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THE STEADY-STATE BUDGET CONSTRAINT AND THE INTEGRATION OF EUROPEAN FINANCIAL MARKETS: AN ARITHMETICAL EXERCISE

by José Ramalho

BANK FOR INTERNATIONAL SETTLEMENTS
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"The steady-state budget constraint and the integration of European financial markets: an arithmetical exercise"

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Introduction

This paper rests on two basic ideas. Firstly, moves towards greater financial integration and exchange rate fixity between the countries of the European Community are likely to be accompanied by a convergence of real interest rates, inflation rates and bank reserve requirements among the countries involved. Secondly, all these items and other elements such as the real growth rate affect the size of the budget deficit which any individual country can run on a sustainable basis. For example, the lower the rate of inflation which is compatible with a given ratio of monetary base to income, the lower the amount of public expenditure which it will be possible to finance with the issue of base money without altering that ratio. This is the well known phenomenon of seigniorage. A similar point applies to the issue of public sector bonds. Assuming that a "sustainable" budgetary situation is defined to involve a stable ratio of outstanding bonds (as well as of money) to GDP/GNP, then the higher the growth rate of the economy, the greater can the increment to debt - and the budget deficit - be, without the fiscal situation becoming unsustainable in the sense defined.

The core of the paper is the calculation of the effects of European financial integration on the long-run sustainable budgetary situations of individual countries. This calculation involves making many necessarily arbitrary assumptions - both as to what constitutes "sustainability" as well as to what will be the effects of integration on the relevant economic variables such as interest rates and inflation rates. The definition of sustainability adopted here is formulated in terms of the so-called "steady-state budget constraint" which is calculated assuming, for example, that present debt ratios are frozen at their present levels rather than continuing to rise as they have been in many countries for some time. By this criterion, several European countries already require significant modification of their budgetary situations before any further pressures from the effects of integration are dealt with. Thus the main subject being dealt with here is a comparison of two hypothetical situations, namely steady-state (or sustainable) budget deficits under present arrangements and under conditions of full financial integration.

Despite the necessarily arbitrary nature of the assumptions which have to be made, the results do nevertheless accord with common sense. For example, they show a tightening of the underlying budgetary constraint in

countries which currently have considerable capital controls in place and which, partly as a result, have experienced low real rates of interest on public debt. By contrast, for several other countries, some relaxation of the steady state budget constraint is afforded by the assumed effects of integration, in particular via the reduction in their real interest rates.

Partly because of the hypothetical nature of the states being compared, and partly because of the arbitrariness of the assumptions which have to be made, the results of the analysis need to be treated with some care. Many European countries have been running "unsustainable" fiscal deficits, on the definitions used here, for some time; they might well continue to do so - for some time - after integration, increasing their debt ratios from their present levels. In addition it should be made clear that the calculations do not purport to shed light on some of the principal arguments for greater coordination of fiscal policies in Europe as set out in the recent report of the Delors committee. The arguments there concerned mainly macro-economic, or demand management, policy and the desirable degree of coordination of such policies. Here we deal with the changes in budgetary policies which would be automatically implied by a move to monetary union and the resulting changes in the background conditions against which fiscal policy is set. However, as the stability condition - as defined here - is not met in many countries in the present situation, it may be that the fiscal implications of integration will not come separately to the notice of policy makers in several cases.

The paper is organised as follows. In the first section the main stylised aspects and consequences of monetary and financial integration in Europe are briefly discussed. In section two the analytical tool - the steady-state budget constraint - is introduced and discussed, and in section three we present the way in which this tool will be used and the practical simplifying assumptions required for the exercise. The empirical results are displayed in section four and summarised in a concluding section. An appendix covering several small mathematical/arithmetical points and an annex on statistical aspects are provided at the end of the paper.

1. Monetary and financial integration in Europe

(a) Main aspects and consequences

The starting point of this paper is the fact that the European Community is embarking on a new phase of the process of financial integration. The progressive integration of European financial markets is by no means a new phenomenon. It has been evolving naturally for some time, though at quite different speeds in the various market segments of different countries, as a result of growing economic interdependence. Recently, however, several co-ordinated decisions taken at the Community level are bound to act as a catalyst to this mainly spontaneous process, making it in fact undergo a real quantum jump.

The first element is the full liberalisation of capital movements. This has been completed before the July 1990 deadline that applied in most countries, and is to be completed by end-1992 in Greece, Ireland, Portugal and Spain, although Greece and Portugal might get a further extension until end-1995. The second element is the creation of a single market, particularly in financial services, which is to be concluded in 1992. Finally, these elements can be viewed as being part of some broad monetary agreement - formal or informal - which will increasingly hinder and perhaps eventually rule out the possibility of exchange rate realignments. Up to now this agreement has basically taken the form of a greater co-ordination of monetary policies, through a reinforced and concerted use of the available instruments, and its results can be seen in the relative stability of exchange rates between the EMS countries in recent years. In the future, this agreement may evolve into a more formal type, whose discussion is beyond the scope of this paper.

This integration scenario has strong implications for monetary variables and monetary policy autonomy in individual countries. With exchange rate realignments progressively ruled out, the possibility of sustained divergences in inflation rates will likewise decrease. Rates of inflation will therefore tend to converge across EC countries. The same will tend to happen to interest rates, for similar credit risks, with free capital movements and virtually perfect mobility of capital. Finally, if equal competitive conditions are to be given to all national banking systems, bank reserve requirements will also tend to converge.

In fact, it is a well-known theoretical result that in a perfect-integration scenario, with fixed exchange rates, no capital controls and perfect capital mobility, little remains of monetary policy autonomy in each individual country - except in the leader, if one exists. If, in addition, monetary and fiscal policies at the domestic level are not strictly independent, in the long run, the loss of monetary policy autonomy in an integrated scenario will also impinge on fiscal policy autonomy. The purpose of this paper is to analyse some of these long-run implications for fiscal policy of the monetary and financial integration of European markets. A very simple theoretical tool, the steady-state budget constraint, is used for this purpose. This tool is presented in Section 2.

(b) Integration and fiscal policy: the Delors Report

The issue of the loss of fiscal policy autonomy is addressed in the "Report on Economic and Monetary Union in the European Community" (Delors Report, 1989). It is important to stress that the fiscal policy considerations and arguments dealt with in this Report cover a much wider spectrum than those aspects being dealt with in the present paper.

The arguments in favour of more coordination of fiscal policies in a full Economic and Monetary Union (EMU), which underlie the recommendations of the Delors' Report, were discussed in its preparatory studies (Lamfalussy, 1989). They were: (1) that the small size of the European Commission's budget means that any European fiscal demand management would have to be carried out via co-ordinated changes in national fiscal policies; (2) that, without co-ordination, one or more countries might appropriate an undue proportion of Community savings and thus raise interest rates for all members; and (3), that without co-ordination there might be an overall bias towards fiscal laxity in the Community as a whole. A fourth argument focused on the convergence of fiscal policies during the transition period to EMU, as a condition for reducing the need for exchange rate realignments and gradually preparing the ground for an irrevocable fixing of parities.

The present analysis throws some light only on the latter argument. In fact, the integrated scenario dealt with in this paper concerns only monetary and financial integration, rather than a full EMU. The full implications of economic union, in which co-ordination of fiscal policies is argued to be a desirable element, are not dealt with here. In the more limited context of monetary integration, the present analysis attempts to

assess the degree of fiscal policy modification and co-ordination which might be required to keep exchange rates fixed. As mentioned above, however, this is done in a long-run perspective; therefore, short-term recommendations on fiscal policy of the kind made in the Delors' Report are out of the scope of this analysis.

2. Long-run interrelationship between monetary policy and fiscal policy: the steady-state budget constraint

(a) General formulation and meaning

The steady-state budget constraint is simply the result of the inter-temporal aggregation of the public sector financing identity in each period of time, given a host of assumptions about growth, inflation and interest rates (see Appendix). In other words, it is the expression of the simple fact that budget deficits must be limited, in the long run, to what can be financed in a sustainable way.It seems intuitively plausible that "sustainability" here might imply constant ratios of money and the outstanding stock of government bonds to income.

In the simplest case the government, consolidated with the central bank throughout this analysis, is assumed to finance its deficit by printing base money, M, without cost, or by issuing bonds B, at a nominal rate of interest, i. The ratios of the outstanding stocks of both available financial instruments to nominal income, denoted by lower case letters m and b, are assumed to be functions of the relative financial prices/opportunity costs involved - in this case, basically the nominal rate of interest, which can be decomposed into the real rate of interest, r, and the inflation rate, π. In a steady-state situation, where the monetary/fiscal policy mix is given, and real output is growing at a steady rate n, these prices are assumed to be invariant, thus leading to constant monetary base and public debt ratios. In this case the steady-state budget constraint, derived in the Appendix, part 1, shows that the sustainable public deficit net-of-interest, expressed as a ratio to income, is given by

$$d = (n+\pi)m + (n-r)b$$

An alternative presentation can be obtained by multiplying through by nominal income, which yields, for period t, the result

$$D_t = (n+\pi)M_t + (n-r)B_t$$

This result shows that a permanent deficit net-of-interest (primary deficit) must be financed by a combination of implicit taxes levied on the stock of monetary base, at the tax rate $n+\pi$, and on the stock of bonds, at the tax rate $n-r$ (Miller, 1983).

An intuitive interpretation of this result can be found in a cash-flow approach. Take government bonds, for example. In any given period, the cash inflow to the government associated with this financial instrument is given by the net purchases by the public, that is, the nominal growth of the public holdings of bonds. Since the debt ratio is fixed, the nominal rate of growth of debt is equal to the rate of growth of nominal income, $n+\pi$. The cash inflow to the government associated with bonds is then given by $(n+\pi)B$. On the other hand, the cash outflow from the government associated with bonds is straight-forwardly given by the cost of debt service, iB. The implicit tax on bonds ("seigniorage on bonds" in Miller and Sargent terminology, 1984), $(n-r)B$, is simply the net cash flow to the government. Similar reasoning applies to the implicit tax on base money ("seigniorage on money").

(b) Policy interpretation and simple numerical illustration

The steady-state budget constraint offers a very simplified framework for analysing the inter-relationship between steady-state fiscal and monetary policies. In this framework, a steady-state fiscal policy is represented by a constant value for d, that is, a given regular primary deficit (expressed as a ratio to income). Steady-state monetary policy is described by a steady pace of money supply growth, which determines a steady rate of inflation, π. In this context, two extreme cases can be considered (Sargent and Wallace, 1981), when a conflict emerges between the long term stances of the two policies. In the first case, monetary policy is assumed to "dominate" fiscal policy. In this case, the monetary authority independently sets an objective for the inflation rate and implements the corresponding policy, that is, a given rate of expansion of the supply of base money; with this constraint, the assumptions set out above, and the resulting demand for bonds, fiscal policy (that is d) has to be adjusted in order to satisfy the steady-state budgetary condition. In the second case, fiscal policy "dominates" monetary policy. Now the fiscal authority sets its policy independently, leaving the monetary authority constrained by the need to

finance, with money issue and inflation, any discrepancy between the government borrowing requirement and the demand for bonds. The difference between the two polar cases is reflected in an inversion of the relative status of the variables $\underline{d}$ and $\underline{\pi}$ in the steady-state equation: in the case of monetary policy dominance $\underline{\pi}$ is an exogenous variable and $\underline{d}$ is endogenous, whereas in the case of fiscal policy dominance $\underline{\pi}$ is the endogenous variable and $\underline{d}$ is exogenous.

Against this background, the use of the steady-state budget constraint can be illustrated with the arbitrary numerical inputs of the accompanying table (Table 1). Assume that the monetary authorities have the objective of keeping the rate of inflation in the long run around 2%; assume further that the steady-state value for the real rate of interest (on public debt) is 3%. Given the public's portfolio behaviour, suppose that the ratios of monetary base and public debt compatible with those steady-state fixed values are 10% and 60%, respectively. Finally, assume a steady real rate of output growth of 4%. With these inputs, the steady-state budget constraint shows that the primary budget deficit that can be run on a sustainable basis is about 1.2 percentage points of income, half of it being financed by implicit taxes on money, the other half by implicit taxes on bonds (first column of Table 1).

A higher steady-state value for the real rate of interest would imply, "ceteris paribus", a lower sustainable deficit net-of-interest. If, for example, the steady-state real rate of interest were 4%, that is, equal to the real rate of growth, the implicit taxes on bonds would be zero, as the proceeds of bond sales in each period would only be enough to match the interest burden on the existing debt; in this case, the allowable primary deficit would be reduced to 0.6 percentage points of GDP/GNP (second column). With a higher real rate of interest, all other inputs being equal, the implicit taxes on bonds would become negative and eventually outweigh (positive) seigniorage on money, requiring a steady-state primary budget surplus. With the arbitrary numerical inputs used here, that would be the case with a real rate of interest higher than 5% (third column).

A reduction in the size of the permissible steady-state primary deficit (or an increase in the required surplus) would also occur if, for example, a supply shock reduced the steady real rate of growth to 3%. In such a case the implicit taxes on bonds would also disappear and, in addition,

Table 1

Simple numerical illustration of the
steady-state budget constraint framework

Items	Monetary policy "dominant"				Fiscal policy "dominant"	
	as a percentage of GDP/GNP*					
INPUT VALUES						
Real rate of interest (r)	3%	4%	5%	3%	3%	3%
Real rate of growth (n)	4%	4%	4%	3%	4%	4%
Monetary base ratio (m)	10%	10%	10%	10%	10%	8%
Debt ratio (b)	60%	60%	60%	60%	60%	62%
DOMINANT LONG-TERM OBJECTIVE:						
Rate of inflation (π)	2%	2%	2%	2%	-	-
RESULTS:						
Steady-state primary deficit $d = (n + \pi)m + (n-r)b$	1.2%	0.6%	0%	0.5%	-	-
of which: "implicit taxes on money" $(n + \pi)m$	0.6%	0.6%	0.6%	0.5%	-	-
"implicit taxes on bonds" $(n-r)b$	0.6%	0%	-0.6%	0%	-	-
DOMINANT LONG-TERM OBJECTIVE:						
Primary deficit (d)	-	-	-	-	3%	3%
RESULTS:						
Steady-state rate of inflation $\pi = [d-(n-r)b]/m-n$	-	-	-	-	20%	25.75%

* Except for real rate of growth, rate of inflation and real rate of interest, which are expressed in percentage points.

seigniorage on money would diminish, reducing the allowable budget deficit net-of-interest to 0.5 percentage points of income (fourth column).

Returning to the initial case where a sustainable primary deficit of 1.2 percentage points of GDP/GNP was allowed, the question can be asked as to what would happen if, despite this constraint, fiscal authorities persistently ran a primary deficit of, say, 3% of income. Assume, for the moment, unchanged ratios of base money and debt to GDP. (This assumption will be discussed below.) In such a case, the steady-state equation can be reversed to calculate the rate of inflation that would raise the additional seigniorage revenue on money required to finance the greater permanent deficit. With the arbitrary numerical inputs utilised, a rate of inflation of 20%, instead of 2%, would be needed in this situation (fifth column).

A more realistic calculation would of course consider the impact of the higher rate of inflation on both the base money and public debt ratios, that is, on the public's willingness to hold these instruments. In this very simple model, a higher rate of inflation would lead to a reallocation of the public's portfolio against money and in favour of bonds. Since the implicit tax rate on bonds is lower than the implicit tax rate on money, this would mean that the rate of inflation required to raise the needed seigniorage revenue on money in the previous example would be greater than 20%. (If, for example, the monetary base ratio were reduced to 8% of GDP - a reduction of one-fifth - and the bond ratio increased to 62%, the required rate of inflation, assumed compatible with these new ratios, given the other inputs, would be 25.75%.)[1] (sixth column).

(c) How binding is the steady-state budget constraint?

The question can be raised as to whether the steady-state budgetary constraint on monetary policy is necessarily active, that is, whether an increase in the steady-state government deficit could sometimes be financed by additional implicit taxes on bonds alone, without posing any long-term problems for monetary policy and inflationary prospects (Darby, 1984). As the steady-state equation shows, additional implicit taxes on bonds can only be

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1 A higher budget deficit would lead to a higher rate of inflation. In theory, this could tend to infinity, if a strong flight away from money developed, with people reducing their money balances to virtually zero. This very stylised model can hence be used to highlight how sufficiently irresponsible fiscal behaviour can unleash a hyperinflationary process.

generated by an increase in the real rate of growth, a lower real rate of interest, a higher debt ratio (as long as the implicit tax rate on bonds is positive) or a lower debt ratio (when that implicit tax rate is negative); the debt ratio is in turn positively related to the real rate of interest. If the real rate of growth is assumed to be supply-determined, and thus fixed in this analysis, a permanent expansionary shift in the fiscal policy stance can only be financed by bond issue alone if the "quantity effect" associated with a higher tax base (higher debt ratio) more than offsets the "price effect" of a lower tax rate (higher real rate of interest). (The effect of the real rate of interest on the monetary base ratio is ignored for simplicity). Using the steady-state equation it can be seen that the steady-state budget deficit can be increased without inflationary consequences up to

$$\Delta d \cong \Delta[(n-r)b]$$

$$\cong (n-r)\Delta b - b\Delta r$$

where the first term on the right-hand side is the quantity effect and the second term the price effect (with $\underline{n}$ unchanged). Assuming a fixed real rate of interest, and thus considering only the quantity effect, Darby concluded that public deficits could be indefinitely financed by debt issue provided that the real rate of growth were greater than the real rate of interest - which he showed to be historically corroborated by long-term empirical analysis.[2] Replying to Darby, Miller and Sargent (1984) argued that the historical comparison between $\underline{n}$ and $\underline{r}$ has to take account of the regime, that is, the mix of fiscal and monetary policies; empirical evidence does not help when there is a switch to a regime with much higher average deficits and debt ratios. Hence they replaced Darby's assumption of a fixed real rate of interest with a more realistic assumption relating it positively to the debt ratio, thus introducing the price effect of the previous equation. In this case "bond seigniorage" is subject to a maximum, so that it may not be

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2 However, as data presented in Section 4 show, this is not generally the case nowadays. In fact, as Miller and Sargent (1984) put it: "evidence that the real interest rate has averaged less than the real growth rate over some historical period may be interpreted as partly reflecting the monetary and budget policies in place during that historical period. The average difference between the real growth rate and the real interest rate would not be expected to remain the same after a change in monetary and budget policies, such as a switch to a regime with higher average deficits".

sufficient to finance a steady-state increase in the deficit. This result may arise even in situations where the real rate of interest is lower than the real rate of growth; two such examples are a situation where the actual real rate of interest is greater than or equal to the one which maximises "seigniorage on bonds", and a situation where the increase in the deficit is simply too large.

In any case, recent experience of real rates of interest exceeding real rates of growth in most European countries would be sufficient to make the right-hand side of the previous equation unequivocally negative when the debt ratio is increased. If further considerations are not added (see Appendix, part 2) and the assumptions are not relaxed, this would mean that that there is presently no scope for a permanent expansionary shift in fiscal policy stance, above the level given by the steady-state constraint, to be exclusively financed by additional implicit taxes on bonds, without long-term inflationary consequences.

This would, in turn, provide a policy justification for keeping debt ratios constant (at their present level) which is a crucial assumption made in the empirical section of this paper. In fact, in the current situation, the authorities are interested in not letting the debt ratio rise, because it would reduce the permissible steady-state primary deficit; on the other hand, a reduction in the debt ratio is simply not feasible in the case of the countries which have fiscal problems - the ones we are concerned with in this paper.

(d) Variants and extensions

The steady-state budgetary condition can be easily transformed into slightly different versions.

One alternative is to focus on the total deficit ratio, instead of on the primary deficit. The corresponding version of the steady-state budget constraint would then be

$$d+ib = (n+\pi)(m+b)$$

which indicates that the size of the permissible total deficit in the long run is given by the steady growth of total liabilities of the consolidated government plus central bank. The rate of growth of these liabilities, that is, the rate at which the public is willingly adding obligations of the

government to its portfolio, is equal to the rate of growth of nominal income, if the ratios of debt and monetary base are to remain stable, avoiding explosive (or implosive) paths.

Another variant emerges when the (primary) deficit is replaced by expenditures (net-of-interest) $\underline{g}$, less taxes, $\underline{t}$, both expressed as constant proportions of income. In this case, a steady-state constraint for government expenditures net-of-interest can be derived:

$$g = (n+\pi)m + (n-r)b+t$$

which highlights the complementary role of explicit taxes and implicit taxes - in particular, the inflation tax - in the financing of a steady ratio of government expenditures to income.

The steady-state budget constraint can also be extended to include other types of financial instrument available to the government. A particular case which will be used in the empirical section involves the sub-division of money into currency (C) and required bank reserves (R), some of which may be remunerated. The steady state budget constraint in this case is derived in the Appendix, part 3. In particular, for time period $\underline{t}$ the equation can be written

$$D_t = (n+\pi)C_t + (n+\pi)R_{1t} + (n-r+\tau)R_{2t} + (n-r)B_t$$

where R_1 is the level of unremunerated bank reserves and R_2 is the level of remunerated reserves which carry a real interest rate $(r-\tau)$ somewhat below that on bonds. It can be seen that, from the viewpoint of the permissible size of the deficit, unremunerated reserves provide an equivalent source of finance to currency. Remunerated reserves are then somewhere between currency and bonds, depending on the rate of interest which they carry. They are assumed to include all forms of direct or indirect public sector debt (excluding currency and non-remunerated reserves) that yield below-market rates of interest. In particular, remunerated reserves include the so-called secondary reserve requirements, obligatory coefficients of public securities and other forms of direct or indirect finance to the government, insofar as they carry below-market rates.

An equivalent presentation of the previous equation in terms of ratios to income, which will be used in the empirical section, is given by

$$d = (n+\pi)c + (n+\pi)k_1\varepsilon + (n-r+\tau)k_2\varepsilon + (n-r)b$$

where k_1 and k_2 are the constant coefficients of the non-remunerated and remunerated reserves respectively, and ε is the ratio of bank deposits to income.

(e) General comments and qualifications

The steady-state budget constraint offers a very simplified model of a complex reality. As with other stylised models, it rests on straight-forward assumptions and aims to focus on a specific problem, leaving other questions in the shade. More specifically, it is a partial equilibrium model relying on a rudimentary modelling of people's portfolio behaviour and very simple underlying steady-state assumptions, including no changes in long-run behaviour and policies. It establishes a link between the long-term stances of fiscal and monetary policies which highlights the role of the inflation tax (or, more precisely, of the government revenues arising from the issue of fiat money and debt) and of growth on public finance. It thus focuses only on the inflationary pressures that stem from the public sector behaviour, disregarding potential inflationary pressures which may arise from changes in the private sector behaviour or from external shocks.

The constraint derived is a long term one and thus not necessarily applicable in the short-term or to each period of time. Short-term deficits may fluctuate around their sustainable steady-state level and they surely would if, for instance, cyclical considerations were introduced.[3] However, temporary oscillations aside, the steady-state framework assumes unchanging policies in the long run - in fact, it takes to the extreme the present stances (or other given stances) of monetary and fiscal policies, in order to derive their long-run compatibility. In this sense, the steady-state budget constraint provides a "formalised" device for gauging the credibility of policies, which in turn is a decisive element in the formation of expectations and behaviour.

The unchanging policies assumption also implies that no other constraints, which may require and trigger policy corrections, are supposed

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3 As José Viñals (1985) shows, cyclical elements only cancel out under specific conditions (namely, $n = r$). Nevertheless, in a simple framework, this complication can be ignored.

to be active. This is notably so in the case of the current account/balance of payments constraint, where experience shows that the first symptoms of policy inconsistencies often emerge - especially in the case of small open economies. In the present analysis this constraint is simply ignored, as is the discussion about the possible impact on it of European monetary and fiscal integration.

The issue of the role of inflationary tax and seigniorage revenues in public finance has been made topical by the discussion and reflection about the monetary future of Europe and the "quantum jump" in the financial integration of countries which, in the past, had recourse to such revenues in very different degrees, in order to finance very different fiscal positions. The goal which is being discussed - economic and monetary union - is a long term one. In this sense, questions relating to the transition to it seem to be suitably analysed within the long-term nature of the steady-state budget constraint. Thus, despite its limitations, such analysis may provide insights into some of the economic policy questions which are at stake in the process of monetary and financial integration in Europe, together with some rough estimates of the magnitude of the impact of this integration on some key policy variables.

3. The integration of European financial markets and the steady-state budget constraint

(a) "Domestic" versus "integrated" steady-state scenarios

In order to assess the impact of European monetary and financial integration on fiscal policy using the steady-state budget constraint, the sustainable primary deficit calculated in two opposite future scenarios - a "domestic" and an "integrated" one - and the current primary deficit are compared. This comparison is made in two steps. In the first step, the estimated sustainable deficit in each steady-state scenario is compared with the present fiscal stance, in order to assess what adaptation of the current fiscal policy would be required to comply with each of the two future alternatives. In the second step, the estimated sustainable deficits in the two scenarios are compared. Clearly this second step permits to assess the effect of the integration of European financial markets on the steady-state budget constraint.

Both scenarios are necessarily artificial constructions. They must be viewed as reference sets of variables, which are considered to be useful for analytical purposes but are by no means intended to represent forecasts of the most probable developments in either alternative context. The building of both scenarios requires the introduction of more simplifying assumptions, which add to the simplicity of the tool. The result is a largely arithmetical exercise which nevertheless, reveals some interesting points.

(b) The "domestic" steady-state scenario

The "domestic" scenario in each country is basically a projection of the present situation to a steady-state, the maintenance of which is brought about by an adjustment of fiscal policy. This means that the ratios of currency, deposits and public debt to income are kept constant from now on at their present levels. The same applies to the variables associated with the reserve system, and to the real rate of interest. As far as the rate of inflation is concerned, two alternatives are offered: in the first one the present rate is retained; in the second one, a rate of inflation equal to that assumed in the "integrated" scenario is chosen. Finally, as regards the real rate of growth, its steady-state value is taken to be basically supply-determined and less affected by the present mix of policies; it was thus measured over a longer period, namely the average of last decade. (For further details on inputs and data, see Annex.)

The artificial/reference nature of the "domestic" scenario is patent in various aspects. In fact, financial integration seems to be an inevitable tendency today; that is, even in the absence of formal agreements, trends exist which are making European financial markets progressively more interrelated and interdependent, and the decisions which have been agreed (such as the liberalisation of capital movements) only accelerate such trends. Projecting the present "domestic" situation of each country in a steady-state form is thus calculatedly unrealistic, and must be interpreted as just a useful exercise for analytical purposes. Moreover, the "domestic" scenarios cover a variety of situations amongst which the degree of integration widely differs. In fact, while in the "integrated" scenario the monetary frameworks in the different countries are, by definition, rather uniform, in the "domestic" scenario they vary widely with respect to capital controls, exchange rate determination, bank reserve regimes and direct and indirect quantitative or interest rate controls. Thus, identical results can

be obtained for different reasons, and symmetrical results may not be due to symmetrical causes. For reference purposes, the present qualitative differences across countries with regard to exchange rate commitments, capital controls, and the existence of far-reaching domestic quantitative or interest rate controls (excluding reserve requirements) are schematically summarised in Table 2.

(c) The "integrated" steady-state scenario

European monetary and financial integration would change the steady-state budget constraint in each country in several ways. In a more or less realistic model, where account was taken of the full implications of financial integration, all the steady-state variables would presumably change. Moreover, a transition pattern would have to be considered, and its effects added to the equation, after being expressed in the form of a steady-state flow as a ratio to GDP. That being so, to keep the simple model workable, assumptions have to be made which permit the estimation of the new steady-state values in the absence of a complete model.

The first simplifying assumption concerns the transition process which is taken to be instantaneous, as described in the Appendix, part 4 .

The second assumption concerns the convergence of monetary policy variables. For the reasons adduced in section 1, integration is supposed to lead to a convergence of inflation rates, interest rates (for similar credit risks) and reserve requirements across all EC members; exchange rates are implicitly assumed to remain fixed. In the scenario considered here, the interest rate assumption is pushed a little further, and full convergence is assumed. This means that, for simplicity, we abstract from the possible impact on interest rates of different debt ratios and country-risks (beyond inflationary/exchange rate risks which would tend to disappear in an integrated context); however, these elements will be brought into the discussion below. Moreover, it is assumed that the levels towards which all EC countries will converge are the present rate of inflation, interest rates, and reserve requirements of the leader country, West Germany. This assumption could be easily replaced by a convergence towards the recent EC average or to the average of the countries belonging to the exchange rate mechanism of the EMS; however, the retained assumption is considered to reflect better a presumable continuation of the trend followed in recent years by most EC countries.

Table 2

Main qualitative aspects of the present institutional monetary framework in EC countries

Countries	Participation in the ERM of the EMS	Existence of significant capital controls	Existence of significant quantitative* /interest rate domestic controls
Belgium	Yes	No***	No
Denmark	Yes	No***	No
Germany	Yes	No	No
Greece	No	Yes	Yes
Spain	Yes**	Yes	No
France	Yes	No***	No
Ireland	Yes	Yes	No
Italy	Yes	No***	No
Netherlands	Yes	No	No
Portugal	No	Yes	Yes
United Kingdom	No	No	No

* Excluding reserve requirements.
** As from June 1989.
*** More or less significant capital controls of one form or another existed until recently but have been abolished.

The substitution of an exogenous rate of inflation for the previous inflation rate in the steady-state budget constraint of each country has an important corollary. This is that, whatever the relative status of monetary and fiscal policy in each country before the financial integration, after this integration monetary policy comes to "dominate" fiscal policy (in the sense described earlier). Notice that this does not contradict the well-known loss of autonomy of individual monetary policies in a financially integrated area. It simply stresses the loss of autonomy that the submission to a general dominating monetary policy stance entails for individual fiscal policies. In other words, as monetary policy now faces an absolute commitment, it can no longer accommodate fiscal policy excesses, in the long run, via the imposition of an inflation tax. This reflects the well-known idea that the exchange rate commitment in each country can be viewed as being a channel for imposing discipline on public sector behaviour, provided that a firm anchor for the whole system exists. It is worth noting that the exchange rate commitment is here assumed to be absolute, the possibility of realignments and the ability to impose capital controls having been ruled out entirely for analytical purposes.

The convergence assumption provides values for the fixed exogenous steady-state monetary policy variables in the "integrated" scenario, in particular for the rate of inflation, the real rate of interest and reserve requirements. The values of the two former variables should then be introduced as arguments in the demand functions for currency, deposits and government bonds, in order to provide estimates for the corresponding ratios in the "integrated" steady-state. This presupposes that the demand functions are known; however, their estimation is not only a complicated empirical exercise, but also a doubtful one. In fact, by relaxing all restraints on cross-border trading of monetary and financial assets, integration is itself likely to shift their demand functions; there seems to be no reliable way, however, of estimating these changes a priori.

In the face of these difficulties, another simplifying assumption - which in fact basically transforms the model into an arithmetical exercise - is added, with a nuance. The assumption is that the ratios of those financial instruments to income are unchanged with the integration, that is, they remain at their present level. This is the precise assumption used for the currency ratio ($\underline{c}$) and the deposit ratio ($\underline{\varepsilon}$), while for the bonds ratio ($\underline{b}$) the nuance applies. The nuance is that the government bonds ratio is assumed

to undergo a once-and-for-all change which exactly offsets the once-and-for-all variation in reserves that results from the change in reserve requirements. This is especially important in the countries where reserve requirements prior to financial integration are particularly high relative to German ones. In this case, the assumption implies that the government is able to replace its debt which was previously held by banks under compulsory reserve requirements (or the equivalent) by debt voluntarily held, that is, yielding market rates; moreover, the new debt ratio is assumed to remain constant.

A final assumption is that the steady-state real rate of growth in each country remains unchanged with financial integration. This may not be a realistic pre-supposition; it may undervalue the impact of financial integration by confining it basically to the monetary domain; and it is probably not fully consistent with the change in real interest rates that results from the previous assumptions. Moreover, it raises problems with regard to the issue of convergence of standards of living among EC countries, an issue which is broached below. Yet, in the absence of a full model for each economy, and given the fact that financial integration is an unprecedented move, it seems an admissible assumption. Note that, in conjunction with the previous assumptions, this implies that the West German steady-state budget constraint does not change with the European financial integration.

Putting all the integration assumptions together, the steady-state restriction in this scenario is then given by

$$d^* = (n+\pi^*)c + (n+\pi^*)k_1^*\varepsilon + (n-r^*)b^*$$

which is to be compared with the corresponding condition in the "domestic" scenario (see section 2(d)). In this equation $\underline{\pi^*}$, $\underline{r^*}$ and $\underline{k^*_1}$ are the present German levels of the corresponding variables (notice that $k_2=0$ in Germany, as there are no remunerated reserves in that country), and $\underline{b^*}$ is the new debt ratio; as implied earlier $\underline{b^*}$ is given by

$$b^* = b+(k_1+k_2-k_1^*)\varepsilon$$

4. Empirical arithmetics

This section presents rough empirical estimates of the steady-state budget deficit in each EC country, in both the "domestic" and the "integrated" scenario. This rough calculation and subsequent analysis can lead to interesting insights into some economic policy questions faced by the EC member countries. To begin with, the estimated sustainable primary deficit in each scenario can be compared with the current level of this variable, in order to evaluate the fiscal adjustment required to conform to each alternative steady-state budget constraint. This adjustment basically indicates the correction of present fiscal policy stance which is needed in each country to make it compatible with a given monetary policy objective, that is, a given rate of inflation, in the long run, given the host of assumptions of each scenario. The required fiscal adjustment in the "domestic" and in the "integrated" scenarios can then be compared, for each country, in order to evaluate the relative tightness of the steady-state budget constraints between the two scenarios. The main determinants of the tightening or loosening of the steady-state budget constraint, when comparing the "domestic" and the "integrated" scenario, can be shown. Finally, the focus can be concentrated on the "integrated" scenario in order to evaluate what degree of steady-state convergence of fiscal policies is necessary in the context of monetary and financial integration. The main elements which allow different countries to run different steady-state deficits can be presented.

These issues are discussed below. The inputs required for these rough calculations are displayed in Table 3, with further details on data definitions and sources being given in the Annex. In the discussion, these data definitions and the simplifying assumptions admitted should be kept in mind, as they very much qualify the results; in order to assess the relevance of data measurement in the results a sensitivity analysis is provided, while the effects of removing some assumptions are discussed in the text.

(a) The required fiscal adjustment in the "domestic" scenario

The estimated steady-state primary deficits in the "domestic" scenario are shown in Table 4, for two alternative assumptions concerning the steady-state rate of inflation: the present rate of each country, or a common low rate. The deficits net-of-interest thus calculated are compared with

Table 3

Input values

Items		Belgium	Denmark	Germany	Greece	Spain	France	Ireland	Italy	Netherlands	Portugal	United Kingdom	Unweighted average
		in percentages											
Both scenarios													
Currency ratio[1]	(1989)	6.6	3.7	6.3	8.8	7.6	3.8	5.9	4.8	7.4	7.2	2.9	5.9
Deposits ratio[1]	(1989)	70.3	40.1	46.1	73.5	56.2	61.1	45.6	56.6	38.0	64.0	77.0	57.1
Debt ratio[1]	(end-1989)	122.4	23.1	21.9	79.0	29.3	25.4	122.6	*94.3*	57.2	62.3	32.9	60.9
Real rate of growth[2]	(1980/89)	2.0	1.7	1.9	1.6	2.7	2.1	1.6	2.5	1.7	2.8	2.3	2.1
Domestic Scenario													
Adusted debt ratio[1]	(end-1989)	115.5	18.7	12.5	64.6	11.3	19.9	111.7	*79.7*	49.3	29.7	29.2	49.3
Unremunerated reserves coefficient[3]	(1989)	0.3	0.8	6.8	5.0	6.4	2.8	0.8	*0.8*	1.3	7.0	1.0	3.0
Remunerated reserves coefficient[3]	(1989)	0.0	0.9	0.0	2.7	12.0	0.0	10.1	*16.5*	0.0	32.8	0.0	6.8
Interest rate tax on remunerated reserves[2]	(1989)	0.0	1.0	0.0	4.0	8.4	0.0	0.0	*7.5*	0.0	1.3	0.0	2.0
Nominal rate of interest[2]	(1987/89)	8.1	10.3	6.6	16.7	12.8	9.1	10.0	*11.7*	6.6	14.6	9.8	10.6
Rate of inflation [2] (a)	(1988/89)	2.6	4.4	2.0	14.5	6.1	3.1	3.1	*6.2*	0.6	11.9	6.1	5.5
Real rate of interest[2]	(1987/89)	5.5	5.9	4.6	2.2	6.7	6.0	6.9	*5.5*	6.0	2.7	3.7	5.1
Integrated Scenario (b)													
Adjusted debt ratio[1]	(end 1989)	111.0	16.7	12.5	65.2	17.8	17.4	113.6	*85.7*	47.2	50.8	24.8	51.2
Recent Fiscal Policy Stance (c)													
Total deficit ratio[1]	(1987/89)	6.8	-0.8	1.2	14.8	2.8	1.7	4.9	*10.7*	5.5	8.5	-0.4	5.1
Interest payments ratio[1]	(1987/89)	9.5	4.3	2.2	8.4	3.0	2.0	7.0	*7.7*	4.9	6.8	2.6	5.3
Primary deficit ratio[1]	(1987/89)	-2.7	-5.1	-1.0	6.4	-0.2	-0.3	-2.1	*3.0*	0.6	1.7	-3.0	-0.2

(a) Rate used in one alternative; in the other alternative a common low rate (the 1987/89 German rate) was used.
(b) The other inputs of the integrated scenario (reserves coefficients, nominal and real rate of interest, rate of inflation) are the German 1987/89 values (see domestic scenario).
(c) A minus sign (-) means a surplus.

[1] Percentage of GDP/GNP; [2] Percentage points; [3] Percentage of deposits.

their current levels, in order to evaluate the required fiscal adjustment for each inflation alternative, that is, for each long term monetary policy objective.

Thus, if the long term objective of monetary authorities is approximated by the observed rate of inflation in the 1987-89 period, Table 4 shows that Belgium, for example, is required to run a primary budget surplus of around 3.7 percentage points of GDP in this "domestic" scenario; since it is running a surplus of only 2.7 percentage points, a fiscal correction of 1 percentage point is needed in this case if the monetary base and debt ratios are to be held at their present levels. As the table shows, other countries where significant fiscal corrections[4] are estimated to be required in this alternative are Greece (4.7 p.p.), Italy (4.5), Ireland (3.8) and the Netherlands (2.5). The remaining countries are estimated to be running compatible monetary and fiscal policies in the long run in this alternative, requiring no fiscal adjustments; in particular, Denmark and the United Kingdom, which have been running total fiscal surpluses on average in 1987-89, apparently have important room of manoeuvre to run debt reduction or tax reduction policies. Comments on these results are developed below, when comparison is made with the "integrated" scenario. For the moment, it is important to notice that these results appear to be particularly sensitive to the values of the real rate of growth and the real rate of interest. As Table 4a shows, a mismeasurement of the real rate of growth of 1 percentage point leads, "ceteris paribus", to an average error in the primary deficit and in the required fiscal adjustment of around 0.6 percentage points; in the case of the real rate of interest the same effect is estimated to be -0.5 percentage points.[5]

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4 Notice that the present fiscal stance is measured by the average of 1987/89. Within this period, however, several countries have pursued significant fiscal retrenchment policies, so that their 1989 primary deficit is below the 1987/89 average and the required adjustment in relation to the 1989 budgetary position is consequently smaller. This is notably the case with Ireland. The opposite holds for Greece.

5 This last result is particularly important in the countries where the absence of well-developed financial markets makes difficult the measurement of the real rate of interest. The most notable cases are Greece and Portugal. As the sensitivity analysis shows, "ceteris paribus" a higher real rate of interest would lead to the need of a stronger fiscal adjustment in

(Footnote Continued)

Table 4

The steady-state "domestic" scenario

Items	Belgium	Denmark	Germany	Greece	Spain	France	Ireland	Italy	Netherlands	Portugal	United Kingdom	Unweighted average
	as a percentage of GDP/GNP											
Rate of inflation of 1987/89												
Steady-state primary deficit (a)	-3 7	-0 5	0 0	1 7	0 8	-0 5	-5 9	-1 5	-1 9	2 0	-0 1	-0 9
Primary deficit 1987/89 (a)	-2 7	-5 1	-1 0	6 4	-0 2	-0 3	-2 1	3 0	0 6	1 7	-3 0	-0 2
Required adjustment (b)	-1 0	4 6	1 0	-4 7	1 0	-0 2	-3 8	-4 5	-2 5	0 3	2 9	-0 6
Common rate of inflation (German rate 1987/89)												
Steady state primary deficit (a)	-3 8	-0 6	0 0	0 1	0 4	-0 5	-5 9	-1 7	-1 8	0 9	-0 3	-1 2
Primary deficit 1987/89 (a)	-2 7	-5 1	-1 0	6 4	-0 2	-0 3	-2 1	3 0	0 6	1 7	-3 0	-0 2
Required adjustment (b)	-1 1	4 5	1 0	-6 3	0 6	-0 2	-3 8	-4 7	-2 4	-0 8	2 7	-1 0

(a) A minus sign ( ) means a surplus
(b) A minus sign ( ) means that a fiscal adjustment is required, a positive value indicates the room of manoeuvre for steady-state fiscal policy

Table 4a

Sensitivity analysis: effect of different input values on the steady-state primary deficit in the domestic scenario

Items		Belgium	Denmark	Germany	Greece	Spain	France	Ireland	Italy	Netherlands	Portugal	United Kingdom	Unweighted average
		in percentages											
Currency ratio (a)	+ 1% of GDP/GNP	0 05	0 06	0 04	0 16	0 09	0 05	0 05	0 09	0 02	0 15	0 08	0 08
(b)	+ 1% of GDP/GNP	0 04	0 04	0 04	0 04	0 05	0 04	0 04	0 05	0 04	0 05	0 04	0 04
Deposits ratio (a)	+ 10% of GDP/GNP	0 00	0 00	0 03	0 09	0 11	0 01	- 0 05	0 08	0 00	0 15	0 01	0 02
(b)	+ 10% of GDP/GNP	0 00	0 00	0 03	0 03	0 08	0 01	- 0 05	0 08	0 00	0 08	0 01	0 02
Debt ratio	+ 10% of GDP/GNP	- 0 35	- 0 42	- 0 27	- 0 06	- 0 40	- 0 39	- 0 53	- 0 30	- 0 43	0 01	- 0 14	- 0 30
Real rate of growth	+ 1%	1 22	0 23	0 22	0 79	0 29	0 25	1 23	*0 94*	0 57	0 62	0 33	0 61
Unremunerated reserves coefficient (a)	+ 1% of deposits	0 03	0 02	0 02	0 12	0 05	0 03	0 02	*0 05*	0 01	0 09	0 06	0 04
(b)	+ 1% of deposits	0 03	0 01	0 02	0 03	0 03	0 03	0 02	0 03	0 01	0 03	0 03	0 02
Remunerated reserves coefficient	+ 10% of deposits	-	- 0 13	-	0 25	0 25	-	- 0 24	0 25	-	0 09	-	-
Interest rate tax on remunerated reserves	+ 1%	-	0 00	-	0 02	0 07	-	0 05	0 09	-	0 21	-	-
Real rate of interest	+ 1%	- 1 16	- 0 19	- 0 12	- 0 67	- 0 18	- 0 20	- 1 16	*- 0 89*	- 0 49	- 0 51	- 0 29	- 0 53
Rate of inflation	+ 1%	0 07	0 04	0 09	0 12	0 11	0 06	0 06	*0 05*	0 08	0 12	0 04	0 08

(a) With rate of inflation of 1987/89.
(b) With common rate of inflation (German rate of 1987/89)

It can be argued that despite the disinflationary process and the important degree of nominal convergence achieved within the EC in recent years, the average rate of inflation in 1987/89 cannot be viewed as a satisfactory long term objective for monetary authorities in most countries. The convergence towards a low common rate of inflation - the present German rate - provides perhaps a more realistic alternative assumption about the monetary authorities' goals. If this alternative is assumed, "ceteris paribus",[6] Table 4 shows that the results change significantly in the case of the highest inflation countries, Greece and Portugal. The reduction in the inflation tax revenue increases the required primary fiscal adjustment in Greece to 6.3% of GDP while Portugal is now estimated to need a fiscal adjustment of 0.8 p.p.

(b) The required fiscal adjustment in the "integrated " scenario

The previous section presented the fiscal adjustments that would be required if the different countries were to move, by adapting their fiscal policy, from their present situation to a "domestic" steady-state. In the present section, by contrast, it is assumed that countries move from their present situation to an "integrated" steady-state; the fiscal adjustments required in this case are estimated here, before we move to the next section where the results, when passing from the present situation to each of the two alternative scenarios, are compared. The estimated steady-state primary deficits in the "integrated" scenario and the corresponding required fiscal adjustments from the current situation are displayed in Table 5. The main differences in relation to the "domestic" steady-state constraint are the tighter situations of Greece and Portugal and the less tight situations of Ireland, Belgium and the Netherlands. This point will be developed in the next sub-section.

With regard to the magnitude of the fiscal adjustment required in the "integrated" scenario, Table 5 shows that countries can be divided into three groups. The first group comprises those countries in which an important fiscal adjustment is needed. It includes Greece and Italy, where the required

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(Footnote Continued)
this "domestic" scenario and would alter the comparison with the "integrated" scenario.

6 This means namely that the effect of a different rate of inflation in the currency, deposit and debt ratios is ignored.

Table 5

The steady-state "integrated" scenario

Items	Belgium	Denmark	Germany	Greece	Spain	France	Ireland	Italy	Netherlands	Portugal	United Kingdom	Unweighted average
	as a percentage of GDP/GNP											
Steady-state primary deficit (a)	-2 4	-0 2	0 0	-1.5	0.2	-0 1	-3 1	-1 4	-1 0	-0 4	-0.2	-0 9
Primary deficit 1987/89 (a)	-2 7	-5 1	-1.0	6 4	-0 2	-0 3	-2 1	3 0	0 6	1.7	-3 0	-0 2
Required adjustment (b)	0 3	4 9	1 0	-7 9	0 4	0 2	-1 0	-4 4	-1 6	-2.1	2 8	-0.7
Steady state total deficit (a)	4 9	0 9	0 9	2 8	1 4	1.0	4 4	4 2	2 1	3.0	1 4	2 5
Total deficit 1987/89 (a)	6 8	-0 8	1 2	14 8	2.8	1 7	4 9	10 7	5.5	8 5	-0 4	5 1
Total adjustment (b)	-1 9	1 7	-0 3	-12 0	-1 4	-0 7	-0.5	-6.5	-3 4	-5.5	1 8	-2 6

(a) A minus sign (-) means a surplus.
(b) A minus sign ( ) means that a fiscal adjustment is required; a positive value indicates the room of manoeuvre for steady-state fiscal policy.

Table 5a

Sensitivity analysis: effect of different input values on the steady-state primary deficit in the integrated scenario

Items		Belgium	Denmark	Germany	Greece	Spain	France	Ireland	Italy	Netherlands	Portugal	United Kingdom	Unweighted average
		in percentages											
Currency ratio	+ 1% of GDP/GNP	0 04	0 04	0 04	0.04	0 05	0 04	0 04	0 05	0 04	0 05	0 04	0 04
Deposits ratio	+ 10% of GDP/GNP	0 03	0 03	0 03	0 02	0 03	0 03	0 02	0 03	0 03	0 03	0 03	0 03
Debt ratio	+ 10% of GDP/GNP	- 0 26	- 0 29	- 0 27	- 0 30	- 0 19	- 0 25	- 0 30	- 0 21	- 0 29	- 0 18	- 0 23	- 0 25
Real rate of growth	+ 1%	1 22	0 23	0 22	0 79	0 29	0 25	1 23	0 94	0 57	0 62	0 33	0 61
Unremunerated reserves coefficient	+ 1% of deposits	0 03	0 01	0 02	0 03	0 03	0 03	0 02	0 03	0 01	0 03	0 03	0 02
Real rate of interest	+ 1%	- 1.11	- 0 17	- 0.12	- 0.65	- 0 13	- 0 17	- 1 14	- 0 86	- 0 47	- 0 51	- 0 25	- 0 51
Rate of inflation	+ 1%	0 11	0 06	0 09	0 14	0 11	0 08	0 09	0 09	0 10	0 12	0 08	0 10

reductions in budget deficits net-of-interest are estimated to be 7.9 and 4.4 percentage points of GDP, respectively. In a second group of countries moderate fiscal adjustments are needed: this group comprises Portugal (estimated required adjustment of 2.1 percentage points of GDP),[7] the Netherlands (1.6) and Ireland (1.0).[8] Finally, the remaining countries form a third group where there is no need of fiscal adjustment, with Denmark and the United Kingdom displaying again the largest margins of manoeuvre. As primary fiscal adjustments have to be brought about by a combination of lower expenditures and higher explicit taxes (budgetary transfers from the central common budget aside), those results show for example, in the first and second group of countries, by how much expenditures have to be reduced if the tax burden is not to increase; conversely, they reveal a potential for tax reduction in Denmark and the United Kingdom if more complex considerations are not added to the analysis.

The existence and presumable continuation of integration trends make this scenario more interesting than the "domestic" one. For this reason, and since monetary and financial integration is the central focus of this paper, further considerations can be added to the results just presented.

First, the issue of monetary versus fiscal policy "dominance" can be made more concrete in the light of these rough empirical findings. To approach it, we relax just for a moment the assumption of monetary policy "dominance" in the "integrated" scenario. Then, the question can be asked what would happen if fiscal adjustment were not carried out in the countries where it is needed, that is, if these countries continued to pursue their recent fiscal policy stances and all of the required "adjustment" were to come from a rise in the rate of inflation? As mentioned before, in the simple framework of this analysis this question can be answered by inverting the

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7 Present fiscal policy stances used to calculate the required adjustment are measured by borrowing requirements net of interest paid and received. This is the correct variable to use, since the focus is on a financing constraint. In the case of Portugal, however, an important gap emerged in recent years between this variable and the primary deficit on a national account basis, due to off-budget expenditures and debt of public enterprises assumed by the general government. If this gap be filled in the future by the ending of these operations, a significant part of the required adjustment will automatically take place.

8 See previous note 4.

roles of the primary deficit and the rate of inflation in the steady-state budget constraint, that is, by determining the inflation rate endogenously. This rough exercise - where the effects on the monetary base and debt ratios are disregarded - leads to inflation rates above 50% in Greece and Italy, and in the range of 13-20% in Ireland (13%), the Netherlands (18%) and Portugal (20%). These results roughly estimate the potential long term inflationary pressures embodied in present fiscal policies (1987/89), if they are to be infinitely pursued, "ceteris paribus", given the host of assumptions detailed above; these estimates should be interpreted very cautiously. In fact, the inflation rate in this exercise is very sensitive to the fiscal deficit: on average, the marginal effect of 1 percentage point in the primary deficit is about 10 inflation points (which is the inverse of the multiplier shown in Table 5a); so, any measurement error or unrealistic assumption may greatly distort the results or lead to incorrect conclusions. It should also be recalled that these results assume unchanged policies, that is, no policy corrections in response to rising rates of inflation. In practice, however, the authorities of the countries concerned would presumably react, by correcting their fiscal policies, long before their inflation rates rose to the levels mentioned. In fact, these results are just another way of presenting the need for fiscal adjustment in a financially integrated scenario, in order to keep exchange rates stable. With an inflation rate of 2% in the leader-country, the results clearly show the inconsistency between the fiscal policies pursued by the mentioned countries and the long-run sustainability of the present level of their exchange rates: in the absence of fiscal corrections, the exchange rate commitment can hardly be viewed as absolute.

A second additional consideration which may be of interest concerns the magnitude of the change in total deficit in the steady-state, from its present level. To calculate this change, total deficit is estimated by adding up the steady-state primary deficit and interest payments, computed using the given debt ratio and nominal rate of interest (see the total deficit version of the steady-state budget constraint, Section 2(d)). All countries are thus implicitly assumed to adjust their present primary deficit to its estimated steady-state level. This seems a reasonable assumption in the case of the countries where a fiscal adjustment is required; in the opposite case, however, it would mean that the countries which have a steady state "room of manoeuvre" for their fiscal policies and are engaged in a policy of debt

reduction - namely the United Kingdom and Denmark - would re-orientate their policies towards a goal of keeping the debt ratio at their present level. Since this shift is neither likely nor desired, the estimated total deficit and its change from the present situation, in the case of these countries, have to be interpreted with these considerations in mind.

The estimated change in total deficit is also shown in Table 5. As the nominal rate of interest in the "integrated" scenario is below its present level in virtually all countries, either due to a lower rate of inflation or to a lower real rate of interest, the estimated change in total deficit is algebraically smaller than the estimated variation of primary deficit.[9] In the case of countries which require a primary fiscal adjustment, this means that the estimated reduction of total deficit is in general greater than the primary deficit correction. As Table 5 shows, the estimated total diminution of budget deficit reaches 12 percentage points in Greece, 6.5 in Italy, 5.5 in Portugal and 3.4 in the Netherlands.

(c) The relative tightness of the steady-state budget constraint in the "domestic" and "integrated" scenarios

The comparison between the steady-state budget deficits net-of-interest which result in each country, on the one hand from the "integrated" constraint, and on the other hand from the "domestic" constraint, provides further insight into the economic policy questions which are at stake. Basically, this comparison attempts to determine whether financial integration, within the stated simplifying assumptions, will imply tighter or less tight long term fiscal stances than the strictly domestic scenarios. It is this comparison that permits to assess the effect of European financial integration on the steady-state budget constraint, which is a major point of this paper. The comparison is established for the two alternative rates of inflation assumed in the "domestic" scenario - the second rate being identical to that of the "integrated" scenario - and its results are presented in Table 6.

As the table shows, three groups of countries can be distinguished in this comparison. In the first group, composed of Ireland, Belgium and the

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9 This may not hold if the implicit interest rate on public debt substantially differs from the rate used in this exercise.

Table 6

Contributions to changes in steady-state budgets between the "domestic" and the "integrated" scenarios (a)

Items	Belgium	Denmark	Germany	Greece	Spain	France	Ireland	Italy	Netherlands	Portugal	United Kingdom	Unweighted average
	as a percentage of GDP/GNP											
Rate of inflation in domestic scenario equal to 1987/89 average												
Difference between steady-state primary deficits (integrated-domestic) (b)	1.3	0.3	0.0	-3.1	-0.6	0.4	2.8	0.1	0.9	-2.4	-0.1	-0.0
Isolated contribution of changes in:												
rate of inflation	-0.0	-0.1	0.0	-1.6	-0.5	-0.1	-0.1	-0.2	0.1	-1.2	-0.2	-0.3
real rate of interest	1.0	0.2	0.0	-1.6	0.4	0.3	2.7	0.8	0.7	-1.0	-0.3	0.3
reserve system variables	0.4	0.2	0.0	0.1	-0.5	0.2	0.3	-0.3	0.1	-0.3	0.4	0.1
Interaction effect	-0.1	-0.1	0.0	-0.1	-0.0	-0.1	-0.1	-0.2	0.0	0.0	-0.1	-0.1
Same rate of inflation in the domestic and integrated scenarios												
Difference between steady state primary deficits (integrated domestic) (b)	1.3	0.4	0.0	-1.6	-0.2	0.4	2.9	0.3	0.8	-1.2	0.0	0.3
Isolated contribution of changes in:												
real rate of interest	1.0	0.2	0.0	-1.6	0.4	0.3	2.7	0.8	0.7	-1.0	-0.3	0.3
reserve system variables	0.3	0.2	0.0	-0.0	-0.5	0.2	0.2	-0.4	0.2	-0.3	0.3	0.0
Interaction effect	-0.0	-0.0	0.0	0.0	-0.0	-0.0	-0.1	-0.0	-0.0	-0.0	0.0	-0.0

(a) For methodology see Appendix, part 5.
(b) A minus sign (-) means a tightening of the budgetary constraint in the integrated scenario relative to the domestic one

Netherlands, the financial integration relaxes the steady-state budgetary constraint - that is, under the assumptions made, these countries can run higher sustainable primary deficits in the "integrated" scenario than in the "domestic" one. The loosening does not change significantly with the assumption about the rate of inflation, and ranges from almost 3 percentage points of GDP in the case of Ireland, to around 1 in the case of the Netherlands. In a second group of countries, the tightness of the steady-state budget constraint is not significantly affected. This group comprises Germany (by assumption), Denmark, Spain, France, Italy and the United Kingdom. Finally, Greece and Portugal form a third group, where financial integration tightens the budgetary constraint; the tightening is estimated at 1.6 and 1.2 percentage points of GDP, respectively, when a common rate of inflation is assumed, and at 3.1 and 2.4 percentage points when a higher rate of inflation is accepted in the "domestic" scenario.

An explanation of these results can also be found in Table 6, which attempts to break down the difference between the "integrated" and "domestic" deficits into a real rate of interest effect, a reserve system variable effect and, where a different rate of inflation is assumed, a rate of inflation effect. This breakdown is done with the help of some arithmetical manipulation which basically consists of changing the value of one variable (of those having different values in the comparing scenarios) at a time, leaving the others unchanged at their "domestic" scenario levels (see Appendix, part 5).

The table shows that, as suggested before, the rate of inflation effect is only significant in the high inflation cases, in particular Greece and Portugal: in these countries the reduction in the inflation tax, when passing from the high inflation alternative of the "domestic" scenario to the "integrated" scenario, tightens the steady-state budget constraint by 1.6 and 1.2 percentage points, respectively. A non-negligible effect of 0.5 percentage point is also found for Spain.

Another interesting conclusion is that the change in the reserve system variables, all other things being equal, does not significantly affect the permissible steady-state deficit. Within the used methodology and data, the largest tightening effect is to be found in Spain and the largest relaxing effects are to be found in countries where presently reserve requirements are practically non-existent, in particular Belgium and the

United Kingdom, but the absolute effect is below 0.5 percentage point in all cases.

Finally, the most important and very clear result is that the real rate of interest effect is decisive in virtually all countries where the steady-state budget constraint undergoes a significant change. In other words, the tightening or relaxing of the budgetary constraint when passing from the "domestic" to the "integrated" scenario is strongly related to the assumed variation of the real rate of interest. As this rate is assumed to be the same in all countries in the "integrated" scenario, the crucial explanation of the results lies in the differences in the present levels of real interest rates (which are assumed to remain unchanged in the "domestic" scenario) across countries.

The differences seem to reflect basically the qualitative aspects displayed in Table 2, as well as debt ratios. High rates, that is, relatively high positive differentials of real rates of interest against Germany, are presently to be found in the group of small northern countries where the steady-state budget constraint is estimated to be significantly affected (Ireland, Belgium and the Netherlands). This group is constituted of small open economies with relatively high debt ratios and a relatively high degree of financial integration. The high debt ratios seem to be an obvious determinant of the high rates of interest on public debt. Another factor may be related to the degree of financial integration. In fact, this group belongs to the exchange rate mechanism of the EMS and needs to defend the parities of its constituent currencies, with relatively few capital controls;[10] the possibility of realignments is not excluded, and the past performance of these currencies and the inflationary record of these countries are weaker than those of the leader economy, West Germany.[11] In this context, the real rate of interest differentials against Germany may

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10 Ireland still keeps some capital controls. In this case the major determinant of the high rate of interest is likely to lie in the previous factor, that is, the high debt ratio.

11 In this respect, the high real interest differential in the Netherlands is somewhat surprising. It may simply reflect a mis-measurement of its level, as a result of a GDP deflator which turned out to be exceptionally different from (lower than) the German one in the 1987/89 period, nominal rates of interest being about the same in both countries.

also reflect the possibility that the small inflation differentials observed recently are not (yet) fully credible, that there is a risk that they widen again and possibly be translated into exchange rate changes.[12] Hence, the assumed disappearance of the real rate of interest differentials when passing from the "domestic" to the "integrated" scenario basically reflects, in this group of countries: (i) a supposed gain of credibility of central banks, which fully succeed, in the "integrated" context, in convincing the public of the permanent reduction of their rates of inflation to the German level, and of the long run fixity of the exchange rate parities; and (ii) that the effect of debt ratios upon the real rates of interest is "dissolved" in the extension of the domestic financial market, through financial integration. Real rates of interest are then reduced to the German level, entailing a relaxation of the steady-state budget constraint. Notice that the extent of this relaxation may be somewhat overstated by the assumption of complete disappearance of interest differentials; if instead some (lower than the present) differentials were assumed to remain in the "integrated" scenario, maybe as a result of the relatively high debt ratios, the relaxation would be accordingly smaller.

At the other extreme, the lowest long term real rates of interest are presently to be found in the small southern countries (Greece and Portugal), which have negative differentials vis-à-vis Germany. However, the main reason for that is not symmetrical to the previous case: it is likely to lie in the existence of direct and indirect controls - including capital controls - and financially immature systems, which have kept the real rate of interest on the public debt in these countries considerably below the levels prevailing in their European partners.[13] This form of seigniorage, consisting of artificially low real rates of interest on public debt, is no longer possible in a financially integrated scenario; thus, the real rate of interest in these countries must rise to the average level when passing from

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12 As mentioned above, the generalisation of this situation to a steady-state, in the "domestic" scenario, makes apparent the artificial/reference nature of this scenario. In fact, if the monetary authorites are to permanently succeed in implementing a low or zero inflation differential, long term real rates of interest would presumably tend to converge, for similar credit risks.

13 In this respect, see also footnote 5 (which, however, does not invalidate this conclusion).

the "domestic" to the "integrated" steady-state, thus tightening the budgetary constraint. Naturally, this tightening would be greater if allowance were made for the possible need for a positive real rate of interest differential in these countries vis-à-vis Germany, in the "integrated" scenario, which could be based on some kind of country-risk considerations.

The tightening/loosening of the steady-state budget constraint has clear implications for the comparative conduct of fiscal policy in the two scenarios. Generally, a tighter constraint means a lower level of "implicit taxation" on the economy, and vice versa; and, as mentioned before, implicit taxes can be viewed as complementary to explicit ones, in the financing of a steady pace of government expenditures (see the taxes/expenditures version of the steady-state budget constraint, Section 2(d)).

At this light, the loosening of the steady-state budget constraint in the small northern countries implies that their economic authorities gain some room for manoeuvre to have lower explicit taxes (or higher expenditures) in the "integrated" scenario than in the "domestic" one.[14] This basically results from the lower risk costs charged by the private sector to the government in the integrated context. In the small southern countries the reverse result applies, although not for a symmetric reason. In this case, the tightening of the steady-state budget constraint is due to the disappearance of excessive hidden taxation on savers. The asymmetry results from the different situation of financial systems: highly liberalised in the small northern countries, still much controlled in the small southern ones. The tightening of the steady-state budgetary constraint in the latter group tends to benefit the private sector if governments comply with it by reducing their expenditure (relative to their sustainable level in the "domestic" scenario). If, however, expenditures are rigid and explicit taxes are increased (relative to their level in the "domestic" scenario), their adverse effects have to be balanced against the positive effects of the lower implicit taxation on savers; considerations on the redistributive effects and

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14 This does not invalidate the fact that, in relation to the present situations, some combination of higher taxes and lower expenditures has to occur in all countries where a fiscal adjustment is required.

relative distortion of the two taxation alternatives are determinant in this respect.

To conclude this section, it may be worth remembering that, arithmetics aside, in a sense the budgetary constraint is always more restrictive in the "integrated" scenario than in the "domestic" one to the extent that in the former case monetary policy is assumed to impose a stronger restriction on fiscal policy; in other words, in the "domestic" scenario the existence of capital controls and the possibility of realignments may allow fiscal policy to "dominate" monetary policy in the long run - imposing an undesirable inflationary tax - if a definite conflict emerges between them, while in an "integrated" scenario such recourse to inflation is more difficult.

(d) The degree of steady-state fiscal convergence needed in the "integrated" scenario

The cross-country comparison of steady-state primary budget deficits in the "integrated" scenario allows us to assess the degree of convergence of long-run fiscal policies that is required in this unified context.

As Table 5 shows, the sustainable budgets-net-of-interest with the "integrated" constraints range from a small deficit in the case of Spain to a required surplus of around 3.1% of income in the case of Ireland. The unweighted EC average, that is, the steady-state budget balance calculated with unweighted average values for all inputs, is a surplus of around 0.9% of GDP. These results mean that an important degree of fiscal convergence may be needed, in relation to current fiscal stances (the standard-deviation falls from 0.030 to 0.010), and in relation to the "domestic" scenario (where the standard-deviation is 0.022 or 0.019, according to the inflation alternative). Absolute convergence, in the sense of equal budget deficits across all countries, is nevertheless not required. As the steady-state budget equation shows, the factors explaining the differences that are allowed across countries are the real rate of growth, and the ratios of the monetary base and public debt to GDP. In order to estimate the contribution of each of these factors, the deviation of the sustainable deficit in each country from the unweighted average deficit is broken down in Table 7 with the help of some arithmetic manipulation. In this manipulation the isolated contribution of each factor in each country results from the difference

between its level in that country and its unweighted average level, all the rest being equal (see Appendix, part 6). Within this methodology, the following conclusions can be drawn from Table 7.

(i) The isolated effect of the monetary base ratio is negligible in all cases; that is, it does not explain the differences in the steady-state budget balances across countries. The reasons for this are the relatively small dispersion of monetary base ratios, in percentage points, and the low common rate of inflation assumed after integration. A corollary of this result is that, if instead of assuming constant currency and deposit ratios in each country a convergence of these ratios had been assumed (and once-and-for-all effects disregarded), "ceteris paribus", the steady-state budget deficit in each country would not be significantly altered. In other words, if the high monetary base ratios of the financially less developed countries (especially Portugal, Greece and Spain) were to diminish to the average level of the more developed countries, all other things unchanged, their steady-state budget deficit would not be significantly affected. On the other hand, the fact of their having higher monetary base ratios does not allow these countries to pursue fiscal policies significantly more expansionary than those of their European partners in an "integrated" context;

(ii) The isolated contribution of differences in the real rate of growth to differences in the steady-state budget balances is more important. From the manipulated equation it can be seen that the marginal contribution of a 1 percentage point difference between the real rate of growth in country i and the average rate of growth is about 0.6 (which is the sum of the average debt and monetary base ratios). In other words, a country having a rate of growth 1 percentage point higher than the average can sustain, "ceteris paribus", a steady-state budget deficit 0.6 points above the average ratio to GDP. Hence, the isolated contribution of the real rate of growth is an important positive element in Spain and Portugal, whose rates of growth are higher than the average, and an important negative element in countries which are in the reverse situation, namely Ireland and Greece. The sensitivity of the results to the assumption about the level of the real rate of growth has to be stressed: if, instead of having measured the steady-state rate of growth in each country by its average over the last decade, another methodology had been followed, the results would have been rather different. In fact, two comments can be made about the rates used. The first comment is that they may

Table 7

Contribution of the major factors leading to the divergence of steady-state budgets from the average in the "integrated" scenario (a)

Items	Belgium	Denmark	Germany	Greece	Spain	France	Ireland	Italy	Netherlands	Portugal	United Kingdom	Unweighted average
	as a percentage of GDP/GNP											
Divergence of the steady-state primary deficit from the average	-1 5	0 6	0 9	-0 6	1 1	0.8	-2 2	-0 5	-0 1	0 5	0 7	0 0
Isolated contribution of:												
real rate of growth	-0 0	-0 2	-0.1	-0.3	0 4	0 0	-0.3	0 3	-0 2	0 4	0 1	0 0
monetary base ratio	0 1	-0.1	-0.0	0 2	0 1	-0 1	-0 0	-0 0	0 0	0.1	-0 1	-0 0
debt ratio	-1 5	0 9	1 0	-0 4	0 8	0 8	-1 6	-0 9	0 1	0 0	0 7	0 0
Interaction effect	-0 1	0.1	0.1	-0 1	-0 2	-0.0	-0.3	0 1	0.0	0 0	-0 1	0 0

(a) For methodology see Appendix, part 6

be unacceptable to the extent that, for "normal" demographic and emigration patterns, they rule out real convergence across European countries (namely in the cases of Ireland and Greece). An alternative assumption might then be to use rates of growth which ensure real convergence in a pre-defined number of years - but this would of course be a rather arbitrary exercise and the question of how to achieve such desiderata, which is outside the scope of this paper, would remain. The second comment is that, by using the average rates of growth of last decade, we are disregarding the addition to growth potential which is expected to result from structural reforms implemented and to be implemented all across Europe (including financial integration). The rates used may then understate the real growth potential; the effects of using higher rates on the sustainable primary deficit in the "integrated" scenario can be seen from the sensitivity analysis of Table 5a.

(iii) Finally, differences in debt ratios are, in most countries, the most important single element explaining deviations from the steady-state budget deficit average. This fact results basically from the wide dispersion of debt ratios around the average. As "seigniorage on bonds" is negative (the real growth rate is lower than the real interest rate) the high debt ratios of Belgium, Ireland and Italy have an important negative impact on their steady-state required budget balances, while the converse occurs in Denmark, Germany, Spain, France and the United Kingdom (see Table 7). It is important to recall here that the simplifying assumption of common interest rates, independent of debt levels, may lead to underestimation of the tightness of the steady-state budget constraint in the countries which have high debt ratios, and to overestimation in the opposite case.

CONCLUSIONS

The empirical results obtained in Section 4 are rough estimates, subject to many qualifications with regard to the simplicity of the tool and of the assumptions used and to data measurement. Nevertheless, they permit one to draw a number of tentative conclusions on the implications of monetary and financial integration for fiscal policy in the individual member countries of the EC. In this analysis two opposed scenarios were assumed: an "integrated" scenario, with common real rates of interest, inflation rates, and reserve requirements, and a "domestic" scenario, where these variables remain at their present level in each country; other variables, such as the real rate of growth and debt ratios, were considered to remain unchanged. The two scenarios represent "alternative futures" and in a first step, the sustainable primary deficit estimated in each of them was compared with the present deficit in each country, to assess the adaptation of present fiscal policy which is required in each alternative. As the existence of strong integration trends makes the "integrated" scenario more interesting than the "domestic" one, the results obtained when passing from the present situation to the former scenario were somewhat emphasised. In a second step, the estimated primary deficits in the "domestic" and the "integrated" scenario were compared; the results of this comparison can be interpreted as the estimated effects of the integration of European financial markets on the prospects of fiscal policy (as gauged by the steady-state budget constraint). Against this background, the main conclusions are the following:

(i) fiscal policies have to undergo significant adjustments from their present stance (1987/89) in a number of countries, in order to conform to an "integrated" steady-state budget constraint. The more important adjustments are required in Greece and Italy, while moderate adjustments are needed in Portugal, the Netherlands and Ireland. Without such adjustments, the long term inflationary pressures arising from the public sector behaviour in these countries would tend to jeopardise the exchange rate stability (which, in turn, is required if an ultimate goal of irrevocable fixing parities is admitted);

(ii) adjustments in fiscal policies from their present stances would also be required in a steady-state "domestic" scenario. In this case,

significant adjustments would be needed in Greece, Italy, Ireland and the Netherlands, and a moderate adjustment would be required in Belgium and Portugal. Indeed, the "integrated" constraint is significantly looser than the "domestic" one in a group of small northern countries (Ireland, Belgium and the Netherlands) while the reverse result is seen to occur in the small southern countries (Greece and Portugal); in the remaining countries the steady-state constraint is not significantly affected by financial integration;

(iii) in the relative tightening/loosening of the steady-state budget constraint in the comparing scenarios, the change in real rates of interest is shown to play a central role; the effect of the change in the reserve system variables is a minor one, and that of the change in the rates of inflation is only significant in the highest inflation countries (Greece and Portugal);

(iv) the relative loosening of the steady-state budgetary constraint in the small northern countries, in the "integrated" scenario, basically arises from (a) a supposed gain in credibility on the part of monetary authorities, which fully succeed, in this context, in convincing the public of their common low inflation commitment; and (b) a "dissolution" in an extended financial market, of the effect of their relatively unfavourable public debt situation upon the rate of interest. These two factors are considered to warrant a decrease in the high real rates of interest of these countries, entailing a relaxation of their steady-state budget constraints;

(v) by contrast, in the small southern countries, the tightening of the steady-state budget constraint in an "integrated" context basically results from (a) the rise of real rates of interest on public debt from the low levels where they have been kept by capital controls and other administrative constraints (that are assumed to be abolished in an "integrated" scenario); and (b) the loss of seigniorage revenues on money as a consequence of a lower rate of inflation;

(vi) the tightening/loosening of the steady-state budget constraint between the two scenarios has clear implications for the comparative conduct of fiscal policy, in particular taxation considerations. In an "integrated"

scenario, the small northern countries are seen to gain some room for manoeuvre to have lower explicit taxes than they otherwise would need (in a "domestic" scenario). In the small southern countries, by contrast, the governments are seen as having to react to the reduction of hidden taxes on savers by a mix of increases in explicit taxes and decreases in expenditures; the mix which will actually be chosen is determinant in assessing the welfare implications of financial integration relative to a "domestic" alternative;

(vii) the degree of convergence of long term fiscal policies required in the "integrated" scenario is significantly greater than both the present degree and that of a "domestic" scenario. Absolute convergence, in the sense of equal budget deficits across all countries, is nevertheless not required: countries with higher rates of growth and/or lower debt ratios would be able to run higher steady-state primary deficits without threatening inflation prospects and exchange rate stability.

APPENDIX The steady-state budget constraint

1. The simple framework

In each (infinitely small) period t, the public sector financing identity is given by

$$D_t + i_t B_t = \dot{M}_t + \dot{B}_t \qquad (1)$$

where

D = government deficit net-of-interest

B = stock of privately held government bonds

M = monetary base

i = nominal interest rate;

all the variables are expressed in nominal terms and a dot over a variable denotes the time derivative.

Equation (1) can be expressed in terms of ratios to nominal GDP/GNP and aggregated intertemporally. The intertemporal budgetary constraint is then given by

$$\int_{t=0}^{\infty}[(D_t + i_t B_t)/(y_t P_t)]e^{-rt}dt = \int_{t=0}^{\infty}[(\dot{M}_t+\dot{B}_t)/(y_t P_t)]e^{-rt}dt \qquad (2)$$

where

y = real output

P = price level

r = real rate of interest

In this simple framework, both the demand for the nominal monetary base and the demand for government bonds are assumed to be a proportion of nominal GDP/GNP, the proportionality depending on the inflation rate and the real rate of interest. That is

$$M_t^d = m_{\pi_t, r_t}(y_t P_t) \qquad (3)$$

and

$$B_t^d = b_{\pi_t, r_t}(y_t P_t) \qquad (4)$$

where m is the ratio of monetary base to GDP/GNP, b is the analogous government debt ratio, and π denotes the rate of inflation.

The following steady-state assumptions are now introduced:

(a) the real rate of growth, $\underline{n}$, is invariant over time

$$n = \dot{y}_t / y_t \tag{5}$$

(b) the inflation rate is constant over time

$$\pi = \dot{P}_t / P_t \tag{6}$$

(c) the nominal interest rate is invariant over time, and is equal to the sum of the fixed inflation rate and a fixed real interest rate

$$i = \pi + r \tag{7}$$

(d) the markets for monetary base and bonds always clear.

Moreover, it is assumed that the stance of fiscal policy is invariant over time, and consists of a fixed ratio $\underline{(d)}$ of the deficit net-of-interest to GDP/GNP. That is

$$d = D_t / (y_t P_t) \tag{8}$$

Using assumptions (3) to (8), equation (2) can be transformed in the following steady-state budget constraint:

$$\frac{d+ib}{r} = \frac{(n+\pi)m_{\pi,r}}{r} + \frac{(n+\pi)b_{\pi,r}}{r}$$

or,

$$d = (n+\pi)m + (n-r)b \tag{9}$$

where $\underline{m}$ and $\underline{b}$ are simplified notations for $\underline{m_{\pi,r}}$ and $\underline{b_{\pi,r}}$, that is, the levels of the two ratios associated with the fixed rate of inflation, $\underline{\pi}$, and the fixed real rate of interest, $\underline{r}$. An alternative presentation of the steady-state budget constraint can be obtained by multiplying through by $y_t P_t$, which yields the result

$$D_t = (n+\pi)M_t + (n-r)B_t \tag{10}$$

This result shows that a permanent deficit net-of-interest must be financed by implicit taxes levied on the stock of monetary base, at the tax rate $\underline{n+\pi}$, and on the stock of bonds, at the tax rate $\underline{n-r}$ (Miller, 1983).

2. Debt financing and once-and-for-all effects

Equation (9) assumes that the debt ratio is fixed, so that the stock of debt grows at the same rate as the nominal income $(n+\pi)$. The implicit tax on public debt, in fact, is no more than the difference between the increase in the debt outstanding in each period, $(n+\pi)B$, and the interest paid by the government on that outstanding stock, iB. But when the debt ratio changes, as in the Darby versus Miller and Sargent controversy, the debt stock does not grow, at least temporarily, at the steady $(n+\pi)$ rate. Assuming that the debt ratio undergoes a once-and-for-all Δb change, and remains constant thereafter, then the economy has actually jumped from one steady-state budget constraint to another one. The equation

$$\Delta d \cong (n-r)\Delta b - b\Delta r \tag{11}$$

presented in Section 2(c), compares only the current bond seigniorage revenues in both steady-state conditions: it fails to include the once-and-for-all change in the debt ratio, that is, the once-and-for-all revenue to the government, which arises when jumping from the initial constraint to the new one. This once-and-for-all effect is a generalisation of Auernheimer (1974), and has been disregarded in both Darby and Miller and Sargent. Expressed in the form of a steady-state flow as a ratio to GDP, the once-and-for-all effect is $r\Delta b$, so that equation (11) becomes

$$\Delta d \cong n\Delta b - b\Delta r \tag{12}$$

In this case (as in Miller and Sargent), the sign of Δd is no longer exclusively determined by $(n-r)$. In fact, it can be seen that Δd would be positive if

$$n > \Delta r/(\Delta b/b) \tag{13}$$

that is, if the real rate of growth were greater than the impact on the real rate of interest of the growth in the debt ratio. Although no definite conclusions can be drawn without recourse to empirical analysis, that impact is presumably an increasing function, especially if a saturation level for government bonds is considered to exist. If this is the case, the inequality (13) is unlikely to hold for significant increases in the debt ratio, that is, the scope for a permanent expansionary shift in the fiscal stance without long-term inflationary consequences is likely to be limited.

3. Extension of the simple framework

The steady-state budget constraint has been dealt with so far in the context of a homogenous monetary base. In the present section allowance is made for a more realistic case where the monetary base consists of currency (C) directly issued by the government/central bank, and required reserves (R) imposed on bank deposits (E).

If no interest is paid on required reserves, the steady-state revenue they provide to the government - that is, the government seigniorage on reserves - can be treated in a similar way to that of currency. In this case, the consideration of a two-component monetary base in the public sector financing identity (1) is limited to the substitution of $(\dot{C}+\dot{R})$ for $\dot{M}$.

If, however, interest is paid on (part of) the required reserves, as it is the case in several countries, the corresponding interest payments also have to be introduced into that identity (see Gros, 1989). This can be done in the same way as for interest paid on the stock of privately held public debt. Indeed, if the full market interest rate is paid on this reserve tranche, it can be assimilated to public debt privately held (by banks) - in a steady-state where the respective ratios to GDP/GNP are fixed by assumption - in the sense that they bear the same implicit tax rate. "Mutatis mutandis", if part of the public debt privately held, in particular by banks, yields below market interest rates, it can be assimilated to required reserves yielding identical rates, within the described assumptions.

Given these considerations, the public sector financing identity in each (infinitely small) period t can now be written, instead of (1)

$$D_t+i_tB_t+i_{r,t}k_{2,t}E_t = \dot{C}_t+(k_{1,t}+k_{2,t})\dot{E}_t+\dot{B}_t \qquad (1')$$

where k_1 and k_2 are the (constant) coefficients of non-remunerated and remunerated reserves respectively. Remunerated reserves are assumed to include all forms of direct or indirect public sector debt (excluding currency and non-remunerated reserves) that yield below market rates of interest, whose weighted average is denoted by i_r.

Equations (3) and (4) are now replaced by

$$C^d_t = c_{\pi_t,r_t,i_{e,t}}(y_tP_t) \qquad (3\text{-}1')$$

$$E_t^d = \varepsilon_{\pi_t, r_t, i_{e,t}} (y_t P_t) \qquad (3\text{-}2')$$

and

$$B_t^d = b_{\pi_t, r_t, i_{e,t}} (y_t P_t) \qquad (4')$$

That is, the demand for currency, the demand for bank deposits and the demand for government bonds are all considered to be proportional to GDP/GNP, with the respective ratios $\underline{c}$, $\underline{\varepsilon}$ and $\underline{b}$, depending upon the inflation rate, the real rate of interest on public bonds and the (average) interest rate on deposits ($\underline{i_e}$).

In addition to equations (5) to (8), the following steady-state assumptions are introduced:

(a) the nominal rate of interest on deposits, $\underline{i_e}$, is invariant over time;

(b) the nominal rate of interest on remunerated reserves, $\underline{i_r}$, is invariant over time, and is equal to the nominal rate on bonds less a fixed "additional tax equivalent", $\underline{\tau}$

$$i_r = i - \tau \qquad (14)$$

(c) the reserve coefficients, $\underline{k_1}$ and $\underline{k_2}$, are constant over time.

Furthermore, it is assumed that the markets for currency, deposits and bonds, always clear.

In this extended framework, the steady-state budget constraint (9) becomes

$$d = (n+\pi)c + (n+\pi)k_1\varepsilon + (n-r+\tau)k_2\varepsilon + (n-r)b \qquad (9')$$

where $\underline{c}$, $\underline{\varepsilon}$ and $\underline{b}$ stand for the respective ratios associated with the given steady-state values of $\underline{\pi}$, $\underline{r}$ and $\underline{i_e}$. The alternative presentation (10) is now converted into

$$D_t = (n+\pi)C_t + (n+\pi)R_{1t} + (n-r+\tau)R_{2t} + (n-r)B_t \qquad (10')$$

This expression shows that a permanent deficit net-of-interest must be financed by implicit taxes levied on the stock of currency and non-remunerated reserves, at the tax rate $\underline{(n+\pi)}$, on the stock of remunerated

reserves, at the tax rate $(n-r+\tau)$, and on bonds, at the tax rate $(n-r)$. Notice that this expression can be viewed as a simplified version of a more general formula

$$D = \sum_i (n+\pi-i_i)L_i \qquad (15)$$

where L_i denotes the stock of the liability i of the government (consolidated with the central bank throughout this analysis) and i_i the respective interest rate, assumed to be constant in a steady state. The tax rate on each liability is simply the difference between its nominal growth rate (which is the nominal rate of growth of GDP, as all ratios to GDP are fixed as a result of the assumptions) and its interest rate; in other words, the implicit tax levied on the government liability L_i is the nominal growth of the public's holdings of it (cash inflows to the government) minus the interest payment on the outstanding stock, which reverts back to the public (cash outflows from the government).

4. The transition to an "integrated" steady-state budget constraint

The transition to an "integrated" steady-state budget constraint is assumed to be instantaneous, at the moment t=0, with instantaneous adjustment of all the variables appearing in the steady-state budget constraint; furthermore, it is assumed that no once-and-for-all changes in the price level and in real income are allowed. In this case, the transition elements would consist of once-and-for-all changes in currency, bank reserves and government bonds (this is a generalisation of Auernheimer, 1974). Within this adjustment framework, the general form of the new steady-state budget constraint would be

$$d^* = (n^*+\pi^*)c^* + (n^*+\pi^*)k_1^*\varepsilon^* + (n^*-r^*+\tau^*)k_2^*\varepsilon^*$$
$$+ (n^*-r^*)b^* + r^*(\delta C+\delta R_1+\delta R_2+\delta B)/(y_o P_o) \qquad (9")$$

where the superscript * denotes the new steady-state values, after the financial integration, and δC, δR_1, δR_2 and δB, denote the respective changes in C, R_1, R_2 and B at the moment t=0. For instance

$$\delta C = C_o^* - C_o \qquad (16)$$

where C_o is the stock of currency at the moment t=0, at the pre-existing steady-state values of the arguments of the demand for currency function, and C_o^* is the new stock of currency, at the new steady-state levels of the arguments, just after the (instantaneous) financial integration. As no once-and-for-all change in the nominal income is allowed, it can be seen that

$$\delta C = (c^*-c).(y_o P_o) \tag{17-1}$$

Analogously

$$\delta R_1 = (k_1^*\varepsilon^*-k_1\varepsilon).(y_o P_o) \tag{17-2}$$

$$\delta R_2 = (k_2^*\varepsilon^*-k_2\varepsilon).(y_o P_o) \tag{17-3}$$

and

$$\delta B = (b^*-b).(y_o P_o) \tag{17-4}$$

5. Contributions to the change in the steady-state budget between the "domestic" and the "integrated" scenario

The difference between the steady-state budget in the "integrated" scenario (d*) and that of the "domestic" scenario (d), in each country, can be broken down into the isolated contributions of each changing variable, with the help of some arithmetical manipulation. The changing variables are the real rate of interest ($r \rightarrow r^*$), the reserve system variables ($k_1 \rightarrow k_1^*$, $k_2 \rightarrow k_2^*$ and $\tau \rightarrow \tau^*$, where k_2^* and τ^* are zero), the debt ratio ($b \rightarrow b^*$), and the rate of inflation ($\pi \rightarrow \pi^*$) when a different rate is assumed in the two scenarios. Since the change in the debt ratio results exclusively from the alteration in the reserve system ($b^*=b+(k_1+k_2-k_1^*)\varepsilon$), its effect can be combined with that of the reserve variables.

Denoting all unchanging variables by Z, the change between the steady-state budget deficits is given by

$$d^*(r^*,k_1^*,k_2^*,\tau^*,b^*,\pi^*,Z)-d(r,k_1k_2,\tau,b,\pi,Z) \tag{18},$$

where

$$d^*=(n+\pi^*)(c+k_1^*\varepsilon)+(n-r^*)b^* \tag{19}$$

and

$$d=(n+\pi)(c+k_1\varepsilon)+(n-r+\tau)k_2\varepsilon+(n-r)b \tag{20}.$$

The isolated contribution of each changing variable is computed by changing its value isolatedly, leaving the values of the other variables unaltered.

Hence, the isolated contribution of the real rate of interest is given by

$$d(r^*,k_1k_2,\tau,b,\pi,Z) - d(r,k_1,k_2,\tau,b,\pi,Z) = -(r^*-r)(k_2\varepsilon+b) \qquad (21).$$

Analogously, the isolated contribution of the reserve system variables is given by

$$d(r,k_1^*,k_2^*,\tau^*,b^*,\pi,Z) - d(r,k_1,k_2,\tau,b,\pi,Z) = (k_1^*-k_1)(\pi+r)\varepsilon-\tau k_2\varepsilon \qquad (22),$$

and the isolated contribution of the rate of inflation is given by

$$d(r,k_1,k_2,\tau,b,\pi^*,Z) - d(r,k_1,k_2,\tau,b,\pi,Z) = (\pi^*-\pi)(c+k_1\varepsilon) \qquad (23);$$

the latter contribution is obviously nil in the alternative where the same rate of inflation is assumed in both scenarios.

The difference between the total change (18) and the sum of the isolated contributions (21), (22) and (23) is called the interaction effect and is given by

$$(r^*+\pi^*-r-\pi)(k_1^*-k_1)\varepsilon \qquad (24).$$

6. Contribution of the major factors leading to the divergence of steady-state budgets from the average in the "integrated" scenario

The deviation of the steady-state budget deficit in each country from unweighted average deficit, in the "integrated" scenario, is obviously due to deviations in the variables whose values are not unified. These variables are the real rate of growth (n), the monetary base ratio ($\beta^*=c+k_1^*\varepsilon$) and the debt ratio (b*). Let us denote the values of these variables in each country i with a corresponding subscript, their unweighted average value with the subscript m, and all unified variables by U*.

Then, the deviation between the steady-state deficit in country i and the unweighted average deficit, in the "integrated" scenario, is given by

$$d_i^*(n_i,\beta_i^*,b_i^*,U^*)-d_m^*(n_m,\beta_m^*,b_m^*,U^*) \qquad (25),$$

where

$$d_i^* = (n_i+\pi^*)\beta_i^*+(n_i-r^*)b_i^* \tag{26}$$

and

$$d_m^* = (n_m+\pi^*)\beta_m^*+(n_m-r^*)b_m^* \tag{27}.$$

The isolated contribution of each variable to total deviation is calculated as the difference between the deficit computed using average values for all variables except that one and the unweighted average deficit.

Hence, the isolated contribution of the real rate of growth is given by

$$d_i^*(n_i,\beta_m^*,b_m^*,U^*)-d_m^*(n_m,\beta_m^*,b_m^*,U^*) = (n_i-n_m)(\beta_m^*+b_m^*) \tag{28}.$$

Analogously, the isolated contributions of the monetary base ratio and of the debt ratio are given by, respectively

$$d_i^*(n_m,\beta_i^*,b_m^*,U^*)-d_m^*(n_m,\beta_m^*,b_m^*,U^*) = (\beta_i^*-\beta_m^*)(n_m+\pi^*) \tag{29}$$

and

$$d_i^*(n_m,\beta_m^*,b_i,U^*)-d_m^*(n_m,\beta_m^*,b_m^*,U^*) = (b_i^*-b_m^*)(n_m-r^*) \tag{30}.$$

The difference between total deviation (25) and the sum of the isolated contributions (28), (29) and (30) is called the interaction effect, and is given by

$$(n_i-n_m)[(\beta_i^*-\beta_m^*)+(b_i^*-b_m^*)] \tag{31}.$$

Annex Data definitions and sources

b: Net public debt to GDP/GNP ratio, at the end of 1989. In order to consolidate the general government and the central bank, the net debt ratio of the general government was adjusted by subtracting the assets held by the central banks as a counterpart of the sum of currency, remunerated and non-remunerated reserves.
Source: "Economic Outlook", OECD June 1990. For Portugal, "Annual Report of the Bank of Portugal, 1989".

c: C/Py

C: Currency (including coins) in circulation with non-bank public, average of 1989 end-of-month figures.
Source: national publications (see list below).

d(exogenous): Ratio of the general government borrowing requirement net of interest paid and received to GDP/GNP, average 1987-89.
Source: as for b.

e: E/Py

E: Monetary aggregates, average of 1989 end-of-month figures minus currency (C). Monetary aggregates: Belgium M2H; Denmark M2 (minus Treasury Bills); Germany, Greece, Spain, France and Ireland M3; Italy and the Netherlands M2; Portugal L- (minus Treasury Bills); United Kingdom M5.
Source: national publications.

i: Nominal rate of interest on long-term public bonds, average 1987-1989. Belgium: secondary market yield on government bonds of five years and over; Denmark: linear repayment loans (effective rate of interest on 10-years government bonds); Germany: secondary market yield on 8-15 years government bonds; Greece: interest rate on 3-month Treasury bills; Spain: secondary market yield on public sector bonds with more than two years to maturity; France: secondary market yield on government bonds over 7-years; Ireland: representative yield on government securities with 8 years to maturity; Italy: gross yield on government bonds; Netherlands: secondary market yield

on 5-8 years central government bonds; Portugal: secondary market yield on public bonds; United Kingdom: secondary market yield on 10 years government stocks.
Source: Belgium, Germany, Greece, France, Netherlands and the United Kingdom: BIS data bank; Denmark, Ireland, Italy, Portugal and Spain: national publications.

k1: R1/E (Notice that this is an apparent, and not a required, non-remunerated reserves coefficient, since the numerator includes all non-remunerated bank deposits with the central bank - and not only the required ones - and the denominator does not coincide with the basis of reserve requirements where these exist).

k2: R2/E. (An analogous note to that of k_1 applies.)

n: Real rate of growth, average 1980-1989.
Source: "Economic Outlook", OECD, June 1990.

π: GDP/GNP deflator, average 1987-1989.
Source: as for n.

Py: Nominal GDP [for Germany and Ireland, GNP] in 1989.
Source: as for n.

r: $i-\pi$.

R1: Non-remunerated bank deposits with the central bank plus cash balances (including coins) held by banks, average of 1989 end-of-month figures. The results were proportionately adjusted in order to reflect the latest required coefficients in the cases where these have undergone recent changes: Spain (May 1990), France (October 1989) and Portugal (May 1990).
Source: national publications.

R2: Remunerated bank deposits with the central bank and other forms of secondary reserves required, average of 1989 end-of-month figures. The results were proportionately adjusted in order to reflect the latest required coefficients in the cases where these have undergone recent changes: Spain

(May 1990) and Portugal (May 1990). R2 includes: in Denmark, remunerated deposits of commercial and saving banks with the National Bank; in Greece, remunerated tranche of required reserves (excluding the part that can be placed in Treasury bills); in Spain, banks' obligatory holdings of certificates issued by the central bank (as from May 1990); in Ireland, primary liquidity banking assets (minus cash balances held by banks, included in R1); in Italy, compulsory banking reserves with the Bank of Italy; in Portugal, remunerated tranche of required reserves plus government bonds held by banks in the interbank bond market and all forms of special liabilities of the Bank of Portugal to banks. Secondary reserve requirements of the form of an investment obligation on public securities were ignored insofar as they yield rates of interest close to the retained domestic long term rates on public debt; these requirements appear then as public debt in this exercise, and they include notably: in Greece, a 40% (March 1990) investment obligation in Treasury bills for commercial banks, plus an optional 1 percentage point out of their interest-bearing reserve ratio; in Spain and Portugal, a 8.25% (June 1990) and a 5% investment coefficient in public debt, respectively; in Ireland, a 25% (on associated banks) or 13-15% (on non-associated banks) secondary liquidity requirement, mostly in Government paper.

Source: national publications.

τ: Interest tax on remunerated reserves (nominal rate of interest of public bonds minus administered nominal rate of interest on R2) in 1989 [for Spain and Portugal, May 1990]. In Portugal, the nominal rate of interest on R2 was calculated as a weighted average of the various components considered.

Source: national publications.

List of national publications used

Belgium: "Bulletin de la Banque Nationale de Belgique", June 1990.

Denmark: "Danmarks Nationalbank Monetary Review", May 1990.

Germany: "Monthly Report of the Deutsche Bundesbank", June 1990.

Greece: "Monthly Statistical Bulletin of the Bank of Greece", January 1990.

Spain: "Boletin Estadistico, Banco de España", June 1990.

France: "Bulletin Trimestriel de la Banque de France", March-April 1990, and "Situations Hebdomadaires de la Banque de France, 1989".

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