SOME CONSIDERATIONS REGARDING THE CALCULATION OF CYCLICALLY ADJUSTED PUBLIC BALANCES

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1. Introduction

Compliance with the fiscal convergence criteria in the transition to Economic and Monetary Union (EMU) and, from 1st January 1999, with the Stability and Growth Pact has required, and will continue to require, strict monitoring of member countries' public finances. In this connection, the economic indicators which seek to separate the budget balance into its structural and cyclical components are of particular relevance as a useful instrument for gauging the fiscal policy stance and the fiscal authorities' room for manoeuvre, and for analysing the scale of the consolidation drive required to comply with the Pact.

Indeed, if the intention is to analyse the expansionary or contractionary stance of fiscal policy, the budget deficit/GDP ratio is not a good indicator. Among other factors, this is due to the endogeneity of the deficit in relation to the economy's cyclical position. That is to say, at times of economic expansion/recession, public revenue tends to grow/diminish and public spending fall/increase merely as a result of the workings of the built-in stabilisers, affecting the budget balance without the government necessarily having taken any discretionary action.

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We therefore need an indicator allowing us to determine to what extent changes in the budget deficit are due to fluctuations in economic activity or to the discretionary action[1] of the government. Currently, various indicators quantify this discretionary change, subtracting from the change in the budget balance the portion thereof which is estimated to be due to cyclical factors. The basis of all these indicators is the choice of a theoretical framework of reference given by potential or trend GDP. They estimate the cyclical component of the budgetary balance through the application of the output gap elasticities of public revenue and spending[2].

Despite the usefulness of these indicators, the theoretical and empirical limitations associated with their definition and calculation should not be forgotten. This document highlights some of these problems or limitations, many of which are evident but no less significant for being so. The document is divided into two sections. The first sets out the problems associated with the calculation of the output gap, while the second focuses on matters pertaining to the calculation of the elasticities of public revenue and spending.

2. Problems associated with output gap estimates

A variety of methods can be used to calculate output gaps. This document focuses on two techniques, as applied by the OECD and EC. The first technique involves estimating potential output[3], based on a production function relationship. The second approach is a statistical

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1 Acting on the budget balance are various factors, in addition to the cyclical position of the economy, which are not the outcome of the government's discretionary action. These include demographic variables, inflation or changes in interest rates. However, most of the indicators available only isolate the changes in the budget balance attributable to the business cycle, which should be borne in mind when interpreting such indicators.

2 For an application of these indicators to the Spanish case, see Gómez (1993).

3 The European Commission defines the potential output as "the level of real GDP attainable with full employment of all production factors and sustainable over the medium term at a stable rate of inflation".

technique, the Hodrick-Prescott filter, based on the calculation of a weighted moving average of GDP over time to obtain trend output estimates. Calculation of the output gap, whether through the potential or trend output concept, poses considerable problems.

2.1 *Estimates of potential output*

The OECD (Giorno et al. 1995) calculates the economy's potential output as the sum of public- and private-sector output. The actual value added of the public sector is taken as the best approximation of this sector's potential output, without any other type of adjustment being made. To calculate the potential output of the private sector, however, a Cobb-Douglas production function is generally estimated with two productive factors (labour and capital), under the assumption of constant returns to scale. This is represented as follows:

$$LnY = LnA + \alpha \operatorname{Ln} N + (1 - \alpha) \operatorname{Ln} K + LnE \qquad (1)$$

$$y = a + \alpha\, n + (1 - \alpha)\, K + e \qquad (2)$$

where Y is value added, N the labour factor, K the capital factor, E total factor productivity and α the intensity of the labour factor. The values in lower case denote logarithms.

Given a value of α, the total factor productivity series, E, is calculated on the basis of the residual estimated in the previous equation. Applying the Hodrick-Prescott filter to the series gives a measure of trend total factor productivity (e^*). Subsequently, substituting into the previous production function, along with the stock of capital (k) and potential employment (n^*), gives a measure of the logarithm of the private sector's potential output (y^p):

$$y^p = a + \alpha\, n^* + (1 - \alpha)\, k + e^* \qquad (3)$$

where n^* (potential employment) is defined as the level of labour that might be used without generating more inflation, and its calculation

depends on the trend of the labour force and on the structural unemployment rate or NAWRU (non-accelerating wage rate of unemployment). To estimate the NAWRU, historical data on wages and unemployment are taken.

The main advantage of this methodology is the presence of a sound theoretical apparatus. However, its principal limitation is as follows: to make estimates of potential output, a set of assumptions (e.g. the exact form of the production function to be estimated) and auxiliary estimates (e.g. an estimate of total factor productivity, an estimate of the NAWRU and an estimate of the stock of capital) are needed. Furthermore, since potential output estimates usually exceed observed GDP values, deviations of actual output from potential ouptut tend to be negative and asymmetrical. That means much caution must be taken when interpreting the results obtained.

2.2 *Estimates of trend output*

The European Commission (1995) calculates trend output applying the Hodrick-Prescott filter to the real GDP series. This method is based on the minimisation of the square of the deviations in the actual output around the trend output subject to a restriction on the change in the trend growth rate:

$$Min \sum_{t=1}^{T} (y_t - y_t^*)^2$$

$$\textit{subject to} \qquad \sum_{t=2}^{t-1} \left[(y_{t+1}^* - y_t^*) - (y_t^* - y_{t-1}^*) \right]^2 \leq k \tag{4}$$

which can be rewritten:

$$Min \sum_{t=1}^{T} (y_t - y_t^*)^2 + \lambda \sum_{t=2}^{T-1} ((y_{t+1}^* - y_t^*) - (y_t^* - y_{t-1}^*))^2 \tag{5}$$

where y is the logarithm of actual real GDP, y^* is the logarithm of real trend GDP, k is a small number, chosen arbitrarily and λ is the Lagrange multiplier.

The estimate of the output gap is obtained taking the quotient of the difference between GDP and trend output, and this latter variable.

Estimates of trend output, based on the application of the HP filter, are not problem-free. To begin with, an underlying economic theory is lacking and there are problems with the definition of the lambda, the question of the end-point or the emergence of structural breaks. There may be an "easy" solution to some of these problems, particularly regarding:

- The arbitrariness of the determination of lambda. The value assigned to lambda determines the length of the weighted moving average and the smoothness of the trend estimates: the higher the value of λ, the higher the number of years included in the moving average and the higher the smoothness of the trend estimates. Although there appears to be broad consensus in the empirical literature on cyclical analysis about the use of the 1600 value lambda with quarterly data, the situation is different with annual data. In fact, the traditional value of 1600 responds essentially to two types of reasoning. First, this was the value used by Hodrick and Prescott in their seminal study, which has promoted its dissemination. Further, from a frequency perspective, this parameter is approximately equivalent to focusing attention on cycles whose length does not exceed eight years. In this latter respect, the use of a lambda parameter equal to 1600 with quarterly data is equivalent to the use of a value of 10 with annual data (Baxter and King, 1995). Nonetheless, the frequency interpretation of the Hodrick-Prescott filter is not excessively disseminated, whereby it is not unusual to come across studies in which lambda values equal to 100 are used with annual data.
- The relevance of the end-point problem**.** Since the HP filter is a moving-average-based method, it becomes asymmetrical at the extremes of the series, due to the lack of observations, increasing the weights over the years for which observations are available. Thus, the estimates obtained for the end of the series may be biased. Applying the HP filter to series including forecasts is one possible solution to

this problem. At the same time, the introduction of forecasts enables the confidence intervals to be reduced.

- The appearance of structural breaks. Underestimation of the break at the time it occurs and the forward and backward distribution of its effects may be avoided as follows.

First, by estimating the impact of the structural change and obtaining the adjusted series.

Second, by applying the HP filter to the adjusted series, obtaining the cyclical component.

Third, depending on the nature of the structural change, by adding its estimated impact either to the previous cyclical component or to its trend.

2.3 *Empirical consequences*

The theoretical and empirical limitations of output gap estimates become clearer when, in addition to the methodological problems indicated, different output gap estimates are produced by the different methodological approximations.

This can be seen in Table 1 and Charts 1,2 and 3. Table 1 shows the means and ranges of the output gap estimates made by the IMF[4], the OECD and the European Commission for the EU countries for 1996,1997,1998 and 1999. The same figures are represented graphically in Charts 1,2 and 3. Analysis of these data gives the following conclusion:

- The differences, measured by the range, between the various estimates may be very high.
- The change in the output gap in the various estimates coincides in most cases. However, they do not coincide in the identification of the change of sign of the output gap.

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[4] The IMF method (Jaeger, 1993) is based on the estimation of potential output, following a production-function approach.

- The IMF and OECD estimates of the output gap are, in general, higher than those of the European Commission.

Chart 4 gives four different estimates of the output gap for Spain using four different methodologies[5]. Table 2 gives the means and ranges of the above estimates. It can be seen from these data that the application of other methodologies introduces greater differences into the estimates.

Chart 5 includes an analysis of the sensitivity of the calculation of the cyclically adjusted deficit to the above output gap estimates, using a Banco de España estimate of the elasticities of revenue and expenditure to the cycle. Table 3 gives the means and ranges of the above estimates.

It may be inferred from the above tables and charts that the sensitivity of the calculation of the cyclically adjusted deficit to the different estimates of the output gap is very high, affecting not only the level of the estimate of the structural deficit but also its growth rates.

3. Problems associated with elasticities estimates

Calculating cyclically adjusted deficits once the output gap measure has been estimated involves, in the case of the OECD methodology, for example, the following procedure. The public revenue and spending components attributable to the economy's cyclical position (as approximated by the difference between actual and potential output) are separated from those non-cyclical components, known as structural or cyclically-adjusted components, which are defined as the levels of public revenue and spending that would be obtained if output were at its

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[5] HP filter, output gap on the basis of a production function, output gap based on the NIGEM multi-country econometric model drawing on a definition of potential output as a time-deterministic trend implying exogenous growth in potential output of 3.6% per annum for Spain (National Institute of Economic and Social Research, 1998), and output gap on the basis of the methodology of Alvarez and Sebastián (1998) consisting of an estimate based on a SVAR model incorporating inflation and growth (long-term identification is on the basis of the long-term effect of the various shocks on output and the estimation of the output gap is obtained from the contribution of the shocks without a long-term effect on output).

potential level. The structural components of revenue (T^*) and expenditure (G^*) are obtained from observed taxes (T) and primary current expenditure (G), as follows:

$$T_{ti}^* = T_{ti}\left(\frac{Y_t^*}{Y_t}\right)^{a_i} \qquad a_i \succ 0 \tag{6}$$

$$G_t^* = G_t\left(\frac{Y_t^*}{Y_t}\right)^{b} \qquad b \prec 0$$

where Y^* is the level of potential output at current prices, Y is the level of actual output at current prices, and a_i and b are the elasticities of the different types of revenue and primary current expenditure, respectively, in relation to the growth of nominal output.

The OECD considers four tax categories: personal income taxes, corporate income taxes, social security contributions and indirect taxes. The output elasticity of each of these tax categories is calculated as follows:

The elasticities of income tax and social security contributions are obtained from the ratio between the values of the average and marginal rates of these taxes. However, this ratio gives the elasticities in relation to gross wages. To obtain the elasticity in relation to GDP, the foregoing elasticity is adjusted in terms of the response that employment and wages show in relation to fluctuations in real output.

The elasticity of corporate income tax is calculated on the basis of a simple regression of the revenue for this tax over output at current prices.

The elasticity of indirect tax is considered to be one.

On the expenditure side, the elasticity of unemployment benefits expenditure in relation to GDP is calculated and this elasticity is applied to all primary current expenditure. The calculation of the elasticity of unemployment benefits spending in relation to GDP is obtained by multiplying the elasticity of the unemployment rate in relation to output

(the inverse of the Okun coefficient) by the elasticity of unemployment benefits expenditure in relation to unemployment.

Once the cyclically adjusted tax and expenditure have been calculated, the items which have not been adjusted, such as interest payments and capital revenue and expenditure, are added to obtain the total for the cyclically adjusted expenditure, revenue and net balance.

In the case of the European Commission's methodology, the procedure also involves calculating the cyclical components of public revenue and spending, based on the estimate of their elasticities.

The cyclical component of public revenue (r) is obtained by multiplying the elasticity of revenue in relation to GDP (E_R) by the average revenue/GDP ratio, $((R/Y)_t)$, and by the output gap (GAP_t):

$$r = \left(R/Y\right)_t \cdot E_R \cdot GAP_t \qquad (7)$$

The revenue elasticity applied by the European Commission is calculated as an average of the respective elasticities of each of the revenue groups, weighted by the relative proportion of each of these categories to total revenue. The Commission takes as given the elasticities calculated by the OECD for each of the four revenue categories considered: corporate income tax, personal income tax, social security contributions and indirect tax. No type of cyclical adjustment is made to the item of other current revenue or to that of capital revenue.

As to the cyclical component of public spending, the EU only considers unemployment benefits spending to exhibit cyclical behaviour. Calculation of the elasticity of this type of spending in relation to the business cycle is based on estimates of the marginal cost of spending on unemployment benefits in relation to the unemployment rate (c), and on estimates of the elasticity of the unemployment rate in relation to GDP (h). If we multiply these two parameters by the output gap measure we obtain the cyclical component of public spending (d_t).

$$d_t = (c \cdot h) \cdot GAP_t \qquad (8)$$

Lastly, to calculate the cyclically adjusted budgetary balance, the aforementioned cyclical components are eliminated from the actual budget balance.

From the foregoing description of the procedure for calculating the cyclically adjusted budgetary balance, it can be deduced that the second methodological problem arises in the public revenue and spending elasticities estimation process. Some of these problems are indicated below, with particular reference to the case of Spain[6].

Definition of the estimation period. First, the elasticities calculated for Spain, based on excessively long reference periods, could lead to significant errors, since the Spanish public sector has undergone far-reaching changes since the late seventies. During these years, fiscal policy in Spain changed from a system in which the general government budgets were formally balanced, or even showed a small surplus, to another -as from 1976- with public deficits, linked to the expansion of spending as a consequence of moving towards European welfare state models. Also, the tax system was thoroughly overhauled, with the introduction of personal income tax in 1978 and VAT in 1986. Further, the progressive move as from 1983 from monetisation to a more orthodox financing of the deficit, which coincides in time with high budget imbalances, resulted in the emergence of a significant public debt balance and a subsequent increase in the interest burden. Lastly, the so-called "State of Regional (Autonomous) Governments" has been established further to the 1978 Constitution, hand in hand with the decentralisation of spending, the result of ongoing negotiations regarding regional government financing arrangements. All this makes it extraordinarily difficult to search for a stable relationship between fiscal variables and economic growth.

Tables 4 and 5 show the share in total revenue and expenditure of the various public revenue and expenditure items in Spain since 1964. By way of example, personal income tax as a proportion of total public revenue was 5.2% in 1964, 9.3% in 1977, 15.6% in 1980, 19.2% in 1990 and, finally, 18.6% in 1997. And social security contributions as a

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[6] A more detailed analysis of some of the following issues can be found in Argimón and Gómez (1997).

proportion of total government revenue were 30% in 1964, 43% in 1980 and 33.4% in 1997. As regards expenditure, interest payments, for example, which accounted for 2.2% of total expenditure in 1980, amounted to over 10% in 1997.

Following the same arguments, it would seem necessary to re-estimate the elasticities whenever there is a significant change in the law, especially when it is intended to analyse future cyclically adjusted deficits.

Second, the possibility of there being lags in the effects that the economic situation has on the observed deficit should be envisaged, owing to the workings and organisation of the public sector. The lags in question are not in any event due to the long-term effects deriving from the response of agents (such as those which occur on saving) but, for example, to the regulation of the timing of receipts and the inertia which characterises spending.

In the case of Spain, the timetable for collecting taxes, in which the final settlement usually occurs with a lag of one year, suggests it is necessary to consider these lags when attempting to measure the discretionary action of the authorities. This is the case, inter alia, for personal income tax (under National Accounts, refunds are allocated to the year in which the State makes them[7]), for corporate income tax[8] (which falls due as of 31st December, pre-payments being determined in relation to the tax borne the previous year or in relation to turnover for the current year, final settlement occurring in year t+1) and for VAT (where the presence of lags is quarterly, this being the periodicity with which small firms make their payments). On the expenditure side, welfare spending directly related to the cycle may also exhibit some inertia lasting more than one year. It should be borne in mind that, for example, relative changes in the volume of spending on unemployment

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[7] Specifically, personal income tax prepayments arise during year t, which are settled in June in the year t+1, while a portion of the refunds is not made until t+2.

[8] Corrections for lags in the collection of corporate income taxes were introduced for some countries by the OECD. However, these lags were not identified in the case of Spain.

benefits depends on the level of unemployment, and the flow which feeds it displays strong inertia. Accordingly, a certain delay is to be expected in the impact of the cycle.

It therefore seems reasonable that if it is sought to separate the cyclical component from the discretionary one, then the possibility of lags arising from the very organisational structure of the public sector should be taken into account.

Thirdly, although on the side of government receipts the elasticities are usually calculated with respect to the cycles of all these items, on the expenditure side only unemployment benefits spending is usually considered cyclical. In the Spanish case, however, other items might also be considered thus: pensions, for instance, which in principle should depend exclusively on the working population pyramid but which, having been used as an adjustment instrument under labour policy, via the use of early retirement and disability pensions granted, in order to tackle situations of crisis in certain companies and as an alternative to unemployment benefit, might depend to some extent on the cycle. The cyclicality of this type of item should thus be analysed. It should not be forgotten that it is precisely the high degree of aggregation in the construction of these indicators which is masking many revenue and expenditure decisions that are operating in the reverse direction.

Finally, the composition of GDP growth may differ considerably from year to year and, foreseeably, this different composition may have a specific bearing on the revenue obtained: an increase in GDP originating essentially from consumption demand will have a different impact on VAT receipts than if the same increase were due to a rise in investment[9].

It also seems likely that the effect of economic growth on public finances may differ in magnitude according to whether it is merely nominal or real. The dependence which may exist directly between inflation and the different components of revenue and expenditure (either through agreements or through regulations, which define the determining elements of revenue and expenditure) means these factors must be taken into consideration. Thus, for example, in the case of personal income tax,

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[9] Changes in the composition of output during the cycle could also lead to an instability of GDP budget elasticities within the business cycle.

the fact that this tax is progressive and is defined in nominal terms is the key element for explaining the positive dependence between inflation and the growth of takings in real terms[10].

4. Conclusions

It should be concluded from all these comments that great care must be taken when interpreting cyclically adjusted public balances. Indeed, it would probably be necessary to present them with confidence intervals. In particular, the interpretation of cyclically adjusted deficits as an indicator of fiscal policy discretionary action is not completely correct since it also reflects factors not directly related to these actions. This is the case of demographic changes, changes in interest rates and the effect of inflation on receipts in the case of non-indexed progressive tax systems.

It should also be clarified that these indicators are not a measure of the sustainability of fiscal policy, since this derives from the dynamics of the government's budgetary constraint, in particular from the path followed by the primary budget balance, the difference between the economy's real growth and real interest rates, and the cumulative stock of debt.

Lastly, these indicators should not be interpreted either as a measure of the effect of fiscal policy on the economy. This is because they do not capture effects that are very relevant such as, for example, those arising on the supply side of the economy, on income distribution or on interest rates.

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[10] The government´s decision to adjust tax rates and deductions for inflation evidently alters this relationship.

Table 1

Means and Ranges of the Output Gap* Estimates of the OECD, the EC and the IMF

COUNTRY	1996		1997		1998		1999	
	Mean	*Range*	*Mean*	*Range*	*Mean*	*Range*	*Mean*	*Range*
Belgium	-2.2	1.3	-1.7	1.2	-1	0.9	-0.3	0.7
Germany	-2	2.4	-2	2.3	-1.8	2.2	-1.3	2.2
Spain	-2.3	0.3	-1.7	0.4	-1.1	0.3	-0.6	0.6
France	-2.4	1.8	-2.2	2	-1.5	2.2	-0.9	2.2
Ireland	-0.2	0.5	1.4	2.5	1.7	3.3	2.6	0.5
Italy	-2.1	1.6	-2.3	1.6	-1.7	1.8	-0.9	2.2
Luxembourg	4.7	9.2	3.8	8	3.1	6.3	0.4	
Netherlands	-0.8	1.7	-0.4	1.3	0.3	0.7	0.5	0.3
Austria	-1.5	0.9	-1.6	1.5	-1.2	1.5	-0.3	0.1
Portugal	-2	0.3	-1.3	0.3	-0.5	0.6	0.2	0.1
Finland	-3.9	3.3	-1.3	4.1	0	4.1	1.2	1.5
Denmark	-0.8	1.2	-0.2	0.6	0.2	0.3	0.4	0.2
Greece	-2.4	1	-1.2	1	-0.3	1.8	0.1	1.2
Sweden	-1.1	0.9	-1.2	0.5	-0.5	0.5	0.1	1
U.K.	-0.7	0.6	0.1	1.3	0.1	0.2	-0.2	0.4

Note: * Output Gap = (Real GDP – Potential or trend real GDP) / Potential or trend real GDP.
IMF estimate. May 1998 for Germany, France, Italy and U.K.; October 1997 for the rest of the countries.
OECD estimate, June 1998.
EC estimate , March 1998.

Table 2

Means and Ranges of the Spanish output gap estimates obtained by using the above methods

1987		1988		1989		1990		1991		1992		1993		1994		1995		1996		1997		1998		1999	
M	R	M	R	M	R	M	R	M	R	M	R	M	R	M	R	M	R	M	R	M	R	M	R	M	R
0.2	2.6	1.5	2.5	2.7	2.1	2.5	2.2	0.9	4.7	1.5	7.6	4.8	9	3.3	3.3	1.9	2.6	2.2	2.2	0.9	2.5	0.3	3.4	0.4	3.3

Note: M=mean; R= range. Shaded figures are negative.

Table 3

Means and Ranges of the Spanish cyclically adjusted balances estimates obtained by using the above methods

1987		1988		1989		1990		1991		1992		1993		1994		1995		1996		1997		1998		1999	
M	R	M	R	M	R	M	R	M	R	M	R	M	R	M	R	M	R	M	R	M	R	M	R	M	R
3	1.3	3.9	1	4	1	5.3	1.4	5.4	2.3	3	3	4.7	3.6	4.8	1.6	6.4	1.7	3.7	1.2	2.1	1.4	2.1	1.7	1.7	1.6

Note: M=mean; R= range. Shaded figures are negative.

Table 4

Structure of Public Revenue as a Percentage of Total Public Revenue

Year	Personal Income Taxes	Corporate Income Tax	Taxes on production and imports	Social Security Contributions	Other revenue
1964	5.2	5.2	38.1	30.0	21.5
1965	4.8	5,9	38.8	29.5	21.1
1966	5,4	6.2	39.4	29.4	19.6
1967	5.0	5.6	35.8	34.7	18.9
1968	4.7	5.4	34,1	35,1	20.6
1969	4.8	4.8	5.9	35.2	18.9
1970	5.0	5.7	34.5	34.3	20.5
1971	5.7	5.8	32.7	37.2	18.6
1972	5.8	5.7	32.6	38.1	17.8
1973	6.6	5.7	32.9	37.5	17.3
1974	7.1	5.8	29.6	39.1	18.4
1975	7.7	5.9	25.9	41.3	19.2
1976	8.6	5.6	25.7	42.6	17.4
1977	9.3	5.1	24.7	43.7	17.1
1978	11.8	4.6	22.3	45.3	16.1
1979	13.0	4.6	21.6	45.0	15.7
1980	15.6	4.0	21.8	43.0	15.6
1981	14.1	3.8	22.9	41.9	15.7
1982	14.1	4.0	24.2	41.6	16.1
1983	15.8	4.2	25.0	40.1	14.9
1984	16.1	4.2	26.5	38.3	13.7
1985	16.1	4.4	26.3	36.6	16.5
1986	14.8	4.8	28.9	35.5	15.9
1987	18.4	6.1	27.4	34.0	14.1
1988	18.9	5.8	27.2	33.4	14.7
1989	20.0	7.7	26.0	32.8	13.5
1990	19.2	7.9	24.9	33.5	14.5
1991	20.1	6.7	24.1	33.4	15.8
1992	20.8	5.7	24.2	34.2	15.1
1993	20.0	5.0	22.4	34.9	17.8
1994	20.1	4.3	24.3	34.9	16.4
1995	20.2	4.9	24.7	33.6	16.6
1996	19.8	5.1	24.5	33.7	16.9
1997	18.6	6.6	24.9	33.4	16.5

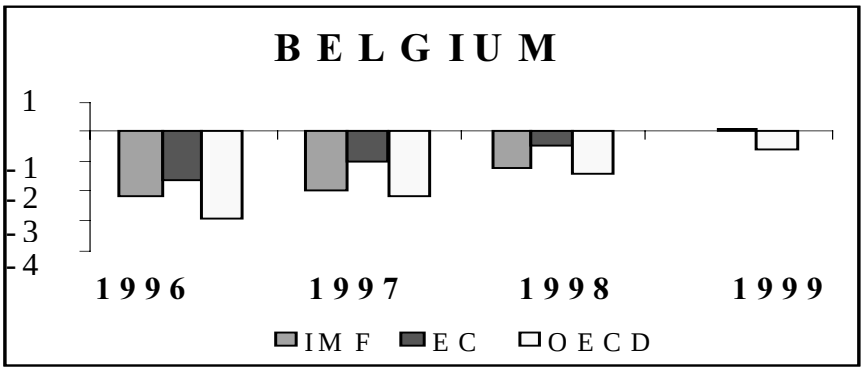
Table 5

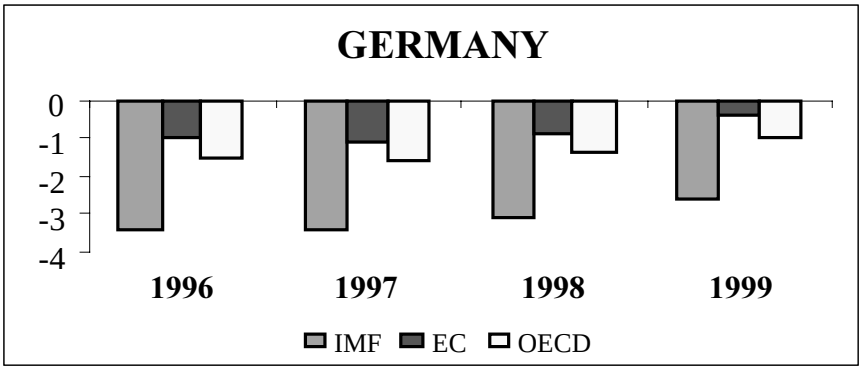
Structure of Public Spending as a Percentage of Total Public Spending

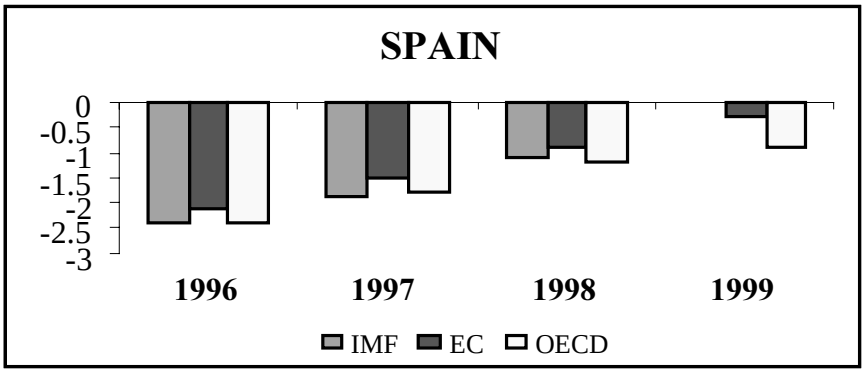
Year	Welfare benefits	Operating subsidies	Interest payments	Government Consumption	Public Investment	Other expenditure
1964	24.1	4.3	3.1	42.6	13.6	12.3
1965	24.7	4.5	3.3	42.0	13.1	12.4
1966	25.0	3.7	2.7	43.7	14.2	10.6
1967	25.7	4.0	2.5	44.2	13.4	10.2
1968	28.4	4.0	2.8	42.6	11.4	10.8
1969	29.3	3.3	2.8	42.2	11.7	10.8
1970	29.7	3.9	2.7	42.5	12.1	9.1
1971	31.6	4.4	2.3	40.5	13.4	7.9
1972	32.6	4.3	2.3	40.5	11.7	8.5
1973	33.5	4.0	2.6	40.9	11.0	8.0
1974	32.9	4.0	2.1	42.2	10.8	8.1
1975	33.3	4.5	1.9	41.4	10.8	8.1
1976	33.5	4.9	1.7	42.8	8.9	8.1
1977	33.1	5.1	1.8	41.3	9.7	9.1
1978	36.2	6.4	1.9	40.2	7.2	8.2
1979	38.1	5.5	2.0	40.2	5.7	8.5
1980	37.4	6.2	2.2	39.5	5.6	9.1
1981	38.0	5.4	2.2	38.5	6.3	9.5
1982	35.7	6.6	2.6	37.3	8.1	9.8
1983	35.8	6.6	3.3	37.4	7.2	9.8
1984	35.4	7.0	5.1	36.3	7.6	8.7
1985	34.4	5.8	4.8	35.3	8.9	10.8
1986	32.7	4.6	9.1	34.4	8.6	10.6
1987	33.0	4.3	10.4	36.0	8.2	8.1
1988	33.4	5.0	8.3	35.5	9.2	8.6
1989	32.0	4.5	9.3	34.9	10.2	9.1
1990	32.6	4.3	9.1	35.2	11.4	7.4
1991	33.6	4.0	8.5	35.6	10.9	7.4
1992	34.4	3.7	9.5	36.5	8.9	7.0
1993	33.9	4.2	10.5	35.2	8.6	7.6
1994	34.2	4.1	10.1	35.1	8.5	7.9
1995	32.8	4.0	11.6	34.8	8.0	8.8
1996	34.0	3.8	11.0	36.0	6.9	8.3
1997	34.4	3.8	10.1	36.2	7.1	8.4

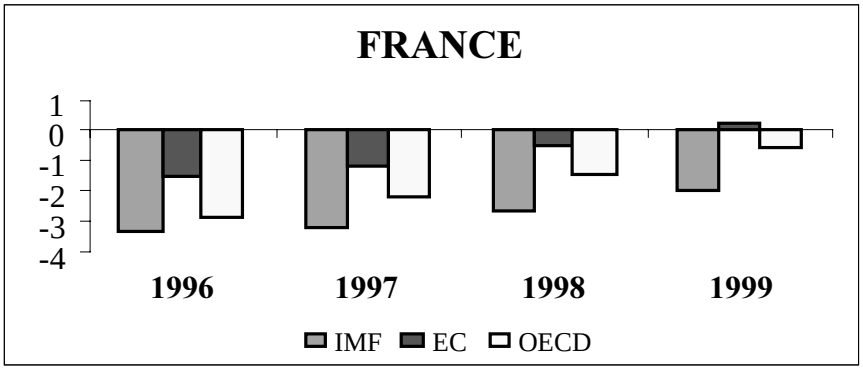
Chart 1

Output Gap Estimates Of The OECD, the EC and the IMF*






SPAIN
0
-0.5
-1
-1.5
-2
-2.5
-3
1996
1997
1998
1999
IMF
EC
OECD


FRANCE
1
0
-1
-2
-3
-4
1996
1997
1998
1999
IMF
EC
OECD

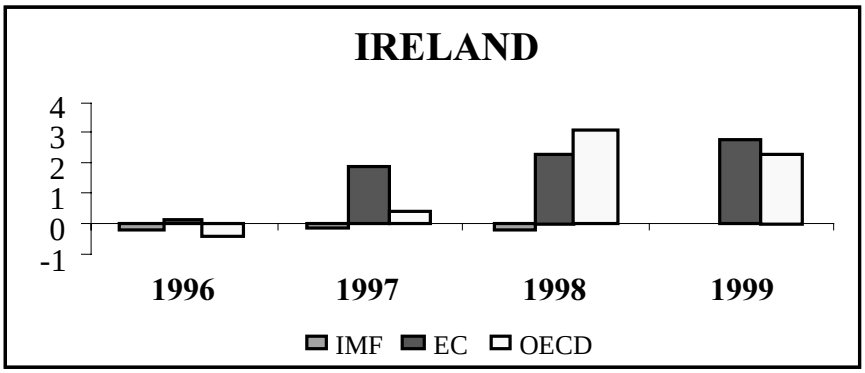
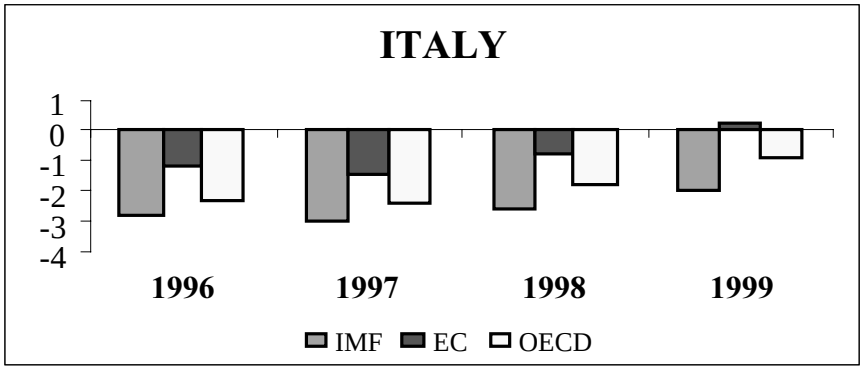
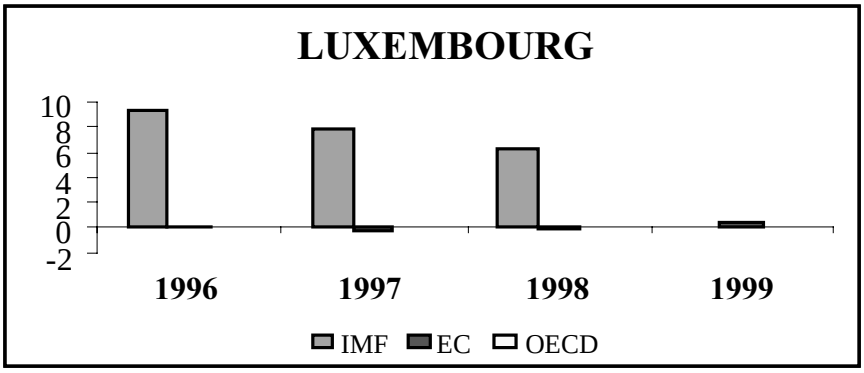
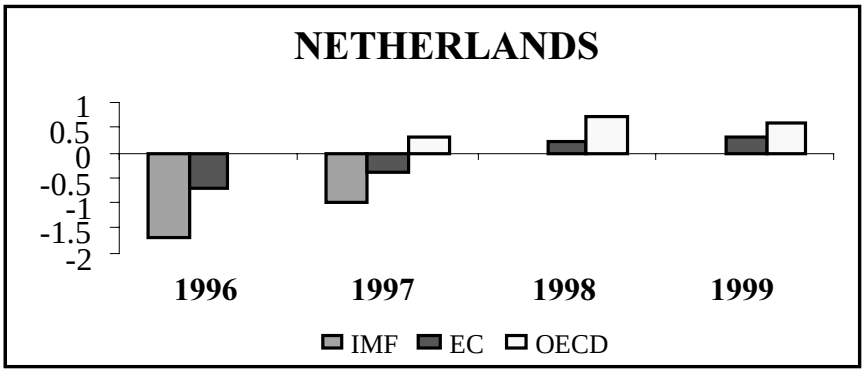

IRELAND
4
3
2
1
0
-1
1996
1997
1998
1999
IMF
EC
OECD

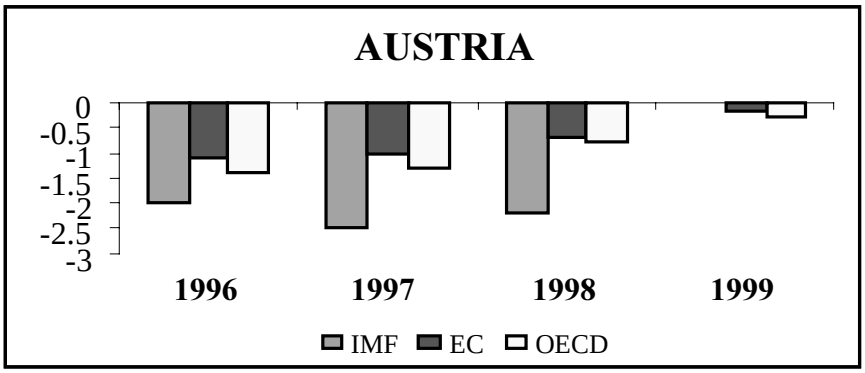
Chart 2

Output Gap Estimates Of The OECD, the EC and the IMF*






NETHERLANDS
1
0.5
0
-0.5
-1
-1.5
-2
1996
1997
1998
1999
IMF
EC
OECD


AUSTRIA
0
-0.5
-1
-1.5
-2
-2.5
-3
1996
1997
1998
1999
IMF
EC
OECD

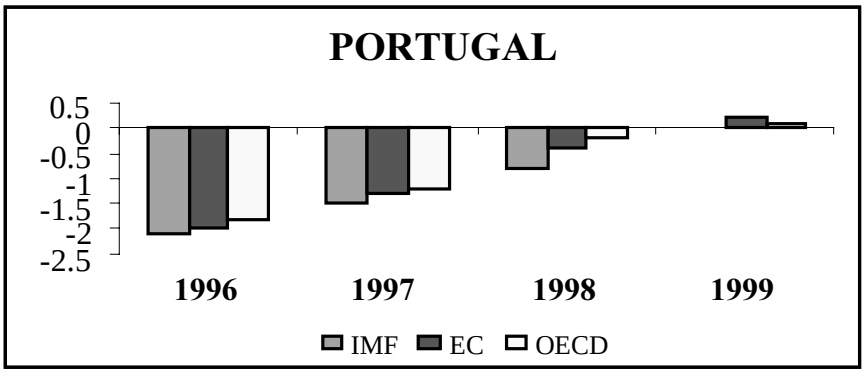
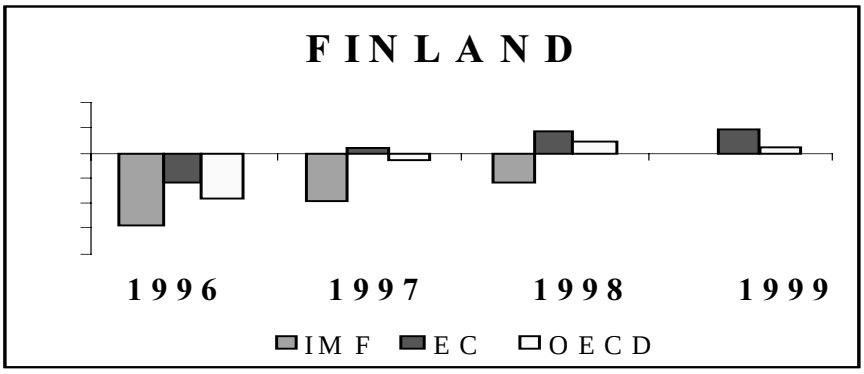
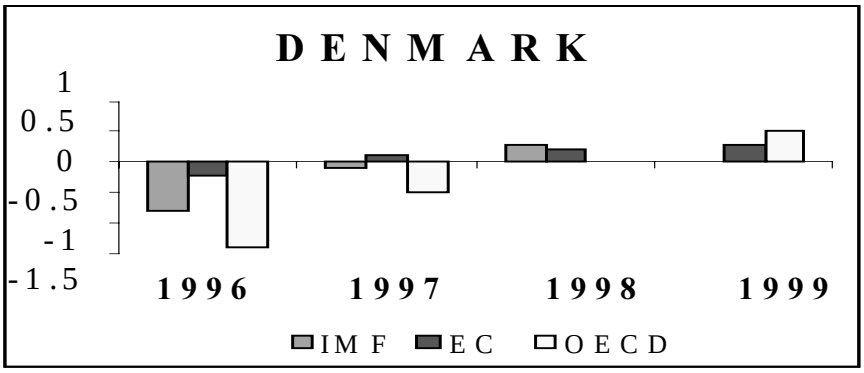
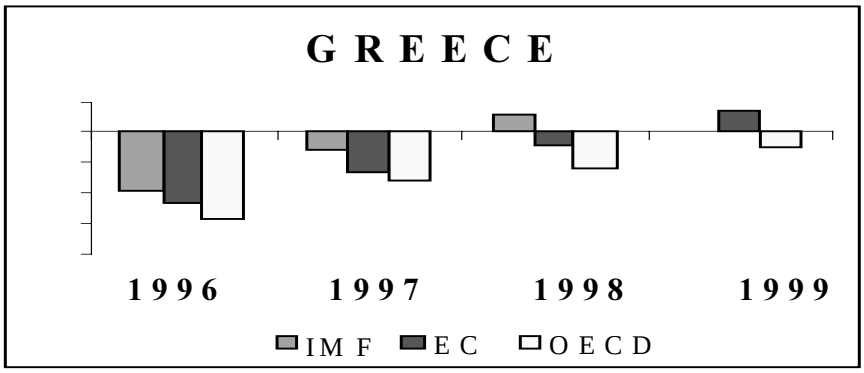

PORTUGAL
0.5
0
-0.5
-1
-1.5
-2
-2.5
1996
1997
1998
1999
IMF
EC
OECD

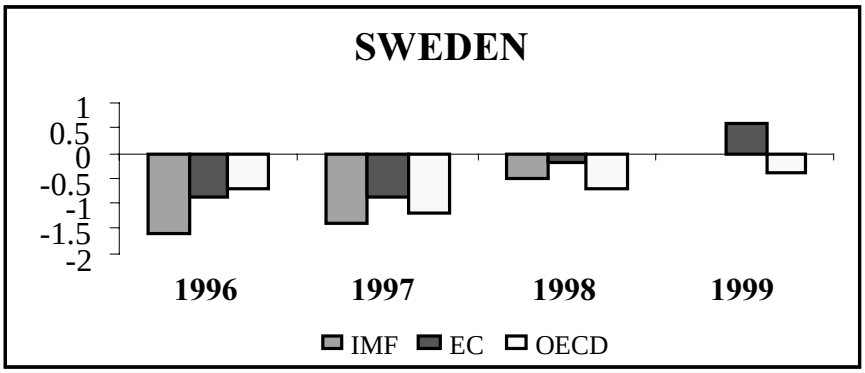
Chart 3

Output Gap Estimates Of The OECD, the EC and the IMF*






GREECE
1996
1997
1998
1999
IMF
EC
OECD


SWEDEN
1
0.5
0
-0.5
-1
-1.5
-2
1996
1997
1998
1999
IMF
EC
OECD

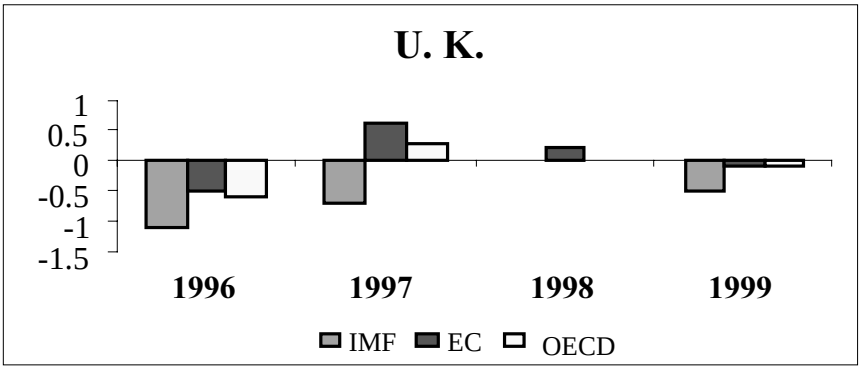
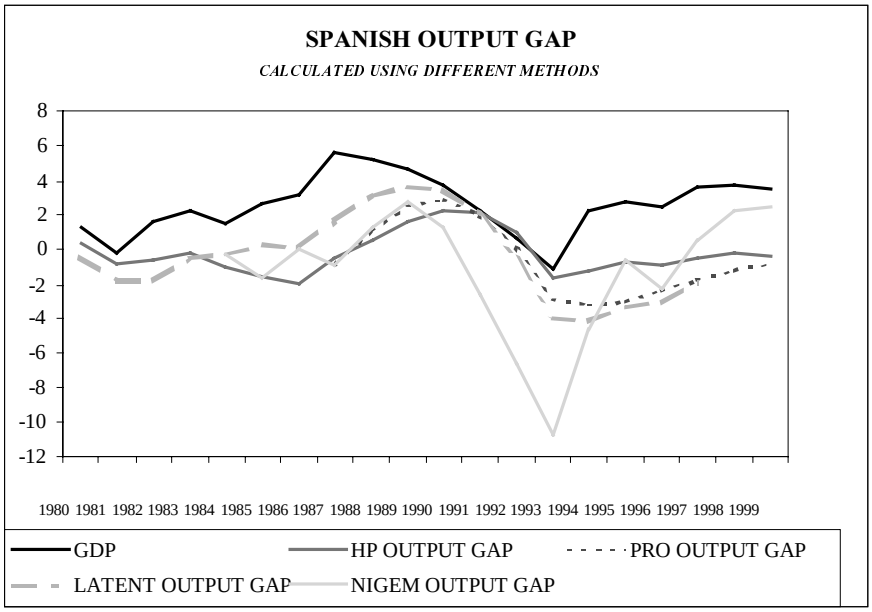

U. K.
1
0.5
0
-0.5
-1
-1.5
1996
1997
1998
1999
IMF
EC
OECD

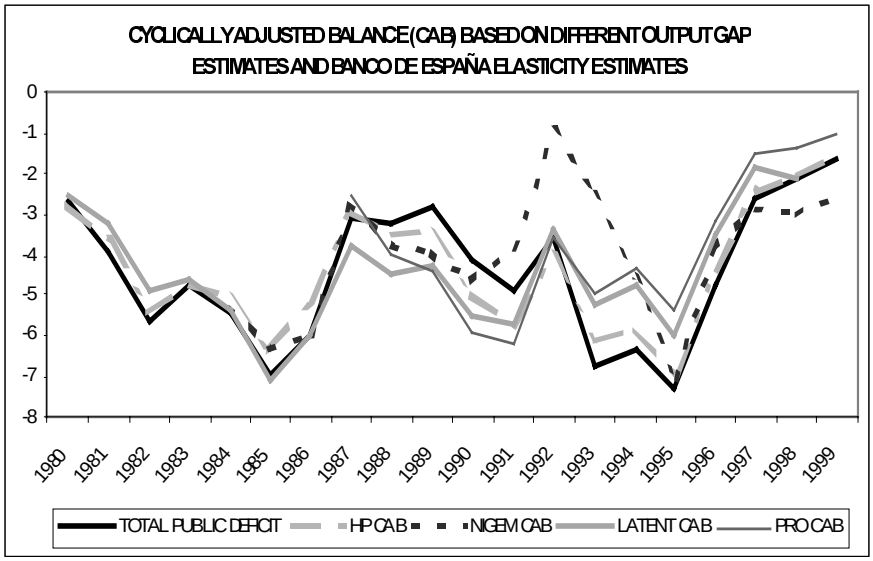
Chart 4



Note:

- Pro Output Gap is calculated on the basis of a production function.
- Nigem Output Gap is based on the NIGEM multi-country econometric model drawing on a definition of potential output as a time-deterministic trend implying exogenous growth of 3.6% per year for Spain. In this case, the observed output is not the GDP but the industrial production index.
- HP Output Gap is the output Gap computed with the Hodrick Prescott method (λ=10; GDP series includes forecast).
- Latent output gap is based on the methodology of Alvarez and Sebastián (1998) consisting of an estimate based on a SVAR model.

Chart 5



Note:
All figures as percentages of GDP.
- Pro CAB is calculated on the basis of the pro output gap (see graph 4).
- Nigem CAB Gap on the basis of the NIGEM output gap (see graph 4).
- HP CAB is calculated on the basis of the HP output gap (see graph 4)
- Latent CAB is calculated on the basis of the LATENT output gap (see graph 4).

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