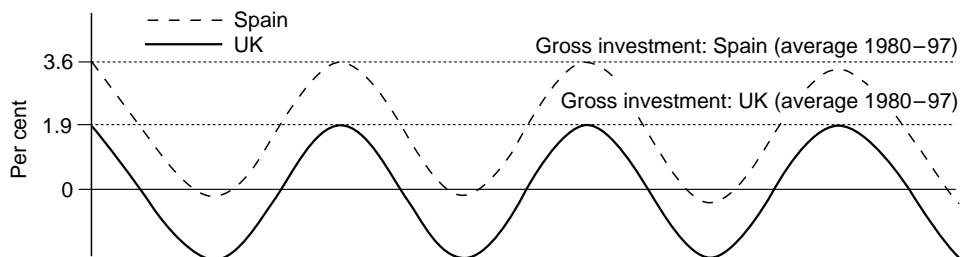
(a) The Stability Pact



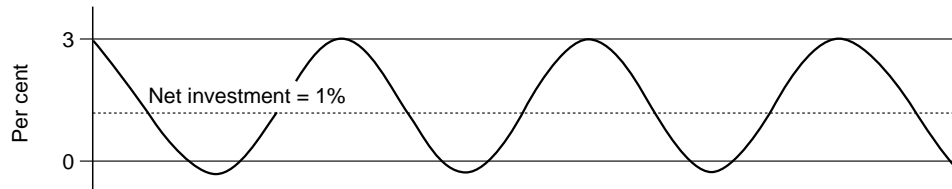
(b) Excluding Gross Investment



(c) Golden Rule: The German Model



(d) Golden Rule: The UK Model



objective presently set for the overall deficit. The increase depends on the country's level of net investment. In fact, (3) can be rewritten as

$$(3') \quad \begin{aligned} (DEF/GDP)_t &\leq 0.03 + [(INV-AMM)/GDP]_t \quad \forall t \\ (DEF_s/GDP)_t &= 0.01 + [(INV-AMM)/GDP]_t \quad \forall t. \end{aligned}$$

The margins for counter-cyclical action are unchanged with respect to (2). However, this proposal would determine an increase in the structural deficit which, for high-enough values of net investment, may be incompatible with the reduction of debt.

Reference to net investment is what a proper application of the dual budget requires. It has the merit of making the deficit level conditional upon the level of that part of expenditures that actually can increase a country's productive potential.<sup>21</sup> However, it also poses some problems for evaluation: (a) amortisation would have to be evaluated item by item, with high administrative costs, and (b) this would be complicated by the fact that public infrastructures have multiple functions and no market value. Furthermore, the margins for opportunistic behaviour may widen.<sup>22</sup> These problems are all the more relevant for the multilateral surveillance procedure.

The use of gross investment would not be in line with the correct application of a dual budget but would avoid the above-mentioned difficulties. The elements for the computation of the modified reference parameter (overall deficit and gross investment) are already available and communicated to the EU by Member States within the Excessive Deficits Procedure.<sup>23</sup> There would not be extra administrative costs and the leeway for opportunistic behaviour would be less pronounced.<sup>24</sup> However, the monitoring of results during the year would become more difficult.<sup>25</sup>

The constraints in (3') would change to

$$(3'') \quad \begin{aligned} (DEF/GDP)_t &\leq 0.03 + (INV/GDP)_t \quad \forall t \\ (DEF_s/GDP)_t &= 0.01 + (INV/GDP)_t \quad \forall t. \end{aligned}$$

In this case, if gross investment remained at the levels recorded on average over the last two decades, the resulting structural deficit would not be consistent with the objective of a sound fiscal stance. In Figure 4(b), two lines are traced

---

<sup>21</sup>On this, see HM Treasury (1998).

<sup>22</sup>For example, how would one distinguish between maintenance and new investment?

<sup>23</sup>In the procedure, investment is defined as 'gross fixed capital formation'.

<sup>24</sup>It would be different if all capital expenditure were excluded from the deficit. Among these expenditures, payments aimed at covering current deficits of public enterprises or at settling past debts would be included.

<sup>25</sup>In several countries, general government accounts are only available on a yearly basis. Monitoring of overall balances is often based on more readily available financial data (for example, borrowing requirement), which do not provide indications concerning the composition of balances and, more specifically, investment expenditure.



corresponding to the limits to the overall deficit resulting from the minimum and maximum value of the gross investment to GDP ratio recorded on average in the 1980–97 period in EU countries (1.9 per cent in the UK and 3.6 per cent in Spain). The structural deficit would lie between 1.9 and 4.6 per cent of GDP (considering fluctuation margins respectively equal to 3 and 2 percentage points).<sup>26</sup> Such values, given the present low-inflation environment, would only be consistent with the limit set for the debt ratio (60 per cent of GDP) under sustained real growth rates; for a country with a structural deficit of 3 per cent and a debt ratio of 60 per cent, growth rates higher than 5 per cent would be required. For Italy, a nominal growth rate of 4.5 per cent and structural deficit of 3 per cent would imply a debt ratio still at 100 per cent in the year 2010.

### *2. The German Model*

The German model would meet difficulties similar to those mentioned above from the point of view of multilateral surveillance (again, gross investment is used). The constraints in (2) would change to

$$(4) \quad \begin{aligned} (DEF/GDP)_t &\leq (INV/GDP)_t \quad \forall t \\ (DEF_s/GDP)_t &= (INV/GDP)_t - 0.02 \quad \forall t \end{aligned}$$

where, as in (3'), it is assumed that the change in the upper ceiling of the reference parameter also determines a change in the medium-term objective allowing stabilisation policy without breaching the upper limit (the margins are left unaltered at 2 per cent).

As for the consistency with the objectives of the Treaty and the Pact, if the same level of expenditure experienced in the past were to prevail in the future, this solution would not imply a significant change with respect to the present situation for most EU Member States. On average between 1980 and 1997, the ratio of gross investment to GDP in EU countries was slightly below 3 per cent; only in a few countries and for very limited periods of time did it go above 4 per cent; so, in order to have sufficient margins for counter-cyclical action, most countries would have to target a structural balance between 0 and 1 per cent of GDP. In Figure 4(c), two examples are depicted concerning the countries with the lowest and the highest gross investment to GDP ratio in the EU (again, the fluctuation margins are set to 2 per cent of GDP).

### *3. The UK Model*

The UK model refers to results over the cycle; thus it appears to be better suited to be consistent with the objectives of soundness and flexibility of the budget. Adopting this model in EMU would imply the following constraints:

---

<sup>26</sup>In Figure 4(b), fluctuation margins are always equal to 2 percentage points of GDP.

$$(5) \quad (DEF/GDP)_t \leq [(INV-AMM)/GDP]_a + 0.02 \quad \forall t$$
$$(DEF_s/GDP)_t \leq [(INV-AMM)/GDP]_a \quad \forall t$$

where the upper ceiling on the reference parameter has been defined so as to leave the fluctuation margins for the budget unaltered and  $[(INV-AMM)/GDP]_a$  is the average level of the net investment to GDP ratio over the cycle.

The actual determination of the reference period (the length of the cycle) may encounter some difficulties both on theoretical and on practical grounds. It also adds to the complexity of the multilateral surveillance process. As already mentioned, additional problems stem from the reference to net investment.

Depending on the level of net investment, the medium-term target consistent with the UK model may or may not fall in the 'safety zone'.<sup>27</sup> In the first case, the UK model would only differ from the present situation in that a structural deficit could only be incurred if net investment were under way; it would leave unaltered both the margins for stabilisation policy and the safeguard of a structural budget consistent with a sustainable debt level. In the second case, both objectives could be compromised. Considering the investment undertaken by EU countries between 1980 and 1997, the structural deficit would lie between  $(1.9-x)$  and  $(3.6-x)$ , where  $x = AMM/GDP$ ; these levels are lower than those allowed by the proposal in Modigliani et al.  $(1.9-x; 4.6-x)$ , but they could still be inconsistent with a reduction of the debt ratio.<sup>28</sup> Furthermore, if the 3 per cent threshold for the overall deficit is kept (Figure 4(d)), net investment larger than 1 per cent would imply shrinking margins for stabilisation policy.

In conclusion, the adoption of the golden rule cannot significantly change the policy options open to EU countries without conflicting with the objective of a sound fiscal stance and without making the multilateral surveillance process more complex.<sup>29</sup>

## VI. CONCLUSION

The Maastricht Treaty defines the soundness of public finances as a necessary condition for the success of EMU and sets quantitative limits to deficit and debt in EU member countries. The centralisation of monetary policy and the impossibility of using the exchange rate as a policy instrument make fiscal policy all the more important. Indeed, fiscal policy together with structural policy becomes the main instrument of national economic policy. Fiscal policy

---

<sup>27</sup>In the UK, net investment to GDP is likely to be below 1 per cent (the gross ratio is just above 1 per cent).

<sup>28</sup>In HM Treasury (1997), a safeguard clause is included for the stability of the debt to GDP ratio over the economic cycle.

<sup>29</sup>These problems become more relevant when referring to the overall contribution of public sector outlays to human and physical capital accumulation. Estimates by Modigliani and Padoa Schioppa Kostoris (1998) clearly show how high the deficit could reach (see footnote 15) and the complexity of evaluating that contribution; the latter would be further compounded at the EU level.

must deal with asymmetric shocks and with situations in which the national cycle diverges from that of the Union as a whole. This requires sufficient margins of fluctuation for the budget. In order to avoid flexibility conflicting with soundness, a structural budget close to balance is called for.

This arrangement is not without problems: (a) the transition to a balanced budget can have negative effects on conjunctural developments;<sup>30</sup> (b) the long process of debt reduction brings significant costs in terms of primary surpluses to current generations; and (c) there is limited scope for using debt in order to finance investment and this in turn can determine a reduction in investment.

The first problem is undoubtedly relevant. In the event of extremely unfavourable conjunctural developments, a prudent tuning of the transition may be considered. However, a large part of the needed adjustment has already been completed: in 1999, the average deficit in EU countries was 0.6 per cent of GDP, compared with the 6.2 per cent peak in 1993. It should also be noted that, in several countries, the interest to GDP ratio tends to decrease as the reduction in interest rates affects the average cost of debt and as the debt ratio itself declines, making the needed effort in terms of primary surplus less demanding.

The effect of the transition to a balanced budget could be lessened by increasing the degrees of competition and flexibility in product and factor markets. A loosening of the rules designed to govern budgetary policy after the transition does not seem necessary; it may damage the credibility of the commitment to sustainable public finances; monetary policy may be called to take a restrictive stance. Moreover, the golden rule does not help during downswings: investment decisions only translate into actual expenditure with a significant delay.

The second problem cannot be avoided. The burden in terms of primary surplus is the price to pay for gaining budget flexibility and soundness. In some countries, the reduction of the debt can break the vicious cycle between high debt and high interest rates which has conditioned economic policy in recent years (for Italy, see Sartor (1998)). Furthermore, it allows margins for counter-cyclical action, avoiding the risk that an expansionary policy be perceived as a threat to sustainability.<sup>31</sup> Finally, it permits tackling, from a sounder financial position, the coming phase of intense ageing and compensating with lower interest payments the ensuing increase in expenditure (see, for example, Franco and Munzi (1997)). If the introduction of the golden rule implied a reduction in primary surpluses, it could endanger the objectives of soundness and flexibility set for government budgets.

---

<sup>30</sup>According to the Ecofin decision on 12 October 1998, the objective should be attained by 2002.

<sup>31</sup>It has been suggested that the effects of expansionary policies diminish with the level of debt and that an increase in deficit may even have restrictive effects. See, for example, Bertola and Drazen (1993) and Giavazzi and Pagano (1990 and 1996).

Previous sections have explained how the third problem evolves: a broadly balanced budget reduces the possibility of spreading investment costs over the generations benefiting from investment and can negatively affect the investment level. This effect can be especially relevant during the transition to the low debt levels consistent with the chosen structural balance. The reduction in deficit recorded in EU countries in recent years benefited from cuts in investment spending; in relative terms, these cuts have often been higher than the corresponding cuts in other items. The problem may be more serious for countries and regions with a lower stock of public capital. However, a reduction in investment as measured in the general government accounts should not be too worrisome since this is not the most appropriate measure of change in public capital.

Should a golden rule be introduced into the EMU fiscal framework to avoid the reduction in investment? The analysis above points to a negative answer. Some of the solutions proposed may be an obstacle to deficit and debt reduction; others meet practical difficulties, such as the evaluation of amortisation. Generally, leeway for opportunistic behaviour would increase and the surveillance of outcomes and trends would be more complex.

Perhaps it is better to search for different solutions. While an exhaustive list is certainly not the aim of this paper, some ideas can be put forward. At the national level, one may consider safeguard clauses to avoid fiscal consolidation efforts translating into investment cuts. The adoption of the UK model at the national level may be a useful self-discipline mechanism warranting a minimum level of investment; if the mechanism has no relevance at EU level, no surveillance problem will arise. In adopting this model, the actual use of the margins for a structural deficit allowed by the EU fiscal constitution will become conditional on the realisation of infrastructure. As noted in Section V, in order to avoid an excessive reduction of the margins for counter-cyclical action and to make sure that EU fiscal rules are not breached, the structural deficit should not be above 1 per cent of GDP; this is a modest amount, which should also limit the relevance of the conceptual problems posed by the dual budget system.

In order to ensure a larger flow of resources available for public investment, other measures are necessary. For example, especially for smaller projects, the decentralisation of investment decisions and financing may help to reduce the disincentive for projects with deferred benefits. At the local community level, intergenerational altruism may be stronger and people may be more willing to bear a larger gap between taxes and immediate benefits. More generally, private capital will have to be involved in funding projects of public interest. Most infrastructure networks are already the responsibility of institutions and firms outside general government.

## REFERENCES

- Artis, M. J. and Winkler, B. (1997), 'The Stability Pact: safeguarding the credibility of the European Central Bank', Centre for Economic Policy Research, Discussion Paper no. 1688.
- Aschauer, D. A. (1989), 'Is public expenditure productive?', *Journal of Monetary Economics*, vol. 23, pp. 177–200.
- Balassone, F. and Franco, D. (1999), 'Public investment in the Stability Pact framework', in M. Bordignon and D. Da Empoli (eds), *Concorrenza fiscale in un'economia internazionale integrata*, Milano: Franco Angeli.
- and Monacelli, D. (1999), 'Politiche di stabilizzazione: quali margini nelle regole fiscali della UE?', *Politica Economica*, vol. 15, pp. 309–28.
- Banca d'Italia (1999), *Indicators of Structural Budget Balances*, Roma.
- Barro, R. J. (1979), 'On the determination of public debt', *Journal of Political Economy*, vol. 87, pp. 940–71.
- Bertola, G. and Drazen, A. (1993), 'Trigger points and budgetary cuts: explaining the effects of fiscal austerity', *American Economic Review*, vol. 38, pp. 11–26.
- Buti, M., Franco, D. and Ongena, H. (1997), 'Budgetary policies during recessions: retrospective application of the "Stability and Growth Pact" to the post-war period', *Recherches Economiques de Louvain*, vol. 63, pp. 321–66.
- , — and — (1998), 'Fiscal discipline and flexibility in EMU: the implementation of the Stability and Growth Pact', *Oxford Review of Economic Policy*, vol. 14, no. 3, pp. 81–97.
- Colm, G. and Wagner, P. (1963), 'Some observation on the budget concept', *Review of Economic Studies*, vol. 45, pp. 122–6.
- Dalamagas, B. (1995), 'Growth, public investment and deficit financing', *Australian Economic Papers*, vol. 65, pp. 244–62.
- Dalenberg, D. R., Partridge, M. D. and Rickman, D. S. (1998), 'Public infrastructure: pork or jobs creator?', *Public Finance Review*, vol. 1, pp. 24–52.
- De Haan, J., Sturm, J. E. and Sikken, B. J. (1996), 'Government capital formation: explaining the decline', *Review of World Economics*, vol. 132, pp. 55–74.
- de la Fuente, A. (1997), 'Fiscal policy and growth in the OECD', Centre for Economic Policy Research, Discussion Paper no. 1755.
- Eberts, R. (1990), 'Public infrastructure and regional economic development', *Economic Review of the Federal Reserve Bank of Cleveland*, vol. 26, pp. 15–28.
- Eichengreen, B. and Wyplosz, C. (1998), 'Stability Pact: more than a minor nuisance?', *Economic Policy*, vol. 26, pp. 67–104.
- Erenburg, S. J. (1993), 'The real effects of public investment on private investment', *Applied Economics*, vol. 25, pp. 831–7.
- European Commission (1997), 'Economic policy in EMU', *Economic Papers*, issues 124–5.
- Evans, P. and Karras, G. (1994), 'Is government capital productive? Evidence from a panel of seven countries', *Journal of Macroeconomics*, vol. 16, pp. 271–9.
- Franco, D. and Munzi, M. T. (1997), 'Ageing and fiscal policies in the European Union', in European Commission, 'The welfare state in Europe: challenges and reforms', *European Economy: Reports and Studies*, vol. 7, pp. 239–388.
- Garcia-Milà, T., McGuire, T. J. and Porter, R. H. (1996), 'The effect of public capital in state-level production functions reconsidered', *Review of Economics and Statistics*, vol. 78, pp. 177–80.
- Giavazzi, F. and Pagano, M. (1990), 'Can severe fiscal contractions be expansionary? Tales of two small European countries', Centre for Economic Policy Research, Discussion Paper no. 417.

- and — (1996), 'Non-Keynesian effects of fiscal policy change: international evidence and the Swedish experience', *Swedish Economic Policy Review*, vol. 3, pp. 67–105.
- Girard, J., Gruber, H. and Hurst, C. (1994), 'A discussion of the role of public investment in economic growth', *Cahiers BEI-EIB Papers*, no. 23, pp. 13–19.
- , — and — (1995), 'Increasing public investment in Europe: some practical consideration', *European Economic Review*, vol. 39, pp. 731–8.
- and Hurst, C. (1994), 'Investment and growth: quality versus quantity', *Cahiers BEI-EIB Papers*, no. 23, pp. 39–55.
- Goode, R. and Birnbaum, E. A. (1955), *Government Capital Budgets*, Washington, DC: International Monetary Fund.
- Gramlich, E. M. (1994), 'Infrastructure investment: a review essay', *Journal of Economic Literature*, vol. 32, pp. 1147–75.
- HM Treasury (1997), *A Code for Fiscal Stability*, London.
- (1998), *The Public Sector Balance Sheet*, London.
- Holtz-Eakin, D. (1994), 'Public sector capital and the productivity puzzle', *Review of Economics and Statistics*, vol. 76, pp. 12–21.
- Holzmann, R. (1997), 'On economic benefits and fiscal requirements of moving from unfunded to funded pensions', *European Economy*, vol. 4, pp. 121–66.
- Hurst, C. (1994), 'Infrastructure and growth: a literature review', *Cahiers BEI-EIB Papers*, no. 23, pp. 57–76.
- Kelejian, H. H. and Robinson, D. P. (1997), 'Infrastructure productivity estimation and its underlying econometric specification: a sensitivity analysis', *Papers in Regional Science*, vol. 72, pp. 297–312.
- Kitterer, W. (1994), 'Tax- versus debt-financing of public investment: a dynamic simulation analysis', *Kredit und Kapital*, vol. 2, pp. 163–87.
- Mera, K. (1973), 'Production functions and social overhead capital: an analysis of the Japanese case', *Regional and Urban Economics*, vol. 3, pp. 297–312.
- Modigliani, F., Fitoussi, J. P., Moro, B., Snower, D., Solow, R., Steinherr, A. and Sylos Labini, P. (1998), 'Manifesto contro la disoccupazione nell'Unione Europea', *Moneta e Credito*, vol. 51, pp. 375–412.
- and Padoa Schioppa Kostoris, F. (1998), *Sostenibilità e solvibilità del debito pubblico in Italia*, Bologna: Il Mulino.
- Munnel, A. H. (1992), 'Infrastructure investment and economic growth', *Journal of Economic Perspectives*, vol. 6, pp. 189–98.
- Musgrave, R. A. (1939), 'The nature of budgetary balance and the case for a capital budget', *American Economic Review*, vol. 29, pp. 260–71.
- Oxley, H. and Martin, J. P. (1991), 'Controlling government spending and deficits: trends in the 80s and prospects for the 90s', *OECD Economic Studies*, vol. 17, pp. 145–89.
- Pontolillo, V. (1998), 'Aspetti economico-istituzionali del *project financing*: problematiche ed esperienze in Italia', Banca d'Italia, *Documenti*, no. 589.
- Poterba, J. M. (1995), 'Capital budgets, borrowing rules and state capital spending', *Journal of Public Economics*, vol. 56, pp. 165–87.
- Premchand, A. (1983), *Government Budgeting and Expenditure Controls: Theory and Practice*, Washington, DC: International Monetary Fund.
- Ratner, J. B. (1983), 'Government capital and the production function for U.S. private output', *Economics Letters*, vol. 13, pp. 213–17.

*Public Investment, the Stability Pact and the 'Golden Rule'*

- Robinson, M. (1998), 'Measuring compliance with the golden rule', *Fiscal Studies*, vol. 19, pp. 447–62.
- (1999), 'The role and nature of public sector balance sheets', Queensland University of Technology, Discussion Papers in Economics, Finance and International Competitiveness no. 49.
- Roubini, N. and Sachs, J. D. (1989), 'Government spending and budget deficits in the industrial countries', *Economic Policy*, vol. 8, pp. 99–132.
- Sartor, N. (ed.) (1998), *Il risanamento mancato — La politica di bilancio italiana: 1986–90*, Roma: Carocci.
- Steve, S. (1972), *Lezioni di scienza delle finanze*, Padova: Cedam.
- van Ewijk, C. (1997), 'Infrastructure, intergenerational conflict and the golden rule of finance', *The Economist*, vol. 145, pp. 447–60.