THE IMPACT OF THE EU FISCAL FRAMEWORK ON ECONOMIC ACTIVITY: A QUANTITATIVE ASSESSMENT

Alessandro Turrini[*] *and Jan in 't Veld*[**]

Introduction

It is a common view that the EU rules-based fiscal framework provided by the Maastricht Treaty and the Stability and Growth Pact has influenced budgetary policies in EU countries, not only in the run-up to EMU, but also after the introduction of the single currency. However, there is no general agreement on the quantitative impact that the presence of the EU fiscal framework exerted on budget balances in EU countries, nor is there widespread agreement on the implications it has had for growth.[1] In the recent policy debate, for instance, it is often claimed that the EMU macroeconomic framework is excessively oriented towards the goal of stability, while lacking sufficient focus on the objective of growth. In particular, the framework for fiscal discipline provided by the Treaty and the Pact is often perceived as a constraint to fiscal policy in sustaining aggregate demand during weak junctures. Conversely, other commentators put the emphasis on the negative growth effects associated with worsened consumers' and investors' confidence that may result from lack of fiscal discipline.

The impact of the EU fiscal framework on economic activity should be evaluated from a medium/long-term perspective. This permits to address the basic question whether the fiscal consolidations that emanated from the EU rules-based framework for fiscal discipline resulted into a contraction in aggregate demand and then output via Keynesian channels or whether it contributed to growth by limiting the crowding out effect associated with high and persistent deficits. This paper provides a quantitative analysis of the impact the fiscal framework has had on economic activity from such a perspective.

There are two major difficulties with such an analysis. First, there is the necessity of assessing what would have been the level of budget balances in EU countries in the absence of the EU rules for fiscal discipline. In particular, it is necessary to distinguish to what extent the reduction in budget deficits that occurred in the second half of the Nineties in many EU countries was the effect of the requirements of fiscal discipline in the Maastricht Treaty and the SGP or to what

---

[*] European Commission and CEPR – E-mail: Alessandro.turrini@cec.eu.int

[**] European Commission – E-mail: Jan.intveld@cec.eu.int

The views expressed here are those of the authors and should not be attributed to the European Commission.

[1] For an overview of the EU countries' fiscal consolidation in the run-up to EMU see European Commission (2000) and Von Hagen *et al.* (2001). Analysis and discussions on the conduct of fiscal policies in EU countries after the introduction of the single currency are contained in Sapir *et al.* (2004) and Hughes-Hallet, Lewis, and Von Hagen (2004).

extent it was instead a response to high debt levels and would have occurred in any case. Second, a general equilibrium analytical setting is required to analyse the impact of such counterfactual budget balances on aggregate demand components, debt and interest rates. Taking into account the above analytical requirements, the strategy followed to perform the analysis is as follows. In a first step "fiscal rules" are estimated (similar as in, e.g., Gali and Perotti (2003)) describing the reaction of fiscal authorities (in terms of chosen levels of budget balances) to major macroeconomic variables, such as the cyclical position and the level of debt. Such fiscal rules are estimated for two different sub-periods: before and after the start of phase II of EMU. It is shown that the reaction of EU fiscal authorities in the two sub-periods changes quite significantly, with a greater weight put on the debt stabilisation motive after the start of phase II of EMU. The estimated change in the parameters for the fiscal rules (summarising the behaviour of fiscal authorities) is interpreted as resulting from the introduction of the EU fiscal framework. Counterfactual budget balances in absence of the Treaty and SGP provisions are then obtained from predictions using the fiscal rules for the period before EMU phase II. In the second step of the analysis, these counterfactual levels of budget balances are used in simulations with the European Commission's QUEST model to analyse what would have been the performance of the economies in terms of aggregate output in absence of the EU fiscal framework. In order to work on a sample of countries which is sufficiently homogenous from the viewpoint of the working of the major macroeconomic relations (among which those relating to monetary policies and exchange rates) only euro area countries are considered for the analysis.

What would have been the impact on economic activity of an absence of the fiscal discipline provided by the EU fiscal framework? According to our analysis, the changes in fiscal behaviour observed after 1994 on average amounted to a reduction in deficits of almost 0.9 per cent of GDP. In a counterfactual scenario of an absence of fiscal discipline simulated with the QUEST model, this would have led to a sizeable build-up of government debt. In the most optimistic case, a scenario ignoring an additional risk premium effect of higher government debt on interest rates, the short run gains of an absence of fiscal discipline would not have exceeded half a percent of GDP and would have faded away quickly. When risk premia effects of higher public debt on interest rates are included, the gains from an absence of fiscal discipline over the last decade would have been even smaller in the short run, and would have become negative in the medium term.

The paper is structured as follows. The next section discusses our estimates of fiscal policy rules before and after 1994 and the changes we attribute to the Maastricht Treaty and SGP. These form the input into our counterfactual model scenario with the QUEST model, described in section 2. This section also discusses empirical evidence on the effects of deficits and debt on interest rates and risk premia and describes simulations which take such effects into account. Section 3 concludes.

1. Determining counter-factual budget balances in absence of the EU fiscal framework

The first necessary step in our analysis of the economic impact is the estimation of counterfactual budget balances in the absence of the EU fiscal framework. This amounts to answering the following question: which values for budget balances would have been recorded in the absence of the EU rules-based framework but allowing for the "normal" budgetary response of budget balances to output gaps and debt levels? In order to answer this question, fiscal rules are estimated for each of the euro area countries before and after 1994. This also allows us to assess to what extent the behaviour of the fiscal authorities has been changed by the EU fiscal framework.

It has become common practice in the applied analysis of budgetary policies to estimate fiscal rules that summarise the behaviour of fiscal authorities on the basis of a limited set of macroeconomic determinants that explain developments in budget balances (see, e.g., Von Hagen *et al.*, 2001, Melitz, 2002, Gali and Perotti, 2003, Ballabriga and Martinez-Mongay, 2003). Most of the fiscal rules estimated in existing work can be derived as the outcome of a problem in which fiscal authorities choose budget balances in such a way as to minimise a loss function which is a function of the output gap and the deviation of the actual debt level from a target level. The underlying notion is that fiscal authorities are motivated by an objective of output stabilisation (so that budget balances should respond positively to expected output gaps) and by a debt stabilisation motive (so that a positive response of budget balances to the existing stock of debt is expected). The budget measures employed in the empirical estimation of fiscal rules is generally net of interest payments, given that this budget item is not directly under the control of fiscal authorities. In some analyses, like in Gali and Perotti (2003), the dependent variable employed in estimating fiscal rules is the cyclically adjusted primary balance. Using such a measure of countries' fiscal positions presupposes that fiscal authorities decide about the level of the budget anticipating the impact of the cycle on the cyclical components of revenues and expenditures and permits to analyse the macroeconomic determinants of "discretionary" fiscal policy. Concerning the explanatory variables that have been included in existing empirical work on fiscal rules, the output gap is generally used as a measure for the cycle, while the lagged debt-to-GDP ratio is normally used to capture the debt stabilisation motive of fiscal authorities. The lagged dependent variable (e.g., the primary budget balance) is quite often included in the empirical specification to allow for a role of inertia in budgetary policy.

Table 1 overleaf reports the results for panel data estimation of fiscal rules across the 11 EU member states. Annual data for the period 1970-2003 are taken from the AMECO database. The specification chosen follows that in Gali and Perotti (2003). Two alternative dependent variables have been considered: the primary balance and the primary cyclically adjusted budget balance. The explanatory variables included are the output gap, the 1-year lagged debt-to-GDP

Table 1

The EU Fiscal Framework and Budgetary Behaviour (EU-11)

Dependent Variable	Primary Budget Balance		Primary Cyclically-adjusted Budget Balance	
	1970-1993	1994-2003	1970-1993	1994-2003
Output gap	–0.066	0.363***	–0.086	0.097
	(–1)	(–3.93)	(–1.5)	(1.39)
Lagged debt/GDP ratio	0.027***	0.085***	0.03***	0.067***
	(4.5)	(5.03)	(5.4)	(4.04)
Lagged dependent variable	0.74***	0.47***	0.69***	0.45***
	(14.9)	(6.31)	(15.46)	(5.78)
Constant term	–1.37***	–4.85***	–1.5***	–3.51***
	(–4.3)	(–3.95)	(–5)	(–2.99)
Number of observations	238	110	238	110
R square within groups	0.57	0.63	0.62	0.47
Wald Chi square	319.4	875.61	371.76	916.5

Note: Z statistics reported in parenthesis. ***, **, * denote statistical significance at, respectively, 1, 5, and 10 per cent level. Estimation method: instrumental variables fixed effects panel regression. The output gap variable is instrumented using its own lag and the lagged US output gap. All variables are expressed as a percentage of trend output.

ratio and the lagged dependent variable.[2] Formally, the estimated equations are as follows:

$$b_{c,t} = \alpha_c + \beta y_{c,t} + \gamma d_{c,t-1} + \rho b_{c,t-1} + \varepsilon_{c,t}$$

where $b_{c,t}$ is alternatively the primary balance or the cyclically-adjusted primary balance in country *c* and year *t*, $y_{c,t}$ is the output gap, $d_{c,t}$ is the debt/GDP ratio, and $\varepsilon_{c,t}$ is an error term.

[2] The results reported in table 1 refer to output gap data obtained as the percentage difference between actual and trend (HP-filtered) output. Estimates have also been performed using potential output computed through the European Commission production function approach (see Denis, McMorrow and Roeger, 2002) and very similar results have been obtained.

To account for the endogeneity of the output gap (*i.e.*, the fact that not only the output gap affects budget variables but also that budgetary policy has an impact on the cycle) this variable has been instrumented with its own 1-year lag and the lagged US output gap.[3] The chosen specification has been estimated separately for the sub-sample 1970-1993 (before the EU fiscal framework) and the 1994-2003 sub-period (after the introduction of the EU fiscal framework).

Several results of interest emerge from the panel-data estimation of fiscal rules.

- A first finding is that while before the introduction of the EU fiscal framework budget measures (both primary budget balances and primary cyclically-adjusted budget balances) were not significantly affected by the output gap, after phase II of EMU the output gap has a significantly positive impact on primary balances, while the coefficient for the primary cyclically-adjusted budget balance remains non-significant but turns from negative to positive. This finding refutes the view that the introduction of the EU fiscal framework has resulted into a less counter-cyclical stance for fiscal policy in EU countries.[4]
- A second major result is that both primary and primary cyclically-adjusted budget balances react positively to debt levels. The regression coefficient for the lagged debt-to-GDP ratio is positive and significant in both sub-periods irrespective of the budget measure used as dependent variable. This supports the view that fiscal authorities pursue debt stabilisation objective when deciding about budgetary policy.
- Third, the magnitude of the coefficient of the debt variable increases after the introduction of the EU fiscal framework, meaning that such debt stabilisation objective has become more relevant after phase II of EMU.
- Finally, results show that the degree of inertia in budget balances has diminished after the introduction of the EU fiscal framework. The regression coefficient for the lagged dependent variable drops from about 0.7 to about 0.45 after phase II of EMU.

In summary, the estimated fiscal rules indicate that the introduction of the EU fiscal framework resulted into an enhanced debt stabilisation motive for fiscal authorities and a reduced degree of inertia in budgetary policy. As for the reaction of budgets to cyclical conditions, there is no evidence that it became more pro-cyclical. Overall, the results from panel data estimation reported in Table 1 suggest that the introduction of the EU fiscal framework led to an improvement in budget balances.

---

[3] More generally, the use of the lagged dependent variable in panel data analysis raises an issue of inconsistency of estimates, generally addressed by relying on GMM estimators. However, given the purpose of the present analysis (understanding how fiscal rules changed after the introduction of the EU fiscal framework) and the relatively small sample used this issue of inconsistency is likely to be of little relevance.

[4] The same result is obtained in Gali and Perotti (2003).

Primary budget balances (both nominal and cyclically adjusted) became in fact more sensitive to debt levels and easier to adjust over time.[5]

The estimation of fiscal rules as reported in Table 1 permits the construction of counterfactual budget balance values in absence of the EU fiscal framework. In other words, they permit to obtain an estimation of which value for budget balances would have prevailed in absence of the EU fiscal framework but allowing fiscal authorities to follow their output and debt stabilisation motives. Calculation of such counterfactual values for budget balances is a necessary first step to assess the impact of the EU fiscal framework on economic activity. The computation of counterfactual budget balances requires using the fiscal rules estimated before the introduction of the EU fiscal framework to predict values for the budget balances for the following period. Such predictions have been obtained after estimating fiscal rules as in Table 1 separately for each country (regressions results are reported in the Annex, Table A1). The counterfactual primary budget balance for a given country in the 1994-2003 period, $b_{t\in[1994,2003]}$, is constructed as follows:

$$b_{t\in[1994,2003]} = \alpha_{1974-1993} * X_{t\in[1994,2003]} + \varepsilon_{t\in[1994,2003]}$$

where $\alpha_{1974\text{-}1993}$ is the vector of the estimated coefficients for the 1970-1993 period, $X_{t\in[1994,2003]}$ is the vector of explanatory variables and $\varepsilon_{t\in[1994,2003]}$ is the estimated regression residuals for the 1994-2003 period. The difference between counterfactual budget balances so obtained and actual values amounts to 0.88 percentage point of GDP on average.[6] Such difference has been used as a shock to the European Commission's QUEST model to simulate what consequences the absence of the rules for fiscal discipline of the Maastricht Treaty and SGP would have had on euro area economies. The values for counterfactual balances so obtained are to be taken cautiously, given the limited degrees of freedom available for the estimation of fiscal rules and the associated problem of robustness and precision of estimated coefficients. Moreover, our strategy to quantify

---

[5] While the choice of the year when the new fiscal policy regime starts being effective (1994, corresponding to the start of EMU phase II in our case) is likely not to be crucial for results, estimates can be quite sensitive to the choice of the time length of the sample. Ballabriga and Martinez-Mongay (1994) estimate country-by-country fiscal rules akin to ours introducing a dummy (taking value 1 in the years of operation of the EU fiscal framework) interacting with the debt coefficient to account for the discipline effect of the introduction of the fiscal rules. They analyse systematically how the value of the coefficient changes when changing the starting date of operation of the fiscal framework and find that similar qualitative results are obtained irrespective of the starting year, with the most significant increase in the debt coefficient taking place in most countries when assuming that the EU fiscal framework starts producing effects in 1996. Gali and Perotti (1993) estimate panel equations using the same specification as ours but limiting the sample to years after 1980 and assuming that the EU fiscal framework starts being effective in 1992. The qualitative results obtained in Gali and Perotti (1993) are similar to ours. In their case, however, the quantitative change in the debt coefficient and in the coefficient of the cyclically-adjusted primary balance is smaller. A possible explanation for this difference lies in a non-linear behaviour of the budget balance with respect to GDP, with the impact being smaller at low levels of debt (as was the case in the Seventies).

[6] Such figure is obtained as the GDP-weighted average of the difference between counterfactual and actual primary budget balance for the different EU-11 countries. See the Annex (Table A2) for differences between counterfactual and actual primary balances at the country level.

counterfactual primary budget balances does not take into account the impact of the EU fiscal framework on the composition of budgetary policies. This choice is motivated by the fact that while the EU fiscal framework provides rules for the containment of deficits, it is silent on issue of composition, so that the way EU countries managed their public budgets on their revenue and expenditure side was not directly affected by the EU fiscal rules, but rather by other country-specific considerations.[7] Hence, the shock given to the QUEST model to simulate a scenario of "absence of fiscal discipline" is not to be interpreted as the exact impact on primary balances associated with the EU fiscal rules that would have prevailed in each year and country but rather the estimation of an average benchmark for analytical purposes.

2. Simulating the effects of the EU fiscal framework with the QUEST model

2.1 Brief description of the QUEST model

The European Commission's QUEST model is an applied macroeconomic model whose foundations can be characterised as a New Neoclassical synthesis model. Behavioural equations in the model are based on inter-temporal optimisation of households and firms with forward-looking expectations.[8] Unemployment arises in the model due to matching frictions, and wages are the result of firm-union bargaining. Prices adjust sluggishly and the nominal wages response is delayed because of overlapping wage contracts.

Since planning horizons are finite, there is no complete tax discounting and Ricardian equivalence does not hold. Moreover, a share of consumers is assumed to be liquidity-constrained, *i.e.*, has to finance consumption out of disposable income. The model has therefore Keynesian features in the short run, but the effectiveness of fiscal policy is more limited than in the traditional econometric models because of the built-in inter-temporal budget constraints.

Total consumption, C_t, is represented as the aggregation of the responses of two groups of households, one forward-looking group that follows the optimal consumption rule given by the life cycle/permanent income hypothesis and a liquidity-constrained group whose consumption depends on current disposable income:

$$C_t = (1-\lambda) * \delta [H_t + F_t] + \lambda * Ydis_t$$

---

[7] The fiscal adjustment after phase II of EMU was based either on revenue increases or expenditure cuts depending on the countries considered and the time periods (see, e.g., Von Hagen, Hughes-Hallet and Strauch, 2001). Some countries adopted a "switching policy", whereby they raised revenues in the run-up to EMU and reduced government spending afterwards (Buti and Sapir, 1998).

[8] The model has a richer theoretical structure than applied traditional macroeconometric models in several respects. Compared with computable dynamic general equilibrium models it allows for adjustment costs and nominal rigidities. For more details, see Roeger and in 't Veld (1997, 2002).

where λ is the share of liquidity constrained consumption, H human wealth, F financial wealth and *Ydis* current real disposable income. Consumption and saving behaviour of the first group is based on inter-temporal utility maximisation of households under a finite planning horizon. Consumers decide how much to consume and how much to save each period by maximising the present discounted expected utility from the consumption stream subject to their intertemporal budget constraint. Human wealth H is the present discounted value of the entire future stream of after-tax income (including unemployment benefits *U.ben*):

$$H_t = E_t \sum_{j=0}^{\infty} b_{tj} \left[(1 - t_l) L_{t+j} w_{t+j} + U_{t+j} ben_{t+j} \right]$$

and financial wealth F equals the sum of total equity wealth, V, bonds and money holdings and net foreign assets, *NFA:*

$$F_t = V + B + M + NFA$$

The second group of consumers is "liquidity constrained" and cannot achieve inter-temporal optimisation. Hence, their consumption is a function of current real disposable income ("rule-of-thumb" consumers).

Turning to the investment specification in the QUEST model, this is based on profit maximisation by firms, assuming that investment is subject to adjustment costs (modelled as a convex function of the rate of change of the firm's capital stock). The optimisation problem yields the following investment rule:

$$I_t = \frac{1}{\phi} \left(\frac{q_t}{(PI_t / P_t)} - 1 \right) K_t$$

where ϕ is an adjustment cost parameter, K_t the capital stock and PI_t/P_t denotes the relative price of investment goods relative to the GDP deflator. The shadow price of capital, q_t, is equal to the marginal product of capital plus any anticipated future events which are expected to influence the marginal product after period t. Q_t is a function of current and discounted future expected profitability, including adjustment costs, and adjusted for profit taxes.

As for the working of fiscal policy in the QUEST model, short-run fiscal multipliers are normally positive, due to imperfect discounting and liquidity constraints (*i.e.*, increases in government expenditure and reduction in taxes raise output). Reduction in taxes boost output not only in the short-run (via a demand stimulus) but also in the long-run, due to increased investment and reduced distortions in the labour market. In the case of government expenditure, instead, the effects of fiscal expansions on output tend to vanish over the medium term and may even turn negative. As expected, future taxes affect permanent income, the expansionary effects of an increase in fiscal spending will be weakened if it leads to an increase in expected future tax liabilities.

As shown in Giudice, Turrini and in 't Veld (2004), expansionary fiscal policies via increases in governments expenditure may have almost nil or a negative medium-term impact on output in the QUEST model due to the offsetting behaviour of forward-looking households and firms. A first offsetting "non-Keynesian" channel works through consumption. A reduction in government expenditure in QUEST affects consumption of the liquidity-constrained households who see their current disposable income decline if wages and employment are falling. However, the non-liquidity-constrained households could increase their consumption as interest rates fall and if they anticipate higher disposable incomes in the future. The removal of distortions that this entails could boost employment and output and already affect life-time income in the short run.[9]

Besides the consumption channel, QUEST allows for the working of non-Keynesian effects through the investment channel. A reduction in public expenditure, in particular public employment, will raise unemployment and exert downward pressure on wages. This in turn tends to boost profits and raise investment spending.[10]

In general, the Keynesian effects of fiscal policy dominate in the model, at least in the short run, but, as shown in Giudice *et al.* (2003), under certain conditions these effects become so small that non-Keynesian effects soon become to dominate.

The monetary policy assumption in the scenarios described below is based on a forward looking Taylor-type rule. The monetary authorities are assumed to set short-term interest rates at a level that depends both on the deviation of the forecast of inflation from the target inflation rate and on the magnitude of the output gap. In the first benchmark simulation reported the risk premium on euro area interest rates is assumed to be independent of debt levels, while in subsequent simulations debt levels are allowed to affect the risk premium, and therefore the difference between euro-area and rest-of-the-world interest rates.

2.2 What would have happened without the EU fiscal framework? Counterfactual model simulation, benchmark scenario

To assess the effect of the EU fiscal framework on the EU economy, the difference between counterfactual (calculated from the fiscal rules as described in section 1) and actual budget balances, are given as shocks to the model. This

---

[9] However, expansionary effects through the consumption channel may occur in the medium term, but if a sizeable share of households is liquidity constrained, the boost to consumers' spending that might result from lower future tax liabilities is not strong enough to offset the negative impact of the reduction in government spending on impact.

[10] This is the investment channel emphasised, for instance, in Alesina *et al.* (2002). This mechanism operates in the model through the wage setting specification which states that the real wage negotiated each period is the outcome of a Nash bargaining solution and depends on the reservation wage (value of leisure, unemployment benefits), labour productivity and a measure of labour market tightness (unemployment). If a fiscal expansion affects the latter and puts upward pressure on wages, it will have a negative effect on investment by lowering expected profitability.

counterfactual "absence of fiscal discipline" scenario is simulated to come fully into effect in 1994 and to last until 2010. Accordingly, primary budget balances are increased by 0.88 percent of baseline GDP over this period. To focus the simulation analysis on the effects of the size of the budget deficits rather than on those of the composition of budgetary adjustment, such shocks to budget balances have been equally split between revenues and expenditures in the model.[11]

Table 2 shows the results of this simulation for the euro area average. The fiscal loosening arising from the estimated fiscal rules implies an *ex post* increase in the deficit-to-GDP ratios of almost 1 percentage point on average for the euro area as a whole. The fiscal relaxation leads to a build-up of government debt over the years and by 2004, the debt-to-GDP ratio is more than 8 percentage points higher. In this counterfactual simulation, the fiscal loosening has a positive impact on GDP but the effects of a lasting fiscal expansion are relatively small. GDP is around 0.3 per cent higher in the first year, and this expansionary effect becomes gradually smaller in the following years. As for the impact on interest rates of the simulated counterfactual fiscal expansion, a small positive effect on interest rates is observed, with long rates 0.11 percentage points higher and real short term rates up by 0.06 percentage points on impact.[12]

The result that the fiscal multiplier appears as small and shrinking over time is due to the fact that the counterfactual increase in the deficit is rationally perceived as persistent by economic agents in the model. Permanent (or protracted) fiscal expansions have a much smaller impact multiplier than temporary expansions in the model since forward-looking agents immediately adjust their behaviour both to current and future changes in the policy environment. In particular, the anticipation of increasing future tax liabilities partly offsets the stimulus from higher current government transfers to households and lower taxes. Consumers' expenditure is boosted by higher transfer payments, but those consumers that are not liquidity-constrained anticipate a higher tax burden in the future and this suppresses their consumption growth to some extent. In addition, private investment is strongly crowded-out by the increase in fiscal spending due to increased real interest rates, wage pressure and expected higher tax liabilities in the future.

A further crowding-out effect arises via the behaviour of net exports. The conventional import leakage channel is reinforced by the fact that the demand expansion at home is accompanied by a jump appreciation of the exchange rate, followed by a gradual depreciation in following years. The resulting loss in competitiveness leads to a worsening of the trade balance.

---

[11] More precisely, the shock to primary budget balances is equally split between taxes and expenditures. Shocks to taxes are in turn equally divided among three tax rates (labour income tax, corporate profit tax and value added taxes) and shocks to expenditures equally divided between transfers to households and government consumption.

[12] Nominal short-term interest rates are determined by a monetary policy rule which targets expected inflation and the output gap and assumes no change in the targeted equilibrium real interest rate. The fiscal expansion simulated has a small positive effect on inflation and output, leading to an increase in interest rates. The 10-year long rate is the forward convolution of short-term interest rates.

Table 2

Counterfactual Simulation of "No Fiscal Discipline"
(euro area, no impact of debt on interest rates risk premium)

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	*2010*
GDP *(percent)* (Difference from baseline)	0.26	0.18	0.18	0.17	0.16	0.15	0.11	0.09	0.08	0.06	0.04	*–0.11*
Consumption *(percent)* (Difference from baseline)	0.53	0.51	0.54	0.56	0.58	0.58	0.59	0.59	0.60	0.61	0.62	*0.62*
Investment *(percent)* (Difference from baseline)	–0.86	–1.01	–1.08	–1.16	–1.25	–1.34	–1.45	–1.64	–1.85	–2.00	–2.11	*–3.16*
Short-term interest rate *(percent)* (Difference from baseline)	0.11	0.11	0.11	0.11	0.11	0.10	0.09	0.10	0.11	0.12	0.13	*0.10*
Long-term interest rate *(percent)* (Difference from baseline)	0.11	0.11	0.11	0.12	0.12	0.12	0.12	0.12	0.12	0.11	0.08	*–0.16*
Real short-term int. rate *(percent)* (Difference from baseline)	0.06	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.05	0.05	*0.04*
Euro-Dollar exchange rate *(percent)* (Difference from baseline)	–0.46	–0.34	–0.22	–0.12	–0.02	0.09	0.18	0.26	0.36	0.47	0.59	*1.32*
Trade balance/GDP *(percent of GDP)* (Difference from baseline)	–0.09	–0.11	–0.11	–0.11	–0.10	–0.09	–0.09	–0.08	–0.07	–0.06	–0.05	*0.03*
Deficit/GDP *(percent of GDP)* (Difference from baseline)	0.89	0.95	0.96	0.96	0.94	0.92	0.98	0.97	0.93	0.90	0.94	*0.94*
Debt/GDP *(percent of GDP)* (Difference from baseline)	0.25	1.16	2.03	2.88	3.69	4.49	5.26	6.07	6.90	7.61	8.28	*12.1*

In the counterfactual scenario presented above the effect of the increase in deficits and debt on interest rates is limited and risk premium is assumed to be unaffected by the debt/GDP ratio. In the following section, we analyse the potential effects an increase in public deficits and debt can have on interest rates taking also into account effects occurring through the risk premium.

2.3 Counterfactual simulations with risk premia effects

In order to allow for a response of the risk premium to changing debt ratios in the QUEST model it is first necessary to define a likely range of values for the impact of debt on risk premia in the average euro-area country. Existing empirical evidence on the relation between deficits, debts and interest rates are useful to guide this choice.

Empirical estimates of the effects of public deficits and debt on interest rates vary widely, depending on the data and methodology used, but most of the recent studies find significant effects of public deficits and/or public debt on interest rates. Existing studies referring to advanced economies indicate that an increase in the deficit of 1 per cent of GDP normally raises nominal interest rates by between 20 to 100 basis points and real interest rates by between 15 and 80 basis points (see, e.g., Gale and Orszag, 2003 and Brook, 2003). In general, available evidence indicates that the impact is relatively higher in the US than in EU countries. Another regularity observed is that estimates using debt measures as explanatory fiscal variable tend to find smaller impacts on interest rates compared with analyses using deficits as explanatory variable. This difference can be explained by the fact that an increase in the deficit will increase the steady-state debt level by the same amount only if temporary, while the increase will be several times higher if the increase in the deficit is persistent.[13]

Concerning the estimated impact of debt on interest rates in EU countries, Tanzi and Chalk (2000) run a pooled random effects regression of interest rates on debt over the years 1970-98 across EU countries and find that an increase in the average EU debt to GDP ratio of 10 percentage points leads to an increase in real interest rates of 0.6 percentage points. However, for the 1980-98 sub-sample the effect of debt amounts to be only 0.1 percentage points.

The analyses mentioned above refer to the relationship between deficits, debt and overall interest rates, without distinguishing to what extent the impact is due to changes in national savings or to modified risk premia on government bonds. A

---

[13] Laubach (2003) studies the relationship between long-horizon expected government debt and deficits, as measured by official US projections, and expected future long term real interest rates. He finds that a 1 percentage point increase in the projected deficit-to-GDP ratio increases the 10 year bond rate expected to prevail in 5 years by 25 basis points. A percentage point increase in the projected debt-to-GDP ratio raises future interest rates by 4 to 5 basis points. For these estimates of the effects of deficits and debt to be consistent which each other, it implies that investors view the increases in projected deficit-to-GDP ratios as highly persistent, but not strictly permanent.

strand of the literature focuses more directly on the effect governments' fiscal positions have had on risk premia. Bernoth, Von Hagen and Schuknecht (2003) analyse differences between bond yields on government bonds of different EU countries and comparable bonds issued by Germany in the same currency over the period 1991-2002. Their findings are that an additional GDP point of debt raises yield spreads significantly but by a relatively small amount (by a bit more than 1 basis point).[14] In Alesina *et al.* (1992) the difference between government and private sector bonds denominated in the same currency is used as a proxy of credit risk premia and employed as dependent variable in regression analysis on a panel of 12 OECD countries over the period 1974-89. The study estimates an average impact of 1.6 basis points of each additional GDP point of debt when limiting the sample to high-debt countries.[15] The proxy used in Alesina *et al.* (1992) to measure credit risk has the main limitation of not being able to control for changes in private risk. A further limitation is that differences in liquidity risk are also not taken into account. In subsequent studies this issue has been addressed by measuring as a proxy of credit risk the difference between the interest rate on government bonds and the returns on swaps (with same maturity and denominated in the same currency). Since there is no principal at risk in swap contracts, such measure permits to control for differences in private risk. Adopting such measure for credit risk, Lemmen and Goodhart (1999) estimate an impact of 1.5 basis point for each additional percentage point of the debt-to-GDP ratio in a panel of EU countries. Codogno, Favero and Missale (2003) disentangle the credit risk component from the liquidity premia component in interest rate swaps and find that debt ratios are not significant in explaining interest rate swap spreads in most EU countries, with the exception of Spain, Italy and Austria, where debt has been found to be a significant and quantitatively relevant explanatory factor.

Given the strong evidence of a significant effect of governments' fiscal positions on interest rates, the counterfactual simulation described in section 2.2 is repeated here to include a risk premium effect in line with this evidence. As estimates based on (projected) deficits depend on the expected persistence of such deficits, the first scenario (reported in Table 3.a) incorporates an additional risk premium effect of 1 basis point per 1 percentage point increase in government debt, corresponding to a risk premium of 10 basis points when the debt-to-GDP ratio has increased by 10 percentage points.[16] This corresponds to the estimates in Tanzi and Chalk (2000) for the EU in the later sample 1980-98 and is also in line with estimates found of risk premia on governments bonds. Compared to some of the other estimates found in the literature, it is however on the low side, and an

---

[14] The estimated impact is much lower than that found in Bayoumi, Goldstein, and Woglum (1995), analysing the impact of the debt of US municipalities over their own interest rate spreads.

[15] A similar result is found in Caselli, Giovannini, and Lane (1998).

[16] Technically, in this simulation the risk premium in the uncovered interest parity condition in the model, linking expected exchange rate changes to interest rate differentials, appears as a linear function of the differences in the debt-to-GDP ratio from that in the baseline. The implicit assumption is that changes in the risk premium in government bonds fully spill-over to private sector bonds.

Table 3

Counterfactual Simulation of "No fiscal Discipline" with Risk Premium (Euro Area)

3.a – 10 Basis-point Increase in Risk Premium for a 10 per cent Increase in Debt/GDP

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	*2010*
GDP *(percent)* (Difference from baseline)	0.20	0.13	0.09	0.07	0.04	0.00	–0.03	–0.05	–0.08	–0.11	–0.14	*–0.28*
Consumption *(percent)* (Difference from baseline)	0.36	0.11	0.22	0.22	0.23	0.24	0.25	0.27	0.29	0.30	0.32	*0.38*
Investment *(percent)* (Difference from baseline)	–1.62	–2.03	–2.21	–2.41	–2.57	–2.73	–2.93	–3.15	–3.35	–3.49	–3.59	*–4.09*
Short-term interest rate *(percent)* (Difference from baseline)	0.11	0.10	0.10	0.11	0.11	0.12	0.15	0.17	0.18	0.19	0.21	*0.20*
Long-term interest rate *(percent)* (Difference from baseline)	0.13	0.14	0.16	0.17	0.18	0.19	0.20	0.21	0.21	0.20	0.17	*–0.08*
Real short-term int. rate *(percent)* (Difference from baseline)	0.06	0.04	0.04	0.04	0.05	0.05	0.06	0.07	0.07	0.08	0.08	*0.08*
Euro-Dollar exchange rate *(percent)* (Difference from baseline)	1.42	1.53	1.59	1.65	1.70	1.74	1.79	1.85	1.91	1.97	2.04	*2.41*
Trade balance/GDP *(percent)* (Difference from baseline)	0.00	0.10	0.10	0.13	0.14	0.15	0.18	0.18	0.18	0.19	0.19	*0.16*
Deficit/GDP *(percent of GDP)* (Difference from baseline)	0.92	1.00	1.00	1.01	0.98	0.96	1.04	1.02	0.99	0.96	1.00	*1.01*
Debt/GDP *(percent of GDP)* (Difference from baseline)	0.30	1.25	2.20	3.10	3.94	4.79	5.57	6.40	7.26	7.99	8.67	*12.58*

3.b – 20 Basis-point Increase in Risk Premium for a 10 per cent Increase in Debt/GDP

	1994	*1995*	*1996*	*1997*	*1998*	*1999*	*2000*	*2001*	*2002*	*2003*	*2004*	*2010*
GDP *(percent)* (Difference from baseline)	0.15	0.08	0.00	–0.04	–0.09	–0.17	–0.17	–0.20	–0.24	–0.29	–0.33	*–0.47*
Consumption *(percent)* (Difference from baseline)	0.17	–0.11	–0.13	–0.14	–0.14	–0.13	–0.12	–0.08	–0.05	–0.03	0.00	*0.13*
Investment *(percent)* (Difference from baseline)	–2.46	–3.16	–3.44	–3.77	–3.99	–4.22	–4.53	–4.77	–4.96	–5.05	–5.08	*–5.18*
Short-term interest rate *(percent)* (Difference from baseline)	0.12	0.10	0.08	0.12	0.11	0.13	0.21	0.24	0.25	0.27	0.30	*0.30*
Long-term interest rate *(percent)* (Difference from baseline)	0.17	0.18	0.20	0.23	0.25	0.27	0.29	0.30	0.30	0.30	0.27	*0.00*
Real short-term int. rate *(percent)* (Difference from baseline)	0.05	0.04	0.03	0.05	0.05	0.05	0.08	0.10	0.10	0.11	0.12	*0.12*
Euro-Dollar exchange rate *(percent)* (Difference from baseline)	3.51	3.59	3.59	3.59	3.59	3.54	3.55	3.58	3.59	3.60	3.62	*3.59*
Trade balance/GDP *(percent)* (Difference from baseline)	0.09	0.34	0.34	0.38	0.41	0.42	0.47	0.47	0.45	0.45	0.44	*0.30*
Deficit/GDP *(percent of GDP)* (Difference from baseline)	0.96	1.05	1.05	1.05	1.01	0.99	1.10	1.09	1.05	1.02	1.07	*1.08*
Debt/GDP *(percent of GDP)* (Difference from baseline)	0.36	1.35	2.39	3.33	4.22	5.12	5.90	6.76	7.65	8.40	9.10	*13.06*

alternative scenario with a risk premium of 2 basis points for a 1 percentage point increase in the debt-to-GDP ratio is also shown (Table 3.b).

The results when risk premia are taken into account are markedly different from the scenario described in Table 2. The positive GDP effects of a fiscal expansion are now short-lived and have almost disappeared after a few years. The risk premium leads to higher interest rates and crowding out of private spending. The stimulus to private consumption is in this case about half as large, while private investment falls further below base. With a larger risk premium (Table 3.b) the increase in interest rates more or less offsets the boost the fiscal expansion gives to private consumption and spending falls back to levels around base. In this case the crowding out of private investment is much stronger and it illustrates the large effect public debt can have on capital accumulation. The exchange rate depreciates, by 1.5 and 3.5 per cent respectively, and the gains in competitiveness and lower demand in later years is associated with an improvement of the trade balance. But the increase in net exports is not enough to offset the decline in private demand and GDP falls below base in the medium run.

Hence, when effects of persistent deficits and rising debt on interest rates are taken into account, the results under a scenario of absence of fiscal discipline turn out to be only temporarily positive, but with larger adverse effects in the medium term (Figure 1). According to these simulations, the EU rules-based fiscal framework has only had a temporarily negative impact on growth in the short run, but it has helped to avoid a situation in which accumulating public debt would have crowded-out private investment and reduced potential growth in the medium and long term.

3. Conclusions

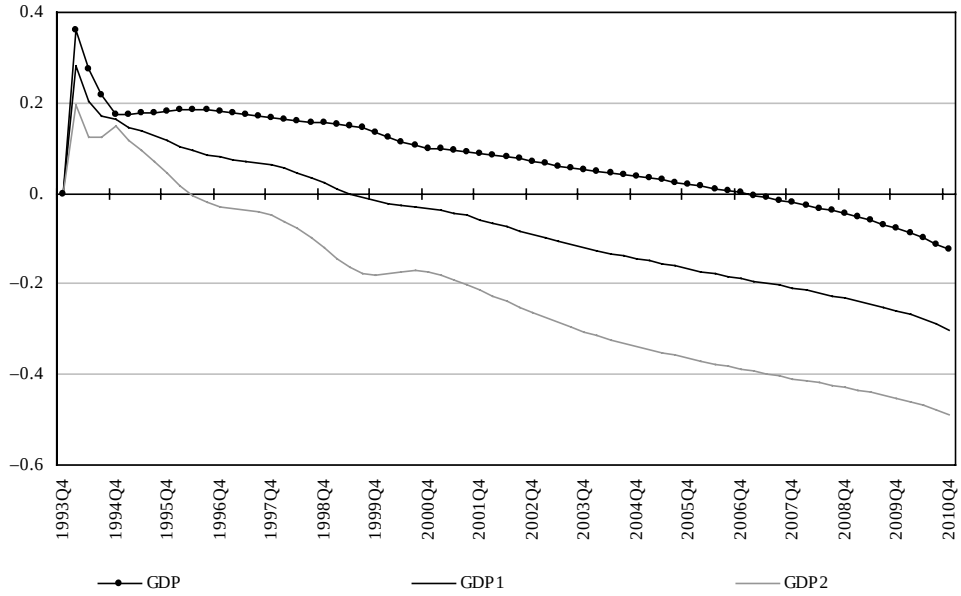
The aim of this paper was that of providing a quantitative assessment of the impact that the introduction of the EU fiscal framework contained in the Maastricht Treaty and the Stability and Growth Pact had on economic activity in the EU.

Our analysis was based on two steps. In a first steps we estimated counterfactual budget balances that would have prevailed in the euro-area in absence of the EU fiscal framework via the estimation of fiscal rules. A comparison based on fiscal rules estimated before and after the second phase of EMU (*i.e.*, 1994) shows that the changes in behaviour of the fiscal authorities were quite significant, with euro-area countries running on average primary balances higher by almost 0.9 GDP points after 1994.

In a second step, the estimated counter-factual primary budget balances have been used to provide shocks to the European Commission's QUEST model, in order to simulate which impact this scenario of "absence of fiscal discipline" would have had on the euro area. Simulations show that this protracted budgetary expansion would have led to an accumulation of almost 8 per cent of GDP of additional government debt over the 1994-2004 period. Its impact on GDP would have been

Figure 1

Counterfactual absence of fiscal discipline scenario
(Euro-area GDP, 1994-2010)



Note: GDP = no risk premium; GDP1 = risk premium of 1 basis points per 1 percent point increase debt; GDP2 = risk premium of 2 basis points per 1 percent point increase debt.

positive but would have shrunk progressively, to become negative in the long run (by 2010). The direct positive impact on aggregate demand due to increased expenditure and reduced taxation would have been offset over time by the crowding-out of private investment. Such offsetting effect of private investment becomes even stronger when an impact of debt on interest rate risk premia is taken into account. In that case, the gains from an absence of fiscal discipline over the last decade would have been even smaller in the short run, and would have become negative already after few years (after 6 years or 3 years, depending on whether risk premia are assumed to increase by 1 or by 2 basis points for each additional GDP point of debt).

We are aware of the limitations of the analysis, in particular of the problems of robustness and precision in the estimation of counterfactual budget balances associated with the small number of degrees of freedom to estimate fiscal rules. However, the qualitative results obtained are independent of the exact size of counterfactual deficits: a protracted increase in primary balances would have had a small positive effect on GDP at impact that would have faded away to turn negative after some years.

Overall, the analysis suggests that the EU fiscal framework as provided by the Treaty and the SGP has not had long-term negative consequences, but instead has helped to avoid a situation in which accumulating public debt would have crowded-out private investment and reduced potential growth.

ANNEX

Table A1

The EU fiscal framework and budgetary behaviour (EU-11)

	BE	DK	DE	EL	ES	FR	IE	IT	NL	AT	PT	FI	SE	UK
Pre-EMU phase II														
Output gap	0.25*	1.44	–0.23***	0.18	–0.03	0.14	–0.55***	–0.14	0.02	0.32	0.03	0.30**	–0.17	0.20
	(0.53)	(1.72)	(–2.00)	(0.80)	(–0.15)	(0.58)	(3.11)	(–0.73)	(0.07)	(1.16)	(0.24)	(2.57)	(–0.27)	(1.37)
Debt at t–1	0.04**	0.07***	0.00	0.00	0.01	–0.04	0.04*	0.06***	0.03	0.02	0.09***	–0.12*	0.03	0.01
	(2.87)	(3.44)	(0.00)	(0.26)	(0.66)	(–1.15)	(2.07)	(3.26)	(1.17)	(0.85)	(4.05)	(–1.79)	(0.72)	(0.44)
Primary budget balance at t–1	0.58**	0.27	0.52***	0.58***	0.81**	0.41	0.69***	0.41**	0.31	0.46**	0.44***	0.25	1.01***	0.66***
	(2.66)	(1.13)	(4.12)	(3.58)	(2.59)	(0.76)	(6.45)	(2.28)	(0.92)	(2.58)	(3.26)	(1.25)	(3.74)	(5.99)
Constant	–3.99**	0.51	0.30	–1.31	–0.58	1.20	–2.97*	–6.02***	–0.91	–0.52	–4.91***	5.29*	–1.80	–0.96
	(–2.88)	(0.59)	(0.26)	(–1.55)	(–1.12)	(1.05)	(–2.02)	(–3.15)	(–0.73)	(–0.55)	(–4.10)	(2.86)	(–1.08)	(–0.59)
No. of observations	23	22	22	23	23	16	23	23	18	23	20	23	23	23
R square	0.7473	0.8217	0.3987	0.47	0.594	0.363	0.83	0.649	0.333	0.527	0.711	0.829	0.594	0.660
F	36.37	58.99	13.89	9.49	8.56	1.77	33.8	16.55	3.44	3.71	15.05	106.82	13.02	15.59
Post-EMU phase II														
Output gap	0.57*	1.82**	2.74***	0.10	0.07	0.25	1.07***	0.65*	1.25***	0.47	0.25	0.83**	1.23	5.75
	(2.41)	(3.12)	(9.04)	(0.17)	(0.26)	(0.52)	(4.72)	(1.22)	(5.25)	(1.55)	(1.88)	(2.78)	(1.65)	(1.50)
Debt at t–1	0.00	–0.02*	0.29***	0.13	0.07	0.14	0.23***	0.16**	0.14***	0.35***	0.29**	–0.08	0.21*	–0.09
	(0.10)	(–0.44)	(8.60)	(0.55)	(1.20)	(0.65)	(4.10)	(2.71)	(6.43)	(3.93)	(3.20)	(–0.45)	(2.03)	(–0.38)
Primary budget balance at t–1	0.35	–0.18	–0.88***	0.23	0.79**	0.18	–0.40	0.36	–0.37	0.59***	–0.42*	0.17	0.60**	–0.24
	(1.13)	(–0.35)	(–7.95)	(1.01)	(3.04)	(0.20)	(–1.67)	(1.92)	(–1.29)	(5.52)	(–2.13)	(0.61)	(2.55)	(–0.35)
Constant	3.62	7.19	–15.02***	–10.04	–3.87	–7.29	–9.98**	–15.53*	–5.20***	–22.41***	–16.51**	7.91	–11.79	4.86
	0.73	(1.39)	–(8.36)	(–0.39)	(–0.99)	(–0.65)	(–2.49)	(–2.30)	(–4.93)	–(3.96)	–(3.13)	(0.78)	(–1.73)	(0.46)
No. of observations	10	10	10	10	10	10	10	10	10	10	10	10	10	10
R square	0.789	0.828	0.924	0.197	0.891	0.685	0.701	0.612	0.921	0.874	0.628	0.937	0.791	0.900
F	13.67	6.84	30.69	1.15	18.43	13.46	7.81	4.99	71.19	33.51	3.64	74.76	9.98	28.29

Note: Z statistics reported in parenthesis. ***, **, * denote statistical significance at, respectively, 1, 5, and 10 per cent level. A lower number of observations for France and the Netherlands are due to missing data for debt in the early Seventies. An outlier for the German primary balance has been identified in 1975 and has been consequently dropped from the sample. The output gap variable is instrumented using its own lag and the lagged US output gap. All variables are expressed as a percentage of trend output.

Table A2

Difference Between Counterfactual and Actual Primary Budget Balances
(percent of trend GDP, annual average over the 1994-2003 period)

Country	Primary balance
Belgium	–0.25
Germany	–0.05
Greece	–3.40
Spain	–0.44
France	–1.52
Ireland	–2.40
Italy	–1.30
Netherlands	–1.02
Austria	–0.28
Portugal	0.30
Finland	–4.00
EU-11 (average)	–0.88

REFERENCES

Alesina, A., M. de Broeck, A. Prati and G. Tabellini (1992), "Default Risk on Government debt in OECD Countries", *Economic Policy*, No.15, pp. 427-63.

Alesina, A., S. Ardagna, R. Perotti and F. Schiantarelli (2002), "Fiscal Policy, Profits, and Investment", *American Economic Review*, No. 92, pp. 571-89.

Ballabriga, F. and C. Martinez-Mongay (2002), "Has EMU Shifted Policy?", European Commission, Economic Paper, No. 166.

Bayoumi, T.A., M. Goldstein and G. Woglom (1995), "Do Credit Market Discipline Sovereign Borrowers? Evidence from US States", *Journal of Money, Credit, and Banking*, No. 27, pp. 1046-59.

Bernoth, K., J. Von Hagen and L. Schuknecht (2003), "The Determinants of the Yield Differential in the EU Government Bond Market", ZEI, University of Bonn, mimeo.

Brook, A.M. (2003), "Recent and Prospective Trends in Real Long-term Interest Rates: Fiscal Policy and Other Drivers", OECD, Economics Department, Working Paper, No. 367.

Buti, M. and A. Sapir (eds.) (1998), *Economic Policy in EMU: A Study by the European Commission Services*, Oxford, Clarendon Press.

Canzoneri, M.B., R.E. Cumby and B. Diba (2002), "Should the European Central Bank and the Federal Reserve Be Concerned About Fiscal Policy?", in *Rethinking Stabilization Policy*, Federal Reserve Bank of Kansas City.

Caselli, F., A. Giovannini and T. Lane (1998), "Fiscal Discipline and the Cost of Public Debt Service: Some Estimates for OECD Countries", IMF, Working Paper, No. 55.

Codogno, L., C. Favero and A. Missale (2003), "EMU and Government Bond Spreads", *Economic Policy* , October, pp. 504-32.

Elmendorf, D.W. and N.G. Mankiw (1999), "Government Debt", in J.B. Taylor and M. Woodford (eds.), *Handbook of Economics*, Vol. 1, Elsevier Science.

European Commission (2000), "Public Finances in EMU-2000", *European Economy, Reports and Studies*, No. 3.

Gale, W. and P. Orszag (2003), "The Economic Effects of Long-term Fiscal Discipline", Urban-Brookings, Tax Policy Centre, Discussion Paper, No. 8.

Gali, J. and R. Perotti (2003), "Fiscal Policy and Monetary Integration in Europe", *Economic Policy,* Vol. 18, No. 37, pp. 533-71.

Giavazzi, F. and M. Pagano (1990), "Can Severe Fiscal Contractions Be Expansionary? Tales of Two Small European Countries", *NBER Macroeconomics Annual*, No. 5, pp. 75-111.

Giudice, G., A. Turrini and J. in 't Veld (2003), "Can Fiscal Consolidations Be Expansionary in the EU? *Ex post* Evidence and *Ex ante* Analysis", *European Economy*, Economic Paper, No. 195, European Commission Directorate-General for Economic and Financial Affairs, Brussels, December.

Hughes-Hallet, A., J. Lewis and J. Von Hagen (2004), *Fiscal Policy in Europe, 1991-2003: An Evidence-Based Analysis*, CEPR, London.

Laubach, T. (2003), "New Evidence on the Interest Rate Effects of Budget Deficits and Debt", mimeo, Board of Governors of the Federal Reserve System, May.

Lemmen, J. and C. Goodhart (1999), "Credit Risks and European Government Bond Markets: A Panel Data Econometric Analysis", *Eastern Economic Journal*, No. 25, pp. 77-107.

Melitz, J. (2002), "Debt, Deficits and the Behaviour of Monetary and Fiscal Authorities", in M. Buti, J. Von Hagen and C. Martinez-Mongay (eds.), *The Behaviour of Fiscal Authorities*, Basingstoke, Palgrave.

Roeger, W. and J. in 't Veld (2002), "Some Selected Simulation Experiments With the European Commission's QUEST Model", *European Economy*, Economic Paper, No. 178, European Commission Directorate-General for Economic and Financial Affairs, Brussels, October.

Sapir, A., P. Aghion, G. Bertola, M. Hellwig, J. Pisany-Ferry, D. Rosati, J. Viñals, H. Wallace, with M. Buti, M. Nava and P. Smith (2004*), An Agenda for a Growing Europe. The Sapir Report*, Oxford, Oxford University Press.

Tanzi, V. and N. Chalk (2000), "Impact of Large Public Debt on Growth: A Discussion of Potential Channels", *European Economy*, Reports and Studies, No. 2.

Von Hagen, J., A. Hughes Hallet and R. Strauch (2001), "Budgetary Consolidation in EMU", European Commission, Economic Paper, No. 148, European Commission Directorate-General for Economic and Financial Affairs, Brussels.