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SUMMARY

This paper presents some partial and provisional results of a broader-based research project being undertaken by the Bank of Spain Research Department on Spanish fiscal policy. In the first section of the paper we sketch the main characteristics of the Spanish public sector performance to set the appropiate background for the subsequent discussion. In section II we review the broad lines of Spanish fiscal policy implemented in recent years, to motivate the issues analyzed in our paper. These issues are the consequences of a protractedly expansive fiscal policy stance for the conduct of monetary policy, and for the saving-investment balance in the national economy. In section III we shall consider the sustainability of this fiscal policy in the context of the European economic and monetary union. In section IV we analyse the implications of fiscal policy on the external sector.

The main conclusions of the paper are:

(1) Fiscal policy and interest rates

From 1985 to 1990, public deficit fell by 3% of GDP. Automatic stabilizers account for this improvement. We have computed different measures of fiscal stance, all of which indicate that discretionary consolidation efforts did stop in 1987. In just three years, the structural deficit has grown above its peak in the last two decades and the primary structural deficit has regained its early -80s level.

We have performed some econometric work on the relationship between fiscal stance and interest rates. Although far from conclusive, most of our results point to a positive and significant relationship between indicators of fiscal stance and interest rates. This association becomes stronger when the fiscal policy variable excludes the interest burden. One point of increase

in the primary structural deficit leads to an increase in nominal interest rates of more than one percentage point.

The expansionary stance of fiscal policy in 1987-90 has had severe effects on the effectiveness of monetary policy. Spain joined the EMS in 1989. Since then, the policy-mix has been that of an easy budget and tight money. Pro-cyclical fiscal stance did put upward pressure on interest rates and exchange rates. Capital inflows and a booming economy rendered monetary tightness less effective in its objective of slowing nominal expenditure and inflation. As a consequence, undesirable capital controls and credit ceilings had to be introduced in 1989. Although effective in restricting demand pressures, these controls have had innefficient asymmetric effects and did not prevent some periods of exchange rate tensions within the EMS.

Recent weakening of economic activity and overriding commitments under EMU agreements recommended the elimination of both types of controls in early 1991. However, interest rates are still too high, and it is felt that an improvement in the policy mix is needed to continue the process of nominal convergence without tensions. In this respect, the 1992 Budget does not lead to expect significant changes in the policy mix.

(2) Sustainability of fiscal policy

Fiscal policy is sustainable if deficits do not lead to an ever-growing debt. A necessary condition for an unsustainability problem to exist is that nominal interest rates exceed the nominal rate of growth of GDP. Apparently this has been the situation in Spain over the 80s. However, mandatory banking coefficients and other privileged sources of public funding have reduced the effective interest rate on public debt well below market rates for most of the period 1964-89. Only recently a real sustainability problem has started to build up, along with convergence of financial regulations in the EC and with the introduction of self-imposed restrictions on the access to Central Bank funds.

All in all, the debt ratio is still comparatively low and the gap between growth and interest rates is small. Our concern in the paper is, rather, with the implications of sustainability criteria as fiscal discipline indicators in EMU. In the paper we argue that the most widely used "sustainability gap" or "primary gap" -difference between actual primary deficit and that deficit which is required to stabilize the debt ratio- may not be the best indicator of sustainability. We show that this indicator is biased in favour of countries with high initial debt ratios when the time period allowed for convergence to a given target is long enough.

The analysis goes on to the issue of "excessive deficits" and bands for fiscal policy. As it happens with the sustainability issue, we discuss what rules should be implemented to discipline budget policies. Notwithstanding, it is not an easy task to devise a set of rules which at the same time reflect national differences, and which are either not redundant with each other or too strict. We show that bands on primary deficits do not suffice to ensure long-run solvency. Given the credibility issues involved, the choice of appropriate rules in EMU is crucial.

(3) Fiscal stance and the external sector

Between 1986 and 1990, the current account has deteriorated by more that 4 points of GDP. An important question to ask is to what extent have the external sector developments effectively reflected fiscal stance. The connection is by no means obvious, since causation in the opposite way -as it would happen if fiscal policy were devised so as to target the current account- cannot be excluded. We devote the final part of the paper to report some empirical results of background research. The analysis explores causality directions between national saving and investment and between the public and the private sectors saving-investment gaps.

The results indicate that causation runs from saving to investment (a change in saving will induce a change in investment of the same size and sign) and from the public to the private savings investment gap (a change

in the public gap will induce a change in the private gap of the same size but of the opposite sign). These findings are consistent with economies in which there is low capital mobility and where capital controls combined with monetary policy were the main instruments used to target the current account balance . This pattern, which was found for most countries under study, implies that fiscal policy has not affected significantly the course of the external sector over the past two decades.

A detailed analysis of recent years for Spain shows that this close relation between saving and investment seems to weaken after 1987.This finding is consistent with the increased capital mobility in the Spanish economy since EC membership. It may also indicate that fiscal policy will determine Spain's external balance position when capital movements are fully liberalized. Since restrictions on the size of current imbalances might emerge from EC consensus, fiscal consolidation would be called for.

I. PUBLIC SECTOR PERFORMANCE

In the last fifteen years there has been an extraordinarily rapid growth in the degree of government involvement in the Spanish economy. Against a historical background of substantial off-budget intervention, general government expenditure began to expand sharply in the mid-seventies. As a result, while general government expenditure rose 1 percentage point per annum in the EC over the 1975-1985 period, in Spain the public expenditure share almost doubled to reach a peak of 42.7 percent of GDP, such figure corresponding to an average annual rise of 1.8 percent of GDP.

This abrupt turnaround in trend reflected two broad factors. First, the decline in economic performance relative to levels experienced and anticipated in the previous decade led to a marked increase in transfers, subsidies and income maintenance expenditures. Second, the political reform resulting in a democratic regime set in motion a "catching-up" process in the welfare state area. Despite the substantial effects of the 1977-78 tax reform, the strength of the foregoing driving forces outpaced revenue potential (the tax share in GDP rose by almost 1.3 percentage points per year on average), resulting in mounting public deficits and rising public debt. The ensuing increase in debt interest payments further compounded these difficulties by adding to government's precommitment of resources.

On the eve of Community membership in 1986, a number of measures were implemented with important implications for the stance and medium-term effects of fiscal policy. The experience of the seventies led to disillusionment with "fine-tuning", partly because of the negative effects of discretionary expansions on inflationary expectations and international competitiveness, and partly due to the harmful impact of deficit financing on investment and debt dynamics. At the same time, however, the government introduced changes in the financing of the public deficit, which shifted away from Bank of Spain resources (Monetary Regulation Loans) by means of the issue of Pagarés del Tesoro (Treasury notes), for which a mandatory coefficient was

created. Against a background of gradual deceleration of monetary aggregates and high interest rates, the move towards orthodox deficit financing made it more difficult to attain the objective of halting the deterioration of the government deficit. The rapid increase in the share of interest expenditure (2.2 points of GDP in 1982-85) obscured the efforts made to slow public expenditure growth. Thus, despite the increase in the tax burden and a sizable reduction in the rate of growth of social expenditures and transfers to enterprises, the overall government borrowing requirement rose to an unprecedented 6.9 per cent of GDP. At the end of 1985, the share of public debt in GDP reached 44.6 per cent, a figure that trebled the 1979 share.

Since joining the European Communities, two periods can be identified in the performance of fiscal policy: the first, in 1986 and 1987, during which the general government deficit fell by 3.7 points; and the second, spanning 1988 to 1990, during which the deficit, adjusted for the change in the timetable for tax reimbursements, increased slightly from the 1987 level. As Table I.1 shows, in the 1986-1987 period revenues increased sharply, due mostly to rises in direct taxes. On the other hand, for the first time since 1966 the share of current transfers in GDP fell owing to both the action of automatic stabilizers (unemployment benefits and subsidies) and to the effects of the 1985 reform of the pension system. As a result of these developments, public sector disposable income increased markedly. Moderate increases in public consumption and debt interest payments made possible sizable improvements in gross savings and the primary balance (4 points of GDP in 1985-87), both of which rose from negative to positive figures.

After the successful fiscal years of 1986 and 1987, fiscal consolidation came to a halt in 1988 and deteriorated thereafter. On the expenditure side, social security benefits and investment expenditures were the leading forces behind the expansion. The former regained strength, partly as a consequence of union pressures that led to a general strike in December 1988; the latter responded to the aim of completing major infrastructure projects for 1992 (the World Fair in Sevilla and the Olympic Games in Barcelona) and 1993 (creation of the European Internal Market). Fiscal

developments were somewhat mixed. Despite the reductions in nominal tax rates, direct taxes remained a buoyant source of revenues, due to the combined effects of strong economic growth and the fiscal drag associated with tax progressivity. However, extra receipts were used to finance additional expenditures. All in all, the outturn of 1988-1990 fiscal policy has been an increase in both total expenditures and net borrowing. These may have lent strong support to demand, thus shifting to monetary policy the full burden of stabilization, mainly achieved through credit ceilings and controls on capital inflows.

International comparisons of general government operations -see Table I.2- bear out differences between public sector performance in Spain and in the European Community. First, over the last decade, both current revenues and current expenditures have grown much faster in Spain than in the EC on average. Second, between 1985 and 1990, the reduction in Spain's total and primary deficits has been substantially in excess of the average reduction in the EC. Third, during this period the improved financial position in Spain has resulted from tax increases stemming from fast economic growth rather than from reductions in current expenditures, as was the average pattern in the EC. Finally, Spain's marked infrastructure gap explains the sharp increase in gross investment, which contrasts with the stability of the average public investment ratio in the EC.

Efforts to reduce the public sector deficit in recent years have been hampered by developments in four areas: behaviour of regional and local governments, budget discipline, deficit funding, and tax evasion. In the early 80s, Spain started a process of budgetary decentralization. As a result, in 1990 the regional and local governments' final expenditures (public consumption plus gross investment) exceeded those of the State. However, tax revenues at the regional and local level of government have not grown in the same fashion. The undesirable outcome of the mismatch between expenditure responsibilities and tax resources -compounded by the existence of perverse political incentives to finance expenditures out of non-tax revenues- has been the emergence of sizable borrowing requirements and increasing indebtedness.

TABLE I.1

GENERAL GOVERNMENT OPERATIONS. 1985-90
(percent of GDP)

	1985	1986	1987	1988	1989	1990
CURRENT REVENUES	35.3	35.7	37.4	37.2	39.0	36.8
Taxes on production and imports	9.8	10.8	10.5	10.4	10.4	10.0
Taxes on income and wealth	8.2	7.9	10.1	10.3	11.9	11.7
Social security contributions	13.0	12.8	12.8	12.5	12.7	13.0
Other	4.3	4.2	4.0	4.0	4.0	4.0
CURRENT TRANSFERS	22.0	21.6	20.7	20.8	21.0	21.5
Social Security benefits	14.4	14.0	13.8	13.9	14.0	14.6
Interest on public debt	3.4	4.0	3.5	3.3	3.4	3.5
Subsidies	2.5	2.0	1.8	2.1	1.9	1.9
Other	1.7	1.7	1.6	1.5	1.7	1.5
NET DISPOSABLE INCOME	13.3	14.1	16.7	16.4	18.0	17.3
PUBLIC CONSUMPTION	14.7	14.6	15.1	14.7	15.0	15.3
Wages	10.6	10.3	10.4	10.5	10.5	10.9
Net purchases	3.1	3.3	3.7	3.3	3.5	3.3
Consumption of fixed capital	1.0	1.0	1.0	1.0	1.0	1.1
CAPITAL REVENUES	0.4	0.5	0.4	0.6	0.6	0.5
Taxes on capital	0.2	0.2	0.2	0.2	0.2	0.2
Other	0.2	0.3	0.2	0.3	0.4	0.3
CAPITAL TRANSFERS	2.3	2.3	1.8	1.7	2.0	1.6
GROSS FIXED CAPITAL FORMATION	3.7	3.6	3.4	3.8	4.3	4.9
NET BORROWING (DEFICIT: -)	-6.9	-6.0	-3.2	-3.2	-2.7 (-3.5)	-4.0 (-3.6)
Memorandum items:						
Gross savings	-1.4	-0.5	1.6	1.7	2.2	2.4
Primary deficit (-)	-3.5	-2.0	0.3	0.1	0.7	-0.5
Total revenues	35.7	36.1	37.8	37.8	39.7	39.3
Tax revenues	30.1	30.9	33.0	33.2	34.9	34.8
Total expenditures	42.7	42.1	41.0	41.0	42.3	43.3

SOURCE: Intervención General de la Administración del Estado (IGAE) Ministerio de Economía y Hacienda. July 1991. Figures in brackets correspond to the defic t adjusted for the change in the timetable for tax reimbursements.

TABLE I.2

SPAIN vs EC: COMPARISON OF GENERAL GOVERNMENT OPERATIONS, 1980-90
(per cent of GDP)

	SPAIN			EC		
	1980	1985	1990	1980	1985	1990
CURRENT REVENUE	30.2	35.3	38.8	41.0	43.9	43.4
Direct taxes	7.0	8.2	11.7	11.3	12.4	12.6
Indirect taxes	6.6	9.8	10.0	12.5	12.9	13.2
Social security contributions	13.1	13.0	13.0	13.1	13.2	12.9
CURRENT EXPENDITURE	29.7	36.7	36.8	40.8	45.0	43.1
Public consumption	12.7	14.7	15.3	18.2	18.6	17.8
Transfers to households	12.7	14.4	14.6	15.9	17.7	17.1
Interest payments	0.7	3.4	3.5	3.2	5.0	5.0
NET CAPITAL EXPENDITURE	3.2	5.6	6.0	4.1	4.0	3.7
GROSS INVESTMENT	1.9	3.7	4.9	3.1	2.9	2.9
NET BORROWING (DEFICIT: -)	-2.6	-6.9	-4.0	-3.8	-5.2	-3.1
PRIMARY DEFICIT (-)	-1.9	-3.5	-0.5	-0.6	-0.2	1.7
GROSS PUBLIC DEBT	18.3	38.9	43.1	45.2	56.7	57.4

SOURCE: IGAE; OECD; IMF.

At present, the system under which the regional and local governments receive most of their funds from state transfers is being revised.

Turning to budget discipline, there are longstanding budgetary practices that reduce the effectiveness of the ex-ante political control of budget objectives, thus providing for the existence of large expenditure overruns. The 1990 budget adopted a new measure limiting strictly non-financial appropriations to the amount approved by the Parliament. This rule is intended to limit previous laxity in the concession of additional credits. Still, budgetary procedure allows a large margin of freedom: unused appropriations can be carried forward, transfers among categories are allowed, and financial operations are not subject to strict limits.

Spain had virtually no public debt until the late seventies, and up to 1982 the public sector deficit was largely monetized. Seigniorage from currency in the hands of the public, combined with implicit taxation from bank reserves and investment requirements, have provided interest savings to the government of 1.7 percent of GDP in the 1980-1990 period[2]. With the introduction of Pagarés del Tesoro (Treasury notes) in 1981 and Letras del Tesoro (Treasury bills) in 1987, short-term securities emerge as the main instruments of a more orthodox financing of public deficits. However, the extensive use of compulsory coefficients and the reduction of the rate of return on Pagarés -used also as an "anonymous" placement of unreported income after 1986- have kept the effective interest on public debt relatively low (see Table I.4), while seigniorage and implicit taxation have remained high (2.3 of GDP in 1990). Further, inflationary expectations implied a weak demand for medium- and long- term debt, so that the average maturity of outstanding balances of debt fell from 2.6 years in 1986 to 1.4 years in 1990. In 1991, expectations that inflation and interest rates would fall stimulated the demand for medium and long term bonds, and the government has been willing to accept the returns sought by markets so as to increase the maturity of

[2] R. Repullo (1991), "Financing budget deficits by seignorage and implicit taxation: The cases of Spain and Portugal", CEMFI, Bank of Spain, Working Paper 9105.

TABLE I.3

COMPOSITION OF GENERAL GOVERNMENT DEFICIT, DEBT, FINAL EXPENDITURES AND TAX REVENUES. 1985-1990
(per cent of GDP)

	1985	1986	1987	1988	1989	1990
DEFICIT (-)						
State (1)	-6.0	-5.2	-3.5	-2.9	-2.2	-2.7
Social Security	-0.3	-0.1	0.3	-0.0	0.1	-0.3
Territorial Governments (2)	-0.6	-0.7	0.0	-0.3	-0.6	-1.0
Total	-6.9	-6.0	-3.2	-3.2	-2.7	-4.0
DEBT						
State (1)	40.7	40.5	41.1	36.8	36.3	36.2
Social Security	0.8	0.7	0.8	0.8	0.5	0.8
Territorial Governments (2)	3.6	4.0	4.0	4.4	6.5	6.4
Total (3)	44.6	44.9	45.2	41.4	42.9	43.1
FINAL EXPENDITURES (4)						
State (1)	8.1	7.7	8.0	7.6	7.7	7.9
Social Security	3.5	3.5	3.6	3.7	4.0	4.2
Territorial Governments (2)	6.8	7.0	7.0	7.2	7.6	8.1
Total	18.4	18.2	18.5	18.5	19.3	20.2
TAX REVENUES						
State (1)	12.8	14.7	16.6	16.8	18.1	17.3
Social Security	13.0	12.8	12.8	12.5	12.7	13.0
Territorial Governments (2)	4.3	3.4	3.6	3.9	4.1	4.5
Total	30.1	30.9	33.0	33.2	34.9	34.8

(1) Includes Organismos Autónomos Administrativos (Autonomous Agencies)
(2) Regional Governments (Comunidades Autónomas) and Local Governments
(3) Net of internal operations
(4) Public consumption and gross capital formation

SOURCE: IGAE

TABLE I.4

GENERAL GOVERNMENT DEBT. 1985-1990
(per cent of GDP)

	1985	1986	1987	1988	1989	1990
TYPE OF DEBT						
1. BANK OF SPAIN	7.6	6.7	3.2	2.1	2.3	2.1
2. SHORT-TERM DEBT	18.1	18.5	21.9	22.0	24.2	23.5
Pagarés del Tesoro	18.1	18.4	14.8	12.6	10.1	7.6
Letras del Tesoro	-	-	7.0	9.1	12.0	14.7
Other (Territorial government)	-	0.1	0.1	0.4	2.1	1.4
3. MEDIUM- AND LONG- TERM DEBT	13.2	16.9	15.5	12.7	11.5	11.5
Market debt	5.8	10.5	10.3	11.9	10.9	11.0
Non-market debt	7.4	6.4	5.2	0.8	0.6	0.5
4. OTHER	5.7	4.8	4.6	4.6	4.9	6.0
5. TOTAL	44.6	44.9	45.2	41.4	42.9	43.1
Memorandum items:						
Total debt without ICO (1) bonds	38.9	39.7	41.0	41.4	42.9	43.1
Three-month interbank interest rate	12.2	11.7	15.8	11.7	15.0	15.2
Rate of return on government bonds	13.4	11.3	12.9	11.7	13.7	14.7
Rate of return on Pagarés del Tesoro	11.5	8.5	7.9	5.6	5.5	5.5
Effective interest rate on public debt	7.7	8.8	7.7	8.1	8.0	8.1

SOURCE: IGAE; Bank of Spain.
(1) ICO - Official Credit Institutions.

outstanding debt. Against this background the ongoing convergence of EC rules - phasing out of compulsory coefficients and end-year zero limit for Treasury net borrowing from the Bank of Spain- poses risks of interest cost increases and instability of the public debt management policy.

Over the last decade, relatively extensive tax evasion has stood in the way of reducing the public deficit. Official sources evaluate lost VAT revenues at 26 per cent of potential revenues, while unreported tax bases are estimated at 45 percent of potential bases for personal income tax purposes, and at about 30 per cent for social security contributions. The creation of a new revenue service (Agencia Tributaria) is expected to increase effectiveness against fraud. At the same time, income tax rebates and increased mobility of tax bases associated with convergence in the Single European Market may render it more difficult in the future to reduce the deficit through increased taxation.

In the following sections we briefly explore three policy-relevant issues: the relationship between fiscal and monetary policies through interest rates, the measurement and implications of sustainability indices, and the impact of budget decisions on the current account.

II. FISCAL STANCE

In recent years, budgetary policy has been the subject of much debate. From 1985 to 1990, the total budget deficit as a percentage of GDP fell by 3 points. That has been interpreted by some as a measure of the success of budgetary policy over this period. The acceptance of such a conclusion would suggest that the counter-cyclical stance of fiscal policy has contributed to keep the overheating of the economy in check, easing the mission of monetary policy and helping to narrow the inflation differential with other EMS members.

This optimistic view should be addressed with caution since the total budget deficit and its course over time depend as much on public spending and revenue policy as on the responsiveness of the deficit to the level of economic activity. Insofar as the deficit is endogenous in relation to cyclical developments in the economy, the evaluation of the fiscal stance should be based on a division of the change in its budgetary balances into cyclical and independent components. Only the latter component can give a measure of the success of a policy aimed at correcting the deficit and at fiscal consolidation.

1. Definitional and conceptual issues

The separation of a deficit's independent and cyclical components poses no conceptual problems. Given a time path for the deficit, a good fiscal stance indicator should offer a measure of the proportion of changes attributable to policy modifications in public revenue and spending. From an empirical standpoint, however, certain difficulties may arise (see Blanchard, 1990 and Gramlich, 1990)[3]. These originate in the need to define a reference

[3] Blanchard, O. (1990), "Suggestions for a new set of fiscal indicators", OECD Working Papers, 79, París.

scenario and elasticities of public expenditure and revenue. Once a trend growth scenario has been defined for the economy, actual economic developments define implicitly the deviations or gaps in relation to the scenario. By applying the related elasticities to each year's gap, we obtain the cyclical change in the deficit. The fiscal stance indicator results from the difference between the change in the total deficit and the cyclical variation.

A scenario can be defined in terms of a basic variable, such as trend GDP, or in terms of this and other variables: the unemployment rate, interest rates, inflation rates, etc. As to the elasticities, they can be related to the set of revenue and expenditure or calculated for each specific category. The broad range of indicators that can be constructed for different reference scenarios and different conventions on elasticities makes it advisable to base the choice on reasonable rules. For an indicator to be good it should be simple, readily computable, require few predictions and not be dependent on specific models of the economy. The "cyclically adjusted budget" (OECD) and the "cyclical effect of the budget" (IMF) are two indicators whose construction satisfies the rules proposed.

The reference framework of the "cyclically adjusted deficit" indicator (DAC) is a medium-run trend of GDP. This trend can be estimated using GDP regressions on truncated trends:

$$Ln\ Y_t = \alpha_0 + \sum_{i=1}^{N} \alpha_i T_{it} + e_t \quad , \qquad (1)$$

where Y_t is real GDP, α_0, and α_i are the parameters to be estimated, T_{it} are time intervals ($\Delta T_{it} = 1$) and e_t is the disturbance. Alternatively, the trend may be calculated through estimation of the "Okun coefficient", ß:

Gramlich, E (1990), "Fiscal indicators" OECD, OECD Working Papers, 80, París.

$$\frac{\Delta Y_t}{Y_t} = \alpha + \beta (u_{t-1} - u_t) + e_t \quad , \qquad (2)$$

were u_t is the unemployment rate in period t. Trend output is defined as that which would have resulted had the unemployment rate at t been the same as a year earlier.

Once trend GDP, Y_t^*, has been obtained, the elasticities of the different categories of revenue and expenditure in relation to output (E_j) are estimated. DAC is defined as follows:

$$DAC_t = \sum_j X_{jt} \left[1 + E_j \left(\frac{Y_t^* - Y_t}{Y_t} \right) \right] \quad , \qquad (3)$$

where X_{jt} are the values of the different categories of public-sector expenditure and revenue (with a minus sign) (for a detailed description see OECD, 1989)[4].

Chart II.1. depicts the course of the general government total deficit, D, and the DAC in the 1979-1990 period, measuring both variables as a percentage of GDP. These results enable the optimistic position over budgetary policy to be qualified. Indeed, following the notable increase in the total deficit in 1985, fiscal policy in 1986 and 1987 was counter-cyclical and entailed a reduction in the DAC of more than 2 percentage points of GDP. This cyclical budgetary stance went into reverse in 1988, whereafter fiscal policy became expansionary and pro-cyclical. This behaviour may have clashed with monetary policy objectives, jeopardising the credibility of price-stability targets and causing tensions in financial markets. If the total

[4] OECD (1989), "Indicators of fiscal policy: A re-examination", Paris, mimeo, December.

deficit proved relatively stable in the four years from 1987 to 1990, this was due entirely to the action of the automatic stabilisers during a period of strong economic growth.

The "cyclical effect of the budget" indicator, which we will call "structural deficit" (DE), responds to the same rationale as above; it is, however, more straightforward to formulate in terms of computability. As earlier, the reference scenario is the course of trend GDP. DE is defined as:

$$DE_t = D_t - DCN_t \quad , \tag{4}$$

where D_t is the total deficit and DCN_t the "neutral cyclical deficit", i.e. that volume of deficit exerting the same pressure on the level of activity as that existing in a year selected as a base:

$$DCN_t = \left(\frac{G_0}{Y_0^*}\right) Y_t^* - \left(\frac{I_0}{Y_0}\right) Y_t \quad , \tag{5}$$

where G and I are public expenditure and revenue, respectively, and where the subindex 0 refers to the base year.

To interpret the significance of DCN, it may help to rewrite definition (5) as follows:

$$DCN_t = \frac{Y_t^*}{Y_0^*} (G_0 - I_0) + I_0 \left(\frac{Y_t^*}{Y_0^*} - \frac{Y_t}{Y_0}\right) . \tag{6}$$

The first part of the expression is a "trend neutral deficit", i.e. that deficit which exerts in year t the same pressure on trend production as that exerted by the budgetary policy in the base year. The second part of the

FIGURE II.1
INDICATORS OF FISCAL STANCE
1979–1990

Figures for 1989 and 1990 correspond to the deficit adjusted for the change in the timetable for tax reimbursments

expression reports the cyclical effect of national income on tax receipts. If the economy grows below (above) trend, receipts will be lower (higher) than the related trends. Thus, a drop in receipts equal to the product of the difference between the real and trend growth rates and the total revenue of the base year is deemed to be neutral. When $Y_0 = Y_0^*$, the "neutral" fall in receipts is that which presents unit elasticity with respect to the production gap. To limit dependence on the base year indicator (4), the "fiscal impulse" -IF- is defined as follows:

$$IF_t = \frac{DE_t}{Y_t} - \frac{DE_{t-1}}{Y_{t-1}} \qquad (7)$$

2. An assessment of fiscal stance in the 80s

Different measures of DE in the 80s are calculated below. For the estimation of Y_t^*, different procedures were used: interpolation between cyclical crests, one trend, two trends (1960-75 and 1976-90) and three trends (1960-75, 1976-85 and 1986-90). It was finally opted to regress GDP on two trends, with the following result:

$$\underset{\quad}{LnY_t} = \underset{(885,5)}{15,50} + \underset{(37,5)}{0,06t_1} - \underset{(-15,5)}{0,04t_2} \quad , \qquad (8)$$

where t_1, has a value of 1 in 1960 and 31 in 1990, and t_2 a value of 1 in 1976 and 15 in 1990. The trend growth implicit in this estimation is 6% from 1960 to 1975 and 2% from 1975 to 1990.

Table II.1 presents the calculations of the DE for the 1980-90 period, taking as the base year the first year in the series. The qualitative

1

TABLE II.1

Indicators of Fiscal Stance

	GAP	D	DE	IF	CHANGE IN D
1979	-0.97	1.98	-0.43		
1980	-1.70	2.65	0.00	0.43	0.67
1981	-3.98	3.93	0.52	0.52	1.27
1982	-4.76	5.62	1.97	1.45	1.70
1983	-4.94	4.82	1.10	-0.87	-0.81
1984	-5.12	5.27	1.48	0.38	0.45
1985	-4.78	7.03	3.35	1.87	1.76
1986	-3.46	6.08	2.86	-0.49	-0.95
1987	0.06	3.19	1.12	-1.74	-2.89
1988	3.12	3.29	2.27	1.15	0.10
1989	5.68	3.49	3.34	1.07	0.21
1990	7.33	3.63	3.97	0.63	0.13

TABLE II.2

Indicators of Fiscal Stance

	GAP	DP	DEP	IFP	CHANGE IN DP
1979	-0.97	1.36	-0.34		
1980	-1.70	1.94	0.00	0.34	0.58
1981	-3.98	3.13	0.45	0.45	1.19
1982	-4.76	4.61	1.69	1.24	1.49
1983	-4.94	3.40	0.42	-1.28	-1.22
1984	-5.12	3.14	0.10	-0.32	0.25
1985	-4.78	3.55	0.61	0.51	0.40
1986	-3.46	2.08	-0.41	-1.02	-1.47
1987	0.06	-0.33	-1.69	-1.28	-2.41
1988	3.12	-0.09	-0.43	1.26	0.23
1989	5.68	0.03	0.53	0.96	0.12
1990	7.33	0.12	1.11	0.58	0.09

Source: Bank of Spain

GAP = (GDP - potential GDP)/GDP (in %) in real terms.

sign of the IF indicator coincides with the year-to-year increase of the DAC, despite the different assumptions on elasticities on which each is based.

As defined, both DAC and DE assume that the interest burden is independent of the level of activity, which is tantamount to postulating that the changes in payments relating to interest are discretional decisions of budgetary policy from one period to the next. This convention is debatable since an increase in the interest burden may originate in an automatic fall in tax revenue in the prior year or in a rise in the interest rate on debt in the present year due to independent increases in demand or to an increase in international interest rates. Accordingly, it is worthwhile checking whether prior results hold for the primary deficit, DP_t:

$$DP_t = D_t - GI_t \qquad (9)$$

$$DEP_t = DP_t - DCNP_t \qquad (10)$$

$$DCNP_t = \left(\frac{G_0 - GI_0}{Y_0^*}\right) Y_t^* - \left(\frac{I_0}{Y_0}\right) Y_t \quad , \qquad (11)$$

where GI are interest expenses, DEP the primary structural deficit and DCNP the primary neutral cyclical deficit. Table II.2 details the calculations for the variables defined in (9) and (10), along with the related "primary fiscal impulse" IFP. The qualitative sign of this indicator reproduces that shown by IF except in 1984, owing to the increase in the interest burden, an increase which also explains the quantitative difference between IF and IFP in 1985.

Chart II.2 shows the fiscal stance measures calculated. The results indicate that fiscal policy has not evidenced a stabilising behaviour

since 1987. This procyclical course may be attributed to the extraordinary increase of total expenditure. In just three years, the structural deficit has exceeded its peak in the last two decades and the primary structural deficit has regained its early-80s level. At that point the economy was coming out of a lengthy crisis. In 1990 it was coming out of an intensive expansionary spell. This may have borne on both interest rates and the sustainability of the deficit and debt. And insofar as the behaviour of interest rates has been constrained by ERM commitments following Spanish membership in 1989, fiscal policy has since then hampered the task of monetary policy and hindered nominal convergence with the core EMS countries. Some of these issues are tackled below.

3. Fiscal policy and interest rates

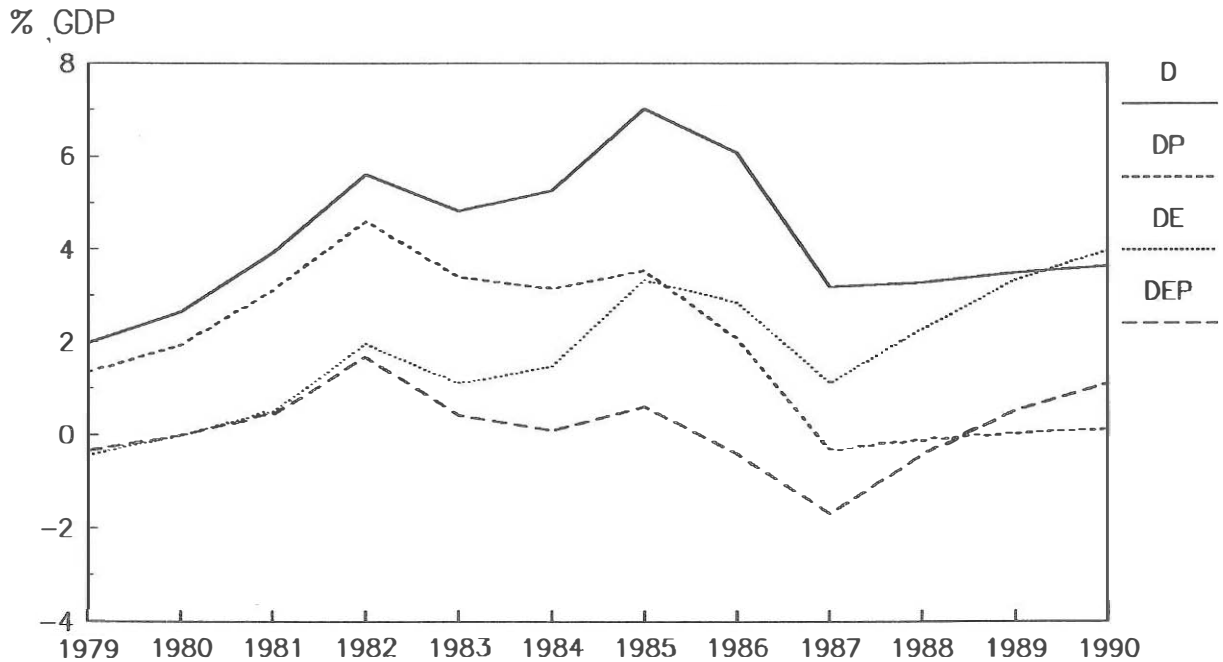
Chart II.3 presents the course of nominal interest rates in recent years. To what extent may the fiscal stance in the 70s and 80s have caused the observed rise in interest rates to 1985, hindering their lowering thereafter? The question is as important for economic policy as it is elusive from the empirical standpoint.

There are basically two approaches under which the behaviour can be explained. The credit market model postulates that the interest rate is determined by credit supply and demand (public and private):

$$i = i(Y_t, CG_t, CT_t, X_t) \quad , \tag{12}$$

where i is the nominal interest rate, Y_t income, CG_t credit to the public sector (stock variable defined as the accumulation of all past deficits), CT_t is total domestic credit and X_t includes other variables (expected inflation, wealth, world interest rates, etc.). The empirical evidence available on this

FIGURE II.2
STANCE OF FISCAL POLICY
1979-1990



Figures for 1989 and 1990 correspond to the deficit adjusted for the change in the timetable for tax reimbursments

FIGURE II.3
LONG TERM INTEREST RATES
1979–1989

model for the Spanish economy enables the positive and significant influence of the variable CG_t on the most representative interest rates to be affirmed (Mauleón and Pérez, 1985; Mauleón, 1987)[5].

The alternative approach takes the conventional IS-LM model as a reference. Under this model, expansionary budgetary conduct boosts consumption and reduces aggregate savings, pushing interest rates upwards. The reduced form of the interest rate is:

$$i = i\left[\left(\frac{M}{P}\right)_t,\ F_t,\ \pi_t,\ X_t\right] \qquad (13)$$

where $\left(\frac{M}{P}\right)_t$ are the real balances, F_t is a measure of fiscal stance (deficit or debt, adjusted or not), π_t is expected inflation and X_t includes other variables (capital productivity, supply-side shocks, etc.).

Several recent estimations of versions of (13) are available for the case of Spain. Raymond and Palet (1990)[6] use the expected value of the cyclically adjusted deficit in relation to trend GDP as an indicator of fiscal stance (see Feldstein, 1986)[7], obtaining a positive and statistically

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[5] Mauleón, I. and Pérez, J. (1985), "Interest rate determinants and consequences for macroeconomic performance in Spain", Banco de España Working Paper, 8420.

Mauleón, I. (1987), "Determinantes y perspectivas de los tipos de interés", Papeles de Economía Española, 32, pgs. 79-92.

[6] Raymond, J.L. and Palet, J. (1990). "Factores determinantes de los tipos de interés en España", Papeles de Economía Española, 43. pp. 144-160.

[7] Feldstein, M. (1986), "Budget deficits, tax rates, and the real interest rates", NBER, Working Paper, 1970, july.

significant coefficient. Merino (1991)[8] obtains the same result using a measure of the cyclically adjusted deficit. Tables II.3 and II.4 present the results of an estimation of (13) using, D_t, DE_t, DP_t and DEP_t (defined earlier) as deficit measures. The results are predominantly similar in that they point to a positive and significant relationship between deficit and interest rates (one point of increase of the primary deficit in percentage of GDP would lead to an increase of one point of nominal interest rates). This association becomes stronger when the fiscal policy variable excludes the interest burden. The fiscal stance variable best reflecting the preasures of budgetary policy on interest rates is the primary structural deficit.

These results, which seem to confirm the conventional explanation of movements in interest rates in recent years, should be viewed somewhat cautiously. The sample period should be enlarged, whereby the estimations would be more robust and the role played by other variables of possible relevance (productivity, volatility of inflation, etc) could be tested. In estimating bivariate (deficit-interest rates) and trivariate (deficit-interest rates-money) models, Ballabriga and Sebastian (1991)[9], detected no clear interaction between interest rates and the non-adjusted State deficit. Tables II.5 and II.6 summarize the dynamic interactions estimated in a three-dimensional VAR system containing proxies of public deficit, interest rate and money stock. Table II.5 arises from a prior which puts a strong weight in the random walk model, whereas table II.6 is based upon a non-informative prior (OLS). As can be seen, the amount of variability in the interest rate explained by public deficit disturbances ranges from 2 to 8%, approximately, depending on the time horizon; a small amount, if one also takes into account that the calculations are based on a scheme where the

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[8] Merino, F. (1991), "Análisis de la relación entre inflación y tipo de interés nominal", CEMFI, Bank of Spain, mimeo, june.

[9] Ballabriga, C. and Sebastián, M. (1991), "Déficit público y tipos de interés en la economía española: ¿Existe evidencia de causalidad?", Banco de España, mimeo, October.

TABLE II.3

LONG RUN INTEREST RATES AND PUBLIC DEFICIT

(Instrumental Variables; 1972-1989)

Coefficients	D_t	DP_t	DE_t	DEP_t
$1/v$	0.43	0.08	0.79	0.34
	(1.60)	(0.36)	(1.90)	(1.20)
π	0.64	0.10	1.05	0.39
	(2.00)	(0.39)	(2.14)	(1.21)
F	0.60	0.97	0.70	1.20
	(3.48)	(4.90)	(2.08)	(3.35)
Constant	0.07	0.11	0.08	0.12
	(4.66)	(10.25)	(3.61)	(9.07)
DW	1.67	1.65	1.76	1.60
σ	0.017	0.013	0.023	0.015
DF	-3.53	-3.46	-3.93	-3.85
P-Value	0.299	0.323	0.19	0.20

Note: $1/v = \frac{M}{PY}$, where P is the price level

π = inflation rate

F = fiscal stance measure (D_t. DP_t. DE_t. DEP_t).

TABLE II.4

LONG RUN INTEREST RATES AND PUBLIC DEFICIT (Instrumental Variables; 1972-1989)				
Coefficients	D_t	DP_t	DE_t	DEP_t
F	0.64	1.06	0.67	2.01
	(3.87)	(5.91)	(2.55)	(4.81)
Constant	0.10	0.11	0.12	0.13
	(17.17)	(31.00)	(25.4)	(29.67)
DW	0.84	1.58	0.64	1.71
σ	0.017	0.013	0.020	0.016
DF	-2.19	-3.49	-1.74	-3.53
P-Value	0.67	0.18	0.81	0.17

TABLE II.5
Variance decomposition implied by the optimal prior

Steps	Percentage shares								
	Public Deficit			Interest rate			Money		
	Deficit	Interest Rate	Money	Deficit	Interest Rate	Money	Deficit	Interest Rate	Money
1	100	0	0	3.04	89.49	7.47	31.56	0.005	68.44
2	99.99	0.00	0.00	2.92	89.81	7.28	31.39	0.00	68.60
3	99.99	0.00	0.00	2.77	90.18	7.04	31.18	0.00	68.81
4	99.98	0.01	0.00	2.63	90.56	6.81	30.96	0.02	69.02
5	99.97	0.02	0.00	2.50	90.91	6.59	30.74	0.03	69.23
6	99.96	0.03	0.00	2.37	91.25	6.38	30.53	0.05	69.42

TABLE II.6
Variance decomposition implied by a flat prior

Steps	Percentage shares								
	Public Deficit			Interest rate			Money		
	Deficit	Interest Rate	Money	Deficit	Interest Rate	Money	Deficit	Interest Rate	Money
1	100	0	0	1.7	69.0	29.2	19.0	0	80.9
2	83.1	11.6	5.2	1.6	66.1	32.2	11.5	4.7	83.7
3	63.5	23.9	12.5	3.2	62.3	34.4	10.5	12.4	77.1
4	47.7	32.8	19.4	5.1	59.0	35.8	8.7	21.2	70.0
5	37.4	37.8	24.7	6.60	56.5	36.8	6.7	28.2	65.0
6	31.2	40.2	28.5	7.7	54.9	37.4	5.1	33.1	61.8

Note: the numbers in each panel represent the percentage shares at steps 1 to 6 in the forecasting error variance of the variable labeling the panel.

public deficit is the dominant source of contemporaneous variability in the system. This finding does not reject directly the foregoing conclusions, but it calls for caution when imposing unidirectional causality from deficit to interest rates. In principle, a measure such as the primary structural deficit should be scarcely affected by problems of spurious correlation. In any event, a more detailed analysis is required to reach definite conclusions.

III. SUSTAINABILITY

1. Measuring sustainability

Fiscal discipline has generally been approached as a situation in which the public debt is sustainable, i.e. where the government's budget constraint is satisfied in such a way that excessive debt accumulation is avoided. This concept is too ambiguous as to generate widely accepted measures or indicators that quantify it.

Discussions on sustainability measures are, however, crucial since they can lead either to "non-entry clauses" in a monetary union or to more or less severe "binding rules" on domestic budget policies: target zones for deficits, for debt stock, etc. These binding rules may jeopardize the active role of national fiscal policies under a fixed exchange rate regime with free capital movements in order to accommodate asymmetric or specific shocks.

There are two ways to approach the measurement of sustainability: (i) time series tests on some relevant variables and (ii) a scalar trying to measure the degree of fiscal discipline of a government at some point in time. Among the former, tests may focus on stationarity of public deficits themselves, debt ratios or present values of debt ratios, derived from either deterministic or stochastic environments (see Hamilton and Flavin, 1986[10] and Wilcox, 1987[11]). Alternatively, a joint test on external deficits and net saving ratios may indicate a degree of budget sustainability, (see Ballabriga et al., 1991)[12].

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[10] Hamilton, J.D. and Flavin M. (1986), "On the Limitations of Government Borrowing: A Framework for Empirical Testing", American Economic Review 76.

[11] Wilcox, D.W. (1989), "The Sustainability of Government Deficits: Implications of the Present-Value Borrowing Constraint", Journal of Money, Credit and Banking 21.

[12] Ballabriga, F.C., Dolado, J.J. and Viñals, J. (1991), "Investigating Private and Public Saving-Investment Gaps in EC Countries", Bank of Spain, Working Paper EC/1991/57.

Attention has recently switched to discipline indicators of the second type, that we can characterize in the following way: first, they should be "model free", that is, based upon accounting procedures rather than subjective or model dependent definitions such as cycle, potential GDP, etc; second, the past behaviour in these accounts is summarized in the initial debt ratio, so that attention is focused on the average behaviour rather than its volatility; finally, simple and manageable assumptions on the forward looking variables that define the law of motion of the debt ratio are introduced: no uncertainty and constancy of interest and growth rates. We are going to focus on this class of indicators, which are empirically very tractable since a single scalar embodies all the relevant information about past behaviour (initial debt ratio) and forward looking variables (constant discount rate). We will argue here that, among all the possible criteria, there is only one which is widely used (see Blanchard (1990, op.cit)) and that yields a very particular ranking of sustainability for the EC countries (see E.C.(1990)[13].

Before proceeding with the argument, we should first comment on a necessary condition for a sustainability problem to exist: nominal interest rates should lie above the nominal rate of growth of GDP (see Box III.1 for an analytical discussion). In Figure III.1 we present both series for the Spanish economy, for the sample period 1965-90. It should be remarked that it displays a representative market long term nominal yield. Moreover, it is gross of taxes. It is therefore well above the implicit rate of the debt burden of the Spanish General Government, that has had access to special borrowing along the sample. In spite of this, interest rates fell short of growth rates during the 60s and 70s, and a "solvency problem" does not seem to appear up to the 1980s, a picture that resembles the Italian and French case (see CEPR(1991)[14].

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[13] E.C. (1990), "One Market, One Money", European Economy 44, October.

[14] CEPR (1991), "The Making of Monetary Union" in Monitoring European Integration, a CEPR Annual Report, October (several authors).

BOX III.1

We start from a standard intertemporal budget constraint for each period t:

$$G_t - T_t + r_t B_{t-1} = B_t - B_{t-1} \qquad (1)$$

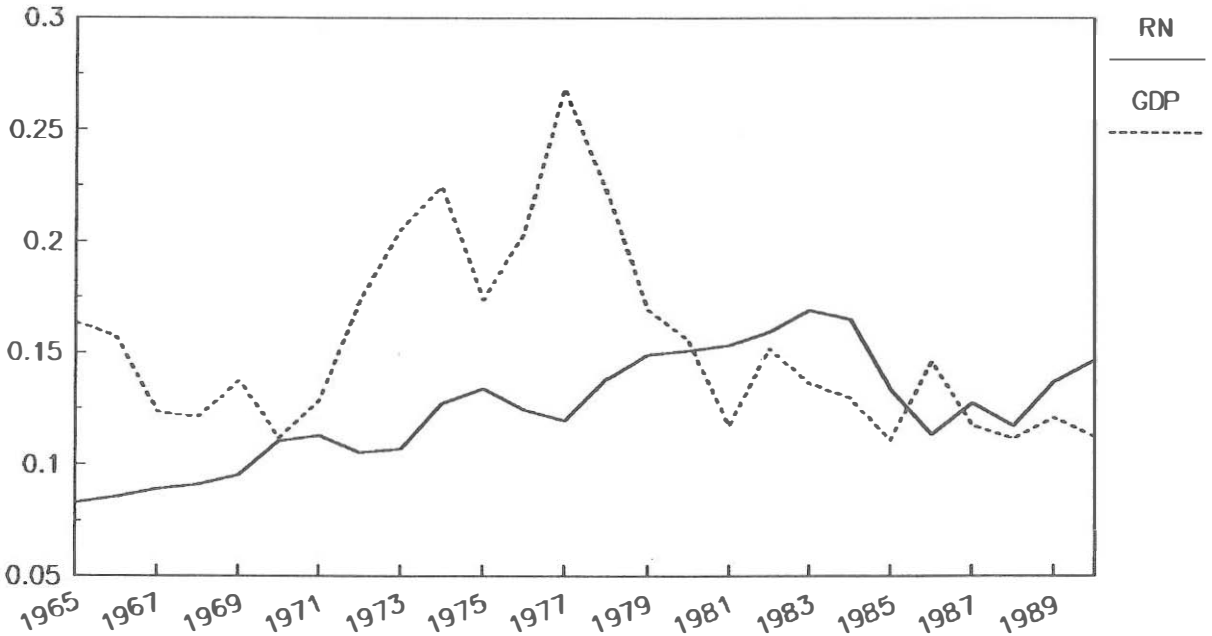
where G_t is public spending (including net transfers), T_t are tax revenues and $r_t B_{t-1}$ are the net nominal interest payments at time t from the net debt stock inherited from the past, B_{t-1}. The left hand side represents government deficit and $G_t - T_t \equiv -S_t$ is the "primary" deficit. On the right hand side we disregard, without loss of generality, any seignoriage receipts, either additional money creation or "inflation tax". If we divide (1) by GDP_t, calling g its nominal rate of growth, we obtain:

$$b_t = -s_t + (1+r_t / 1+g_t)b_{t-1} \qquad (2)$$

where a lower case letter denotes a ratio over GDP.
If $r < g$ the government can issue debt without having to reimburse it. Therefore $r > g$ is a necessary condition for a sustainability constraint to appear. It does not mean that the debt will necessarily grow explosively, but rather that the government will have to generate a positive primary surplus at some point in time in order to meet solvency requirements.

FIGURE III.1

NOMINAL INTEREST AND GROWTH RATES
SPAIN 1965-1990



We will assume that the future conditions will be closer to the current experience, since the government is to surrender its ability to obtain funding under special conditions. In other words, a "solvency" problem will exist unless the government generates a primary surplus for some periods in time.

The standard sustainability criterion is derived assuming both interest and GDP growth rates constant. It basically states that the constant or "permanent" required surplus to meet solvency is the product of the debt ratio times the discount rate (approximated by the difference between the interest rate and the GDP growth rates). This is equivalent to stabilizing the debt/GDP ratio at the initial ratio. In Box III.2 we present the formal derivation of such a condition.

This standard way of accounting for solvency allows us to compute "sustainability gaps" and to rank countries according to their degree of fiscal discipline. Table III.1 shows, for 1989, the ranking of EC countries derived from this criterion[15]. As long as the gap is close to zero, the country meets its borrowing requirements. If it is negative, debt policy poses no sustainability problems; positive values indicates that the country's fiscal policy is unsustainable. According to that Table, there are three types of countries: the ones clearly sustainable (Ireland, Denmark, UK), some which just barely meet the requirement (Germany, France, Belgium and The Netherlands) and the unsustainable ones (Greece, Portugal, Italy and, to a lesser extent, Spain).

The stability of the debt/GDP ratio condition is somehow distressing since, if taken as a guideline, it allows some countries to run permanently higher deficit/GDP ratios than others, in particular those countries that start off from higher debt stock. It implies a reward for past indiscipline and an incentive to accumulate as much debt as possible before the date the agreement is made. However, it should be accepted if it were the

[15] We take this year for comparative purposes with One Market, One Money (op.cit.)

BOX III.2

With constant interest and growth rates, $(1+i)_t / (1+g)_t \equiv \alpha$, we can rewrite (2) as

$$b_t = - s_t + \alpha\, b_{t-1} , \qquad (3)$$

which, for $\alpha > 1$, can be solved forward, yielding:

$$b_T = - \sum_{i=1}^{T} \alpha^{T-i}\, s_i + \alpha^T b_0 \qquad (4)$$

For a constant s, or "permanent surplus":

$$b_T = - (\alpha^T - 1) (s / \alpha - 1) + \alpha^T b_0 \qquad (4')$$

The solvency condition states that the present value of the debt ratio goes to zero as time goes to infinity:

$$b_T / \alpha^T \to 0 \qquad (5)$$

which implies

$$s^* = b_0 (\alpha - 1) \qquad (6)$$

or, using (3) recursively,

$$b_t = b_0 \quad \text{for every } t$$

s^* is interpreted as the "required primary surplus" to meet sustainability, hence $s^* - s_t$ is the "sustainability gap".

sole way of accounting for budget discipline.

We shall now argue that such a standard criterion, and therefore the above ranking, are far from being the only representation of the solvency condition, even when we adhere to the same basic pieces of information: initial debt ratio, primary surplus and interest and growth rates. Moreover, the combination of these variables embodied in the standard criterion is biased in favour of countries that display a relatively large debt ratio and a relatively small primary deficit. In Box III.3 we show the derivation of a more general sustainability criterion, from which the standard one is just a

TABLE III.1

SUSTAINABILITY RANKING: STANDARD CRITERION ($s^* - s_t$)	
Ireland	(-6.1)
Denmark	(-3.4)
U. Kingdom	(-3.4)
Germany	(-0.7)
France	(-0.1)
Belgium	(0.2)
Netherlands	(0.5)
Spain	(1.6)
Italy	(4.3)
Portugal	(4.3)
Greece	(11.4)

TABLE III.2

DEBT RATIO AND PRIMARY SURPLUS RANKING			
DEBT RATIO		PRIMARY SURPLUS	
France	(35.5)	Ireland	(7.7)
German	(43.0)	Denmark	(4.7)
Spain	(43.8)	U. Kingdom	(4.3)
U. Kingdom	(44.3)	Belgium	(2.4)
Denmark	(63.5)	Germany	(1.6)
Portugal	(73.1)	Nertherlands	(1.1)
Netherlands	(78.4)	France	(0.8)
Greece	(86.2)	Spain	(-0.9)
Italy	(98.9)	Italy	(-2.3)
Ireland	(104.9)	Portugal	(-3.2)
Belgium	(128.4)	Greece	(-10.1)

particular case: one in which the time horizon allowed for a debt target to be achieved is extended up to infinity (for the formal proofs, see Blázquez and Sebastián [16]).

We can intuitively summarize the argument by comparing the two basic pieces of information: debt to GDP ratio and primary surplus. Table III.2 shows the corresponding ranking for the EC countries according to these variables. For the debt ratio there are, again, three groups, but they are very different from the ones reported in Table III.1: those around the 68 percent EC average (Denmark, Portugal, the Netherlands), those below it (France, Germany, Spain and the UK) and those well above it (Greece, Italy, Ireland and Belgium).

For the primary surplus, the ranking is much closer to the standard sustainability criterion reported in Table III.1.

However, as formally explained in Box III.3, this approach is biased; an equivalent sustainable measure may generate a ranking closer to the left hand column. We can conclude that there are countries clearly unsustainable under either extreme case (Greece, Italy and, to a lesser extent, Portugal), countries with a disciplined pattern (U. Kingdom, Germany, France and Denmark) and countries whose relative position depends upon the time/debt targets chosen (Belgium, Ireland, Spain and the Netherlands). For any target debt ratio other than the initial one, the longer the time horizon given to the country to adjust, the smaller the required surplus relative to its initial condition. The infinite horizon case is the extreme case, in which the relative importance of the initial debt is minimized. This is, indeed, the standard criterion. (See Figure III.2 for a graphical representation).

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[16] Blázquez, J. and Sebastián M. (1991): "Alternative criteria on debt sustainability: an application to EC countries", manuscript, Bank of Spain.

BOX III.3

A general condition.-

It is somehow puzzling that the standard criterion implies a constancy of the debt ratio (6), which is a "severe" version of the general solvency condition (5). The latter would allow for the debt ratio to grow at some positive rate, provided than it is smaller than $\alpha-1$. Such "severity" is introduced as we solve (4) for a constant primary surplus. Here we will relax this implicit assumption.

Consider a target debt ratio for some time horizon:

$$b_T = b^* \qquad \text{for some } T$$

and

$$b_{T+i} = b^* \qquad \text{thereafter.}$$

This policy is sustainable since it verifies (5). We will show that it is, in fact, a general condition that includes (6) as a particular case.

We can compute two different s^*:

$$s^*_1 \quad \text{for } t< T$$

$$s^*_2 \quad \text{for } t> T$$

It can be shown that:

$$s^*_1 = b_0 (\alpha -1) + \frac{(b_0 - b^*)(\alpha -1)}{(\alpha^T -1)} \qquad (7)$$

(i) if $b_0 > b^*$, the bigger T (the bigger b^*), the smaller s^*_1 and viceversa.

(ii) $s^*_1 \to s^*$ as $T \to \infty$, hence $b^* \to b_0$ (the standard criterion)

A general sustainability gap will then be defined as $s_1(b^*, T) - s_2$ that displays two degrees of freedom: b^* and T, which disappear in the infinite horizon case.

Therefore, by choosing appropiately b^* and T for each country we could conclude that the solvency criterion (5) could be equally met by every country without distinction (all countries will have the same sustainability gap).

If we impose that the target b^* should be equal for all countries, there is still a degree of freedom, given by T, and all countries may be equally sustainable. The only way to remove the indeterminacy is to fix both b^* and T. However, as mentioned above the choice is not innocuous. The larger T (b^* closer to b_0) the smaller the weight of the initial debt ratio in the required primary surplus (see (7)). The standard case is an extreme version of this case, where the infinite time horizon removes both degrees of freedom.

It should be clear now that the conventional sustainability indicator minimizes the importance of the past behaviour of the fiscal policy embodied in the initial debt-to-GDP ratio. At the same time, the current

FIGURE III.2
SUSTAINABLE DEBT PATHS
FOR DIFFERENT TIME HORIZONS

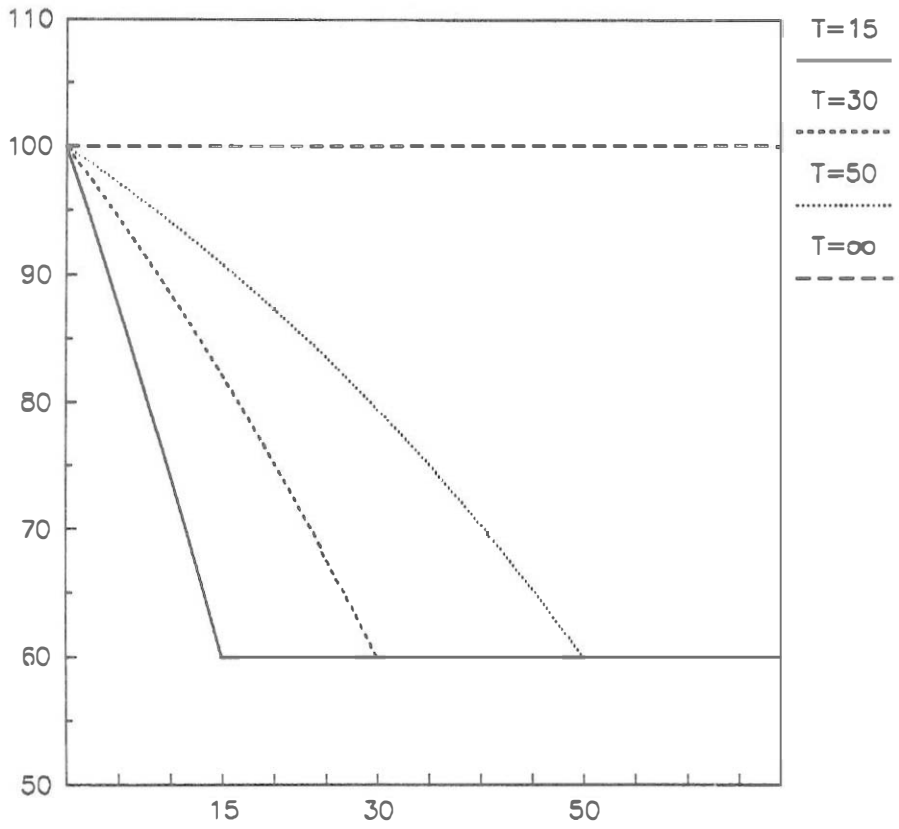
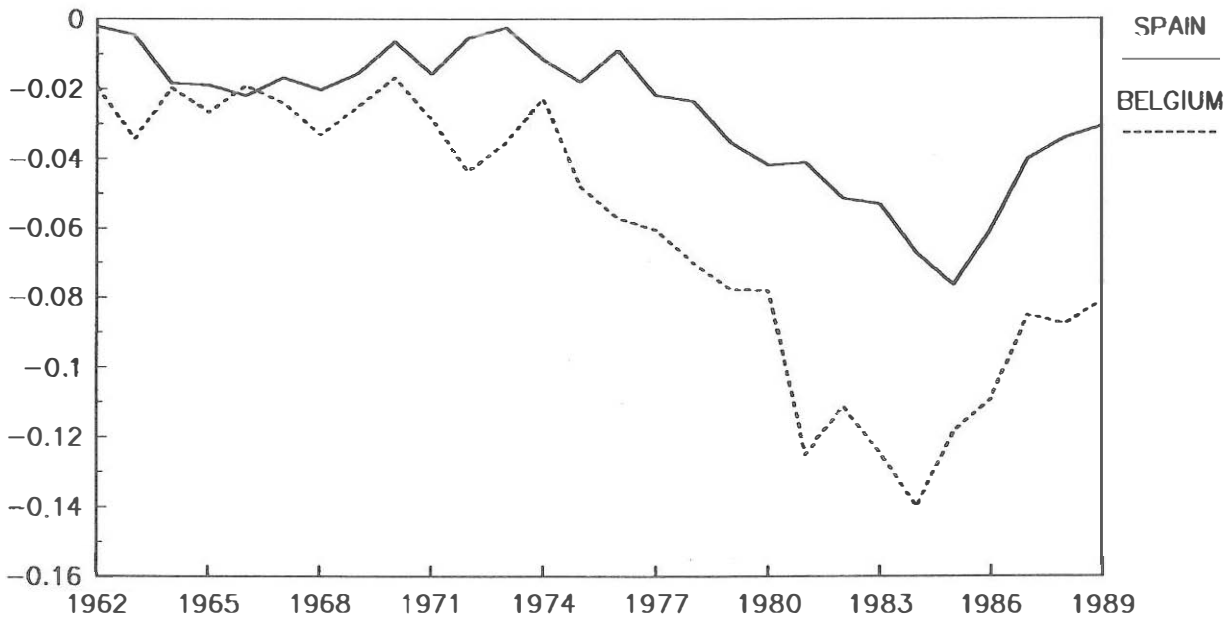


FIGURE III.3

DEFICIT/GDP:SPAIN AND BELGIUM
1962–1989



primary deficit's role is maximized. Observation of the time series of public deficits of Spain and Belgium for the last decades is illustrative of this point (see Figure III.3). The second country's deficit has been systematically larger. However, the standard criterion labels Belguim as "sustainable" and Spain as "unsustainable".

2. The question of excessive deficits: bands for fiscal policy

Long run sustainability requirements may induce establishing short-run (period by period) binding rules. There are economic reasons advising against imposing such rules. We will focus here in a more technical (yet not economically irrelevant) discussion on fiscal bands.

There are several questions that should arise prior to a concrete decision on a specific target zone for deficit or debt ratios:

(i) Should they be defined for deficits (primary or observed) or debt (gross or net)? What are the implications of one in terms of the other?

(ii) Should they be symmetric or just defined on an upper bound basis?

(iii) Should they be fixed on average or should "realignments" be possible?

(iv) Should they be the same for all countries or specific? If imposed on debt ratios, equal bands for all countries are not "egalitarian"; on the contrary, it implies accepting the initial condition as the desired one, merely limiting the variability around it. Some countries will permanently have more access to budget deficits than others. If they were different, this would allow for convergence on a common target in terms of debt ratios. If imposed on deficits, equal bands will imply accepting that shocks are symmetric. But in this case, there is no need for a differentiated fiscal policy; a coordinated monetary policy may be superior. If shocks are specific, equal bands may be undesirable and "realignments" may be needed.

(v) Should they be constant or vary in a cyclical pattern around some average? In the latter case, should they be procyclical (supporting sustainability arguments) or countercyclical (favouring the counteraction-of-specific-shocks argument) ?

(vi) What is the sustainability (long-run) criterion around which they are to be imposed?

(vii) How is the discretionary range (if allowed) for each country set? One possibility is to look at history (sample variances) taking into account sustainability experiences (Germany will be a paradigmatic case: high volatility, yet disciplined behaviour). Alternatively, foreseeing the degree of asymmetry of shocks to be suffered by each country depending, for example, on structural differences.

To illustrate the complexity of the decision, assume that we decide on most of the questions raised above and we impose bands on primary deficits, symmetric, equal for all countries, fixed average (no realignments), non cyclical, and with the standard sustainability criterion (target ratio equal to initial ratio). Even with all these decisions taken, we still have a great deal of difficulty when translating into debt ratios (which is the variable in which the sustainability criteria are built). Consider two types of bands on primary surplus:

(i) one that allows for a permanent deviation period by period.

(ii) one that allows the deviation in present values, so that the band on deficits narrows, and the actual room for manoeuvre reduces over time.

The first outline would violate the sustainability criterion, so an extra clause should be introduced: one that corrects downward each time the target is deviated (error correction mechanism); if the target (initial debt ratio) must be reached in the next period, then the band "disappears" in the

sense that a certain surplus must be raised without any room for manoeuvre. If a (narrower) band is offered, the standard criterion is violated (although sustainability in the wider sense holds). The first scheme introduces either strong volatility in fiscal policy or limits the ability to counteract shocks. The second one is not sustainable under the standard criterion, since the debt ratio converges to a higher (although stationary) level than the initial one (the more general criterion holds since the solvency condition, in terms of the present value of the debt ratio, is satisfied). Volatility is reduced under the second outline, but the margins for fiscal policy disappear.

We may conclude that there is no outline of fixed bands that guarantees the general solvency condition. Moreover, there is no outline of bands (including a narrowing one) that satisfies the standard criterion (stabilizing the debt ratio), although a scheme with narrowing bands may fulfil the general solvency condition. In any case, there is a trade-off between volatility in fiscal policy and room for manoeuvre. Box III.4 presents a formalization of these arguments. Figure III.4 illustrates both types of bands.

Box III.4

Bands on primary deficits.- $s_t = s^* + a_t$

We consider two different types of bands (both are equivalent for the first period):

(i) $a_t \in [-m, +m]$

(ii) $a_t \in [-m/\alpha^{t-1}, +m/\alpha^{t-1}]$

Using (4') , we can solve for the debt ratio for a constant a:

$$b_t = b_0 - a(\alpha^t - 1)/(\alpha - 1)$$

if the country always chooses the "upper" band for deficits (a=-m),

under (i) $b_t = b_0 + m(\alpha^t - 1)/(\alpha - 1)$

under (ii) $b_t = b_0 + m(\alpha^t - 1)/(\alpha - 1)\alpha^{t-1}$

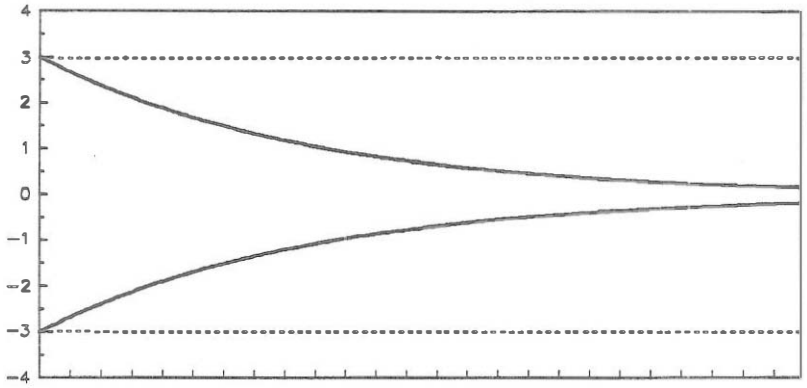
(i) is not sustainable since b_T/α^T does not converge to zero
(ii) is sustainable in this wider sense although it violates the standard criterion since $b_T \to b_0 + m\alpha/(\alpha - 1) > b_0$
Therefore (i) requires some additional "error correction" rule:

$$s_t = s^* - \alpha a_{t-1} + a_t$$

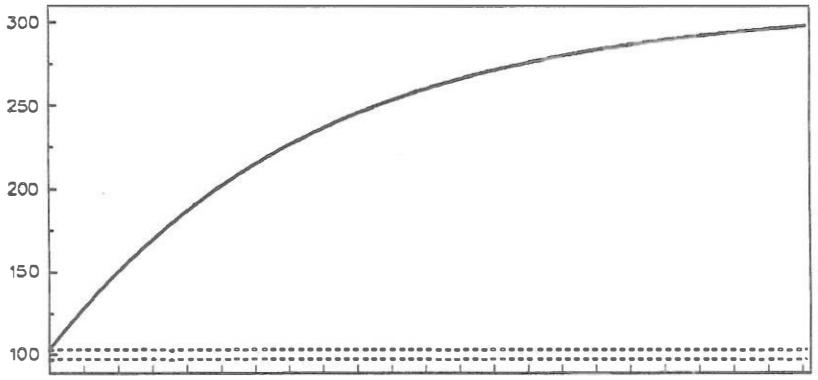
and, if the upper band is chosen, $b_t \simeq b_0 + m$ for all t, which also violates the standard criterion. If b_0 must be the target, when a deviation takes place at some t, $b_t = b_0 - a_t$, then $s_{t+1} = \alpha b_t - b_0$ without choice (the band disappears during that period).

FIGURE III.4

time paths of deficits (% GDP)



time paths of debt (% GDP)



Note: only the upper band is shown.

IV. FISCAL POLICY AND THE EXTERNAL SECTOR

1. Fiscal Policy and the Saving-Investment Balance

The relationship between the public sector deficit and the current account of a nation is straightforward. Defined from the National Accounts standpoint any change in the current account must originate in variations of the public sector deficit and/or of the private sector deficit. Specifically, since the basic national account identity states:

$$CAB = GNS - GNI + NCTA = (GS_p - GI_p) + (GS_g - GI_g) + NCTA \qquad (14)$$

the current account balance (CAB) must be equal to the difference between Gross National Saving (GNS) plus Net Capital Transfers from Abroad (NCTA) and Gross National Investment (GNI). Separating the private (denoted by $_p$) and the public (denoted by g) items of saving and investment, the current account balance must be equal to the sum of the public and private saving-investment gaps (considering NCTA to be negligible).

The well known absorption approach concentrates on this national account identity. Nevertheless, only knowledge of the causality direction can give us a more sophisticated relationship between sectoral gaps than the simple and direct one of the basic identity expressed in (14). This is so because causality means that any variation of the dominant variable will also induce a variation of the determined variable, but not simply as a result of an accounting relationship.

There are several scenarios that lead to some causality relationships between what can be called the private saving-investment gap

($GS_p - GI_p$) and public saving-investment gap ($GS_g - GI_g$). The following results are based on Argimón and Roldán (1991)[17].

First, fiscal policy can be defined as targeting the current account. The reasons for setting this target may be:

(i) The correction of social inefficiencies in the private allocation of foreign investment. On social grounds the correct comparison should be made between expected foreign returns after tax with expected domestic returns before tax, since tax revenues remain in the home country. Nevertheless, domestic agents compare only expected returns after tax.

(ii) The desire to restrict the inflow of foreign capital to the domestic economy due to political rather than economic reasons. Insofar as an external deficit means that foreign agents are buying national assets, this external deficit can be viewed as a sign of diminishing economic sovereignty.

(iii) The need to limit the negative effects on external equilibrium of domestic inflationary pressures arising from excessive domestic demand.

(iv) The departure of the current account from its long-run sustainable path. Fiscal policy can be used in this case to bring the current account deficit onto its long-run path, thus preventing potential external-deficit sustainability problems.

The complexity of fiscal policies is great, mainly because there is an extremely large set of instruments that can be used. These include tax rates, tax income definitions, allowance provisions, withholding taxes, level and composition of expenditures, and legal provisions pertaining to all these issues. Nevertheless, the degree of control of fiscal policy over this set of

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17 Argimón, I. and Roldán, J.M. (1991), "Saving, Investment and International Capital Mobility in E.C. Countries", Bank of Spain Working Papers, 9110, Madrid.

instruments is also quite limited, since many of them are affected by endogenous factors such as the level of growth, the behaviour of private agents, and so on.

For simplicity, fiscal policy can be limited just to budgetary policy. Fiscal policy can be formulated to be endogenous in the sense that it may react to the level and sign of the private saving-investment gap. This is, simply, the targeting of current account through budgetary policy: a way of achieving this target is through the offsetting of a proportion of the private saving-investment gap.

This kind of reaction can be extended to the private sector. If private agents foresee in the budget deficit the future taxes that will have to be paid to close the budget gap, they may offset a certain proportion of the public saving-investment gap through increases in private saving. If the government is running a surplus, the same arguments can be used: private agents foresee the future tax reductions associated with the present accumulation of wealth.

There is still another causality relationship that can arise under a null capital mobility scenario. If private saving and investment depend on the level of real interest rates (say, positively and negatively), then any variation of the public saving-investment gap will lead to a variation of the opposite sign in the private saving-investment gap. This result is the usual crowding-out of private investment: given a certain amount of national funds, an increase in the public deficit will increase interest rates until the decrease in private investment and the increase in private savings are large enough to finance the public deficit.

The causality directions that arise from the two polar scenarios of capital mobility and of the possible public and/or private reaction to the gap of the other sector are shown in Table IV.1. As it can be seen, the model predicts causality directions between national saving investment and between public and private sectoral gaps.

The results in Argimón and Roldán (1991) for nine EC Countries (EC-12 except Greece, Portugal and Luxembourg) lead to the definition of two groups of countries:

(a) Those countries which exhibit a high degree of capital mobility. These are Germany, U.K. and the Netherlands. For the U.K. there is some evidence of private reaction to the public saving-investment gap, in line with the Ricardian Equivalence models (there is causality from the public sector gap to the private sector gap).

(b) Those countries in which there has been no response by either the public or private sectors and there is low capital mobility. For these countries there is causality from saving to investment and from the public to the private-sector gap.

The results for this second group of countries can be interpreted as follows. First, saving has constrained investment during the period under study. Second, the public sector has crowded out the private sector. And third, these results indicate that capital controls may have been the main instrument used to target the current account. Indeed, economies which have applied extensive capital controls have been grouped under the low capital mobility scenario.

Another important result is that in all countries there is a lack of response by budgetary policy to the private gap. This simply indicates that, if there has been a current account target, instruments other than budgetary policy (such as capital controls) may have been used to reach such a target. Monetary policy and incomes policy, to a lesser exent, are the remaining instruments which may have been used.

Indeed, under perfect capital mobility and fixed exchange rates, monetary policy is ineffective in solving external deficit problems generated by the pressure of domestic demand. Budgetary policy is then the only instrument that can be used to solve these external deficit problems. Nevertheless, the use

TABLE IV.1

		SECTOR REACTION			
		PUBLIC	PRIVATE	BOTH	NONE
CAPITAL MOBILITY	NULL	$S \leftrightarrow I$ $D_p \leftarrow D_g$	$S \leftrightarrow I$ $D_p \leftarrow D_g$	$S \leftrightarrow I$ $D_p \leftarrow D_g$	$S \leftrightarrow I$ (1) $D_p \leftarrow D_g$
	PERFECT	$S \leftarrow I$ $D_p \rightarrow D_g$	$S \leftarrow I$ (2) $D_p \leftarrow D_g$	$S \leftarrow I$ $D_p \leftrightarrow D_g$	$S \not\leftrightarrow I$ $D_p \not\leftrightarrow D_g$

The arrows indicate the causality direction, i.e. $S \rightarrow I$ means that causality goes from saving to investment. Hence any change in Saving will lead to a change in Investment.

(1) IF $S'_p(r) = 0$, THEN $S \rightarrow I$

(2) IF THE ORIGIN OF THE SHOCK IS IN PRIVATE INVESTMENT, $S \not\rightarrow I$

Note: $D_p = (S_p - I_p)$; $D_g = (S_g - I_g)$

TABLE IV.2

		EMPIRICAL RESULTS (1960-1988). SECTOR REACTION			
		PUBLIC	PRIVATE	BOTH	NONE
CAPITAL MOBILITY	NULL				BELGIUM DENMARK FRANCE IRELAND ITALY SPAIN
	PERFECT		U. KINGDOM		GERMANY NETHERLANDS

For Spain, 1964-1989

of capital controls increases the effectiveness of monetary policy in solving these problems. The results obtained by Argimón and Roldán (1991) indicate that the possible targeting of the current account has used such capital controls to avoid the monetary policy ineffectiveness scenario. But the issue of why budgetary policy has not been used remains unsolved. The absence of response by budgetary policy may be seen as a reflection of the lack of flexibility of this policy due to social pressures in favor of certain public expenditure categories or to the political costs associated with the increase in personal, corporate or indirect taxes.

This exercise for nine Community countries has been repeated for Spain including 1990 as a sample year. Replication of the exercise for the 1964-1990 period was considered worthwhile for several reasons. First, it was interesting to see whether the close link between saving and investment (associated with the low capital mobility scenario) has been affected by the growing liberalisation and integration of the Spanish economy. In other words, since the degree of capital mobility has increased during the 80s, especially since EC entry in 1986, the saving/investment relationship should weaken over that period. Second, in connection with the foregoing, the possibility of a change in economic policy stance cannot be discarded; this would have been associated with the peseta joining the ERM and would have involved a reassignment of the respective tasks of monetary and fiscal policy given the lesser room for manoeuvre of the former.

The results obtained for the series of saving and investment and of sectoral balances as a percentage of GDP are reported in Tables IV.3 to IV.5. In the first table, national saving and investment are observed to be cointegrated, i.e. although they are not stationary there is a stationary relationship between both in the long run. The non-stationarity of both series could be tested by the conventional procedures (Dickey-Fuller tests); however, the fact that there is only one cointegration vector already constitutes a test of the non-stationarity of the series. Specifically, if there are two linear combinations of the two variables that are stationary, then any linear

TABLE IV.3

COINTEGRATION BETWEEN SAVING AND INVESTMENT

VAR (2) Without constant

λ_i	LR(max)	CV(max)	LR(trace)	CV(trace)
0.0064	(r=1 vs r=2) 0.16	4.09	(r≤1) 0.16	4.09
0.3991	(r=0 vs r=1)12.73*	10.622	(r=0) 12.89*	11.527

- Long-run relationship: (s , i) = (1 ,-0.97)
- Test of the restriction (s , i) = (1 ,-1)

λ^R = 0.29932

Test = 3.84 ~ $\chi^2(1)$

COINTEGRATION BETWEEN SECTORAL SAVING-INVESTMENT GAPS

VAR (2) with an unrestricted constant

λ_i	LR(max)	CV(max)	LR(trace)	CV(trace)
0.0163	(r=1 vs r=2) 0.41	7.709	(r≤1) 0.41	7.709
0.4709	(r=0 VS r=1)15.92*	13.791	(r=0) 16.33	16.824

- Long-run relationship: $(D_p , D_g) = (1 , 0.99)$
- Test of the restriction $(D_p , D_g) = (1 , 1)$

λ^R= 0.4709

Test ≈ 0 ~ $\chi^2(1)$

* means significant at the 5% level.

Note: (s i) = (1 -1) ⇔ (D_p D_g) = (1 1) since

(s -i)= (S_p + S_g -i_g -ig) = [(S_p - i_p) + (S_g - i_g)] = (D_p + D_g)

LR means the value of the likelihood ratio test.CV indicates the critical value at the 5 % level of significance.λ_i is the eigenvalue of the linear combinations.

TABLE IV.4

STATIONARITY TEST OF THE NATIONAL SAVING-INVESTMENT GAP

$\Delta(s-i)_t = -0.0077 + 0.61\ \Delta(s-i)_{t-1} + 0.46\ \Delta(s-i)_{t-2}$
(-2.55) (3.44) (2.29)

$-0.92\ (s-i)_{t-1}$
(-4.48)

Period: 67-90
DW = 2.08
LM(1) = 0.22
LM(2) = 0.19

ADF test crit. value: -2.99 (5%), -3.735 (1%)

LONG RUN CAUSALITY

Between saving and investment

$\Delta s_t = 0.355\ \Delta s_{t-1} - 0.11\ \Delta i_{t-1} - 0.002\ (s-i)_{t-1}$
(1.33) (-0.71) (-0.002)

DF = -4.87
DW = 2.03
LM(1) = 0.71
LM(2) = 0.70

$\Delta i_t = -0.12\ \Delta s_{t-1} + 0.375\ \Delta i_{t-1} + 0.479\ (s-i)_{t-1}$
(-0.4) (2.19) (2.96)

DF = -5.23
DW = 1.99
LM(1) = 0.04
LM(2) = 0.98

Between sectoral gaps

$\Delta D_t^p = -0.006 + 0.726\ \Delta D_{t-1}^p + 0.848\ \Delta D_{t-1}^g$
(-1.61) (3.20) (1.64)

$-0.879\ (s-i)_{t-1}$
(-4.30)

DF = -5.79
DW = 2.41
LM(1) = 3.27
LM(2) = 3.63

$\Delta D_t^g = +0.0037 - 0.208\ \Delta D_{t-1}^p - 0.432\ \Delta D_{t-1}^g$
(0.197) (-1.75) (-1.59)

$+ 0.269\ (s-i)_{t-1}$
(2.51)

DF = -4.81
DW = 2.05
LM(1) = 0.56
LM(2) = 4.296

LM(i) is the LM test of serial autocorrelation of order i. It is distributed as a $\chi^2(i)$

Note: $(s-i) = (D_p + D_g)$

TABLE IV.5

RECURSIVE ESTIMATION OF THE ECM COEFFICIENTS IN THE LONG-RUN CAUSALITY VAR'S				
	Equation			
Year	s	i	D_p	D_g
1985	-0.02	0.57	-0.85	0.13
	(-0.10)	(3.31)	(-3.40)	(1.14)
1986	0.81	0.58	-0.79	0.16
	(0.049)	(3.49)	(-3.42)	(1.53)
1987	0.11	0.59	-0.86	0.24
	(0.067)	(3.61)	(-4.01)	(2.12)
1988	0.10	0.59	-0.86	0.24
	(0.064)	(3.55)	(-4.14)	(2.20)
1989	0.23	0.54	-0.87	0.24
	(0.15)	(3.22)	(-4.07)	(2.25)
1990	-0.002	0.48	-0.88	0.27
	(-0.02)	(2.96)	(-4.30)	(2.51)

t-ratios in parenthesis

combination will be stationary since it can be reproduced from the two initial ones.

As the long-term relationship is very close to the identity S=I, the constraint whereby the cointegration vector must be of the form (s,i)=(1,-1) (that is, saving equals investment in the long run, and there is no external deficit in that long run) is tested, with positive results in the margin. A different means of testing this is looking at the stationarity of the current balance (i.e. ascertaining whether it has a unit root). This is shown in Table IV.3, with similar results.

Given that the external balance is no more than the sum of the sectoral balances, a test is performed to decide whether there is a stationary relationship between both sectoral balances. This is confirmed. Indeed, it is accepted that, in the long run, the sectoral balances offset each other (i.e. a private deficit will, in the long run, match a public surplus of the same size and vice-versa), a result consistent with that obtained for saving and national investment.

As to long-term causalities, the results are given in Table IV.4. Causality can be seen to flow from saving to investment, i.e. changes in saving lead, in the long run, to changes in investment of the same volume and sign, but not vice-versa. This result would be consistent in an economy with low capital mobility, as indicated in Argimón and Roldán (1991). In the case of the sectoral balances, bidirectional causality is observable. Public-sector-to-private-sector causality, whereunder changes in the public-sector balance would lead to changes in the private-sector balance of the same volume and sign, is consistent both with an economy with low capital mobility in which the public sector crowds out the private sector, and with an economy in which the conditions for complying with Ricardian equivalence are met. As to reverse causality, the result precludes any interpretation, since the sign of the error correction mechanism (ECM) is incorrect. Namely, increases in the current deficit lead to increases in the budget deficit, a behaviour of a destabilising nature.

Table IV.5 reports the recursive estimates of the ECM in the regressions of Table IV.4. As can be seen, the ECM of the investment equation lost significance as from 1987, and the estimated coefficient also diminished as from 1988. Such instability might be the result of growing capital mobility in the Spanish economy, making the saving-investment relationship weaker. This interpretation is consistent with the results obtained by Argimón and Roldán (1991) for countries with high capital mobility (such as Germany and the United Kingdom). This loss of significance of the ECM is not perceptible, however, for the private-sec tor balance equations. That might suggest that the evidence of causality could be interpreted less along the lines of crowding out in a closed economy than of Ricardian equivalence . Lastly, the ECM of the public-sector balance equation is significative only as from 1987, and bears the wrong sign. Strictly speaking, this incorrect sign precludes interpretation; however, to some extent this result would support the findings in other sections of this paper: that the behaviour of fiscal policy has not been of a stabilising (counter-cyclical) nature in recent years.

2. Fiscal Convergence under E.M.U.

The main conclusion of Argimón and Roldán (1991) in relation to EMU is that, insofar as EMU imposes the free capital mobility scenario, we should see in the coming years an increasing response by budgetary policy to the current account balance (that is, to the private sector gaps) or a greater spread of external balances. Moreover, if there are external deficit guidelines in the transition towards EMU, we should see all the countries grouped under the perfect capital mobility scenario with public gap response (with or without private gap response).

Ballabriga, Dolado and Viñals (1991)[18] use a variant of the above model to study the implications for the sustainability conditions of the public

[18] Ballabriga, F.C., Dolado, J.J. and Viñals, J. (1991) "Investigating Private and Public Saving-Investment Gaps in E.C. Countries", Bank of Spain, Working Paper EC/1991/57.

sector, the private sector and the economy as a whole. Along these lines, the previous result for Spain (or Italy) can be read as follows: although these countries violate both the government and private sector intertemporal budget constraint, they do not violate the nation's budget constraint. However, for some other countries, such as Greece, the violation of the government budget constraint has jeopardised the nation's solvency.

Thus, the situation of the public sector in, say, Greece, cannot be compared with that of Italy. Nevertheless, if the outcome for Italy is due to the presence of capital controls that lower the degree of capital mobility, this result would be reversed in the EMU process, with the public sector deficit possibly generating substantial external sustainability problems.

Turning to the results of this paper, these can be summarised as follows:

(a) Excessive Budget Deficits.

If the fiscal behaviour exhibited by governments in the sample period were to continue in the future, there would be potential fiscal unsustainability problems for Belgium, Greece, Ireland and Italy. Germany would seem to exhibit excessive surpluses.

Nevertheless, if the process of fiscal consolidation in Belgium and Ireland were to continue in the future, there would be no fiscal sustainability problems as long as these changes prove to be permanent. If there is no permanent change in fiscal policies in the future, Italy and Greece could suffer problems of fiscal sustainability. German unification will surely reduce the excessive surpluses and the super-solvent behaviour of the public sector.

(b) Fiscal and external sustainability

Five countries satisfy the national budget constraint: Denmark, France, Holland, Italy and Spain. But with the exception of France, the national constraint holds without either the public or private sector satisfying their constraints.Germany and Holland seem to be super-solvent, and Greece and Ireland face potential sustainability problems. Belgium and the United Kingdom are not such problem cases.

These results highlight the need to improve budget and external solvency for those countries facing problems, given the structural changes related to EMU. In the case of Greece, solving the budget sector unsustainability problems would lead to the solution of the external constraint problem.

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8701 **Agustín Maravall:** The use of ARIMA models in unobserved components estimation: an application to spanish monetary control.

8702 **Agustín Maravall:** Descomposición de series temporales: especificación, estimación e inferencia (con una aplicación a la oferta monetaria en España).

8703 **José Viñals y Lorenzo Domingo:** La peseta y el Sistema Monetario Europeo: un modelo del tipo de cambio peseta-marco.

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