

THE STRUCTURAL BUDGET BALANCE: THE IMF'S METHODOLOGY

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1. Introduction

It is well known that the government's actual budget balance reflects the influence of both temporary and permanent factors. The former typically include transitory effects on outlays and revenues of cyclical deviations of output from its underlying trend. For instance, transfer payments--notably unemployment insurance benefits--increase (decrease) during recessions (recoveries), while tax receipts fall (rise). Temporary influences on the budget can also include one-off events such as lumpy outlays (e.g. disaster-related outlays), or transitory changes in selected government earnings (e.g. temporary surges or declines in natural resource receipts). By contrast, permanent elements refer to the enduring components of expenditures and revenues, that is, flows on both sides of the ledger that can generally be expected to be observed under normal circumstances, by which is usually meant an absence of external shocks and when the economy is operating at a maximum level consistent of capacity utilization with low and stable inflation.

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In assessing or formulating fiscal policy, failure to distinguish between temporary and permanent influences on the budget poses the risk that fiscal levers may be over- or under-adjusted in response to budgetary developments that might be reversed automatically over the course of the business cycle. Discretionary policies aimed at offsetting short-term effects can at times be self-defeating. On the one hand, the eventual reversal of offsetting policies could create uncertainty for economic agents and have a destabilizing impact on financial markets. On the other hand, budget deficits, if unchecked, could lead to an unsustainable accumulation of debt over the medium term.

It is therefore considered important to disentangle temporary from permanent influences on the budget balance in order to gauge the medium-term orientation of fiscal policy. To this effect, several techniques have been developed over the years. These follow one of two broad approaches. One approach, which can be characterized as “bottom up”, seeks to account separately for the budgetary effects of individual policy initiatives on the one hand, and each cyclical influence on the other, and, thereby, explain the different causes of the change in the budget balance. An alternative approach, which can be referred to as “top down”, consists of estimating the so-called structural budget balance (SBB) as the residual balance after purging the actual balance of the estimated budgetary consequences of the business cycle¹. For some time, the IMF has estimated the structural budget balances of most advanced economies using the second approach, and these have been routinely published in the semi-annual *World Economic Outlook*². The purpose of this note is to describe the methodology underpinning the SBB, to present recent estimates for members of the European Union (EU), and

¹ The structural budget balance is often characterized as reflecting discretionary—rather than non-discretionary—policies. Such a distinction is problematic, however, insofar as what constitutes a discretionary action is not always obvious. (IMF (1998a), Box 2.4).

² For a number of years, the IMF also produced a measure of the thrust of fiscal policy—the fiscal impulse measure—which was designed to provide an indication of the short run impact of fiscal policy on aggregate demand.

elaborate some of the constraints on interpretation of the SBB³. The paper also considers briefly the usefulness of the structural budget balance as a tool for enforcement-under the Stability and Growth Pact (SGP) - of the European Economic and Monetary Union (EMU) reference value on the deficit specified in the Maastricht Treaty.

2. Methodological considerations

The SBB is founded on the assumption that actual aggregate real output fluctuates over time around an underlying output path that reflects essentially the long-term potential growth rate of the economy. This underlying output path, however, is occasionally subjected to both permanent and temporary shocks of varying strength. Permanent shocks (e.g., a significant technological change) have a lasting impact on the path of output. By contrast, the output effects of temporary shocks, by definition, dissipate over time, with successive negative and positive temporary shocks resulting in “cyclical” movements of actual output around potential⁴. In this framework, the budgetary effects of a cyclical downturn (upturn), other things being equal, should be self-correcting during the subsequent upturn (downturn). If it is possible to quantify both the size of the deviation of actual output from potential and the cyclical sensitivity of public expenditures and revenues to such a deviation, it is technically feasible to estimate the portion of the budget balance that is attributable to relatively favorable or unfavorable economic conditions⁵. By subtracting the estimated cyclical component of the budget balance from the observed balance, one obtains an estimate of the SBB.

Estimation of the structural budget balance thus involves basically three steps: (i) estimation of underlying potential output and the associated output *gap*; (ii) quantification of the cyclical component of expenditures and revenues; and (iii) subtraction of cyclical expenditures

³ For an earlier and more elaborate derivation of the SBB see, Heller et al. (1986). Also see IMF (1993), and IMF (1995).

⁴ See Blanchard and Fischer (1989), Chapter 1.

⁵ If output follows a random walk, neither a deterministic trend nor business cycles can be identified.

and revenues from their observed levels, which then allows the calculation of the structural budget balance. Each of these steps is discussed in turn.

(i) *Potential output*

There are essentially two methods of deriving underlying potential output. The first approach relies on statistical methods to estimate trend output. Advantages of the statistical technique are its simplicity, coupled with the fact that it requires little judgmental intervention insofar as it is a mechanistic detrending of historical data. A prominent technique is the Hodrick-Prescott (HP) time-series filtering method, which permits the estimation of a trend line around which the deviations of actual from trend output are symmetric over the complete business cycle⁶. A difficulty of the HP filter, however, is the so-called end-point problem, which arises from the fact that the HP filter becomes asymmetric at the extremes of a time series. An alternative method of deriving potential output--the principal approach followed at the Fund--is the estimation of a production function⁷. Estimated parameters are combined with actual (or projected) values of the determinants of output to obtain underlying potential output. A principal advantage of the production function approach is that it provides a more transparent link of output to trends in factors of production and total factor productivity. At the same time, the data requirements are, per force, far greater than in the statistical approach.

At the Fund, responsibility for the estimation of potential output lies with country desk officers. Although no standardized methodology is imposed, the production function approach tends to predominate, notably in the case of industrialized countries. For a number of countries, the HP filtering technique is also used to de-trend selected variables. Generally, the methodology consists of modeling output as a function of the underlying factors of production, and entails the estimation of a

⁶ This method is used by the European Commission in the calculation of structural budget balances in the European Union. See European Commission (1995).

⁷ For a detailed review of the Fund's approach to the estimation of potential output, see De Masi (1997).

production function linking output to capital, labor, and total factor productivity. Potential output is then calculated as the level of output at which capacity utilization rates are at "normal" levels, the labor input is consistent with the natural rate of unemployment, and total factor productivity is at its trend level. In recent years, research has focused on quantifying the role of various structural variables and policy instruments in the determination of potential output. For instance, work has centered on measuring the extent to which movements in total factor productivity can be explained by its underlying determinants, such as public infrastructure investment, research and development, and international trade. In addition, in estimating the natural rate of unemployment, account has increasingly been taken of such variables as the generosity of unemployment insurance benefits, the scope of unionization, taxes on labor, minimum wages, and demographic factors. Table 1 provides a summary of the methods used at the Fund to estimate potential output for EU countries, while Table 2 presents the most recent estimates of the growth rate of potential output for the period 1984 - 97.

(ii) *Quantifying the cyclical components of expenditure and revenue*

As noted earlier, the structural budget balance is approximated in part via an estimation of the responsiveness of revenues and expenditures to deviations of actual output from potential. With respect to revenues, their cyclical component is obtained by adjusting observed revenue using elasticities for the major tax items and taking into account the gap between actual and potential output. As regards expenditures, total outlays are adjusted by an amount that reflects the expenditure impact of the divergence between the actual rate of unemployment and the non-accelerating inflation rate of unemployment (NAIRU). More formally, let the letters B, R, and E refer to the level of the budget balance, revenues and expenditures, respectively, and let the subscripts *c* and *s* indicate whether an item is *cyclical* or *structural*, respectively. The observed budget balance in year *t* (B_t) consists of both cyclical ($B_{c,t}$) and structural ($B_{s,t}$) components:

$$B_t = B_{c,t} + B_{s,t} \quad (1)$$

or

$$B_t = (R_{c,t} - E_{c,t}) + (R_{s,t} - E_{s,t}) \quad (2)$$

Table 1

Summary Descriptions of Fund Staff Methodologies Used in Estimating Potential Output in Euro Area and Other EU Countries

1/

Methodology	
Euro Area countries	
Austria	Production function, together with HP filter and non-parametric techniques. Based on OECD capital stock data (non-smoothed) combined with HP filtering of participation rate, NAIRU rate and TFP ($\lambda=100$).
Belgium	Production function; OECD data for the capital stock, and a smoothed series (using an HP-filter) for total factor productivity. Trend labor input obtained by smoothing hours worked, the participation rate and desk's estimate of the NAIRU. For recent observations, potential output adjusted to compensate for the end-point bias of the filtering procedure.
Finland	Production Function. Approach focuses on the incremental capital-output ratio, first selecting a base year in which the output gap estimated at close to zero (1986 was selected as inflationary pressures were minimal, capacity utilization was high, and unemployment was low). Next, starting from the base year, the growth rate of potential output is calculated from the fixed investment series (excluding residential housing) using the historical correlation between the investment-to-output ratio and growth. Finally, direct adjustments were made for two structural changes: the loss of output stemming from the collapse of trade with the Soviet Union (with an estimated output loss of around 2 percent), and changes in the NAIRU (based on Okun's law) due to changes in the tax wedge.
France	Production function approach together with HP filtering of selected variables.
Germany	Production function approach together with HP filtering of selected variables.
Ireland	Production function approach. 3/
Italy	Production function.
Netherlands	Production function, based on OECD data for the capital stock and a smoothed series (using an HP-filter) for total factor productivity. Labor input was based on an estimate of the NAIRU, and smoothed series for labor participation and hours worked per person. Desk officer judgment.
Portugal	HP filter for initial estimate, followed by judgmental intervention by desk officer.
Spain	Production function and HP filtering.
Other EU countries	
Denmark	Production function. Total factor productivity and labor force participation smoothed using an HP-filter.
Greece	Production function, creating a synthetic capital stock from a perpetual inventory method and investment, and smoothing the labor and TFP inputs using an HP filter.
Sweden	HP filtering ($\lambda=400$).
United Kingdom	Production function approach. The shares of labor and capital as well as total factor productivity are based on historical experience. Labor input adjusted based on desk officer estimates of the NAIRU. Over the projection period, labor input incorporates information on desk's projections for employment and unemployment, and capital input is derived based on desk's projections for investment (in the national accounts). 4/

1/ HP refers to Hodrick-Prescott; NAIRU refers to non-accelerating inflation rate of unemployment; TFP refers to total productivity.

2/ IMF (1998b).

3/ IMF (1998c).

4/ IMF (1996).

Table 2

**Potential Output Growth in Euro Area and Other EU Countries
(Rate of Change)**

	1984-1989	1990-1994	1995-1997
Euro Area countries			
Austria	2.22	2.72	2.25
Belgium	2.05	2.05	2.00
Finland	3.29	1.60	1.76
France	2.32	2.29	2.07
Germany	1.97	5.04	1.88
Ireland	3.80	5.73	7.51
Italy	2.36	1.95	1.63
Netherlands	2.43	2.78	2.67
Portugal	3.01	2.79	2.90
Spain	2.69	2.71	2.62
Other EU countries			
Denmark	1.96	1.95	2.49
Greece	1.79	1.47	2.28
Sweden	1.70	1.24	2.43
United Kingdom	2.44	2.14	1.73

Source: IMF estimates.

where

$$R_{s,t} = R_t - R_{c,t} \quad (3)$$

As $R_{c,t}$ is not observed, it must be calculated. Cyclical revenues are calculated using revenue elasticities drawn from estimates made

initially by the OECD and adjusted subsequently in some cases by IMF desk officers on the basis of additional information⁸. Elasticities are available for the major tax revenue items, notably: personal income taxes, corporate income taxes, indirect taxes, social security contributions and other revenues. These are shown in Table 3. An aggregate revenue elasticity, ε , is computed using the average share of each item in total revenue during the period from the mid-1980s to the early 1990s. In the case of corporate income taxes, allowance is made for the fact that, in some countries, a portion of such taxes is collected with a lag, which is reflected in the partial elasticity ε_{lag} . This parameter is calculated as the product of the average corporate tax share, the corporate tax elasticity, and one minus the corporate tax lag (Table 3)⁹. Structural revenues in year t are computed by adjusting observed revenues by an amount that reflects both the size of the gap between potential output Y_t^* and actual output Y_t and the cyclical sensitivity of revenues, and taking into account any delay in the collection of corporate taxes:

$$R_{s,t} = R_t * \left(\frac{Y_t^*}{Y_t}\right)^\varepsilon * \left(\frac{Y_{t-1}^*}{Y_{t-1}}\right)^{\varepsilon_{lag}} \quad (4)$$

In the Fund's approach to estimation of the SBB, only a fraction of government expenditures is assumed to be sensitive to the cyclical movements of output. In particular, only outlays on unemployment benefits are adjusted to take account of the effects of cyclical variations in unemployment. These are adjusted in proportion to the gap between the actual and the natural (viz. NAIRU) rates of unemployment. Specifically, structural expenditures, $E_{s,t}$, are obtained by:

⁸ The elasticities estimated by the OECD are reported in Chouraqui et al. (1990)

⁹ The figures shown in the last column of Table 3 indicate the share of corporate tax revenues collected in year t . Thus, for instance, a lag of 0.7 indicates that 70 percent of the corporate revenue collected in year t is for the tax liability in the same year, and the remaining 30 percent is collected in year $t+1$.

$$E_{s,t} = (E_t - UB_t) + (UB_t * (UR_t^n / UR_t)) \quad (5)$$

where UB_t refers to outlays on unemployment insurance benefits in year t , UR_t to the actual rate of unemployment in year t , UR_t^n to the NAIRU in year t^{10} . The NAIRU is obtained in the context of the estimation of potential output. In particular, it is calculated using an Okun coefficient to adjust the actual rate of unemployment in proportion to the output gap. The SBB is then obtained by simple subtraction:

$$SBB_t = R_{s,t} - E_{s,t} \quad (6)$$

Table 3

**Revenue Elasticities and Lags in Corporate Tax Collection
in Euro Area and Other EU Countries**

	Corporate Tax	Individual Tax	Social Security	Indirect Tax	Other Taxes	Weighted Elasticity	Corporate tax lag 1/
Euro Area countries							
Austria	2.50	1.20	0.50	1.00	1.00	0.94	1.0
Belgium	2.50	1.20	0.80	1.00	1.00	1.08	1.0
Finland	2.50	1.10	0.80	1.00	1.00	1.05	1.0
France	1.50	0.90	1.00	1.00	1.00	1.01	0.9
Germany	2.50	0.90	0.70	1.00	1.00	0.95	1.0
Ireland	2.50	1.30	0.50	1.00	1.00	1.08	1.0
Italy	1.70	0.80	0.60	0.80	1.00	0.84	0.7
Netherlands	2.50	1.30	1.00	1.00	1.00	1.14	0.6
Portugal	2.10	1.10	0.50	1.00	1.00	0.97	1.0
Spain	2.10	1.90	1.10	1.00	1.00	1.25	1.0
Other EU countries							
Denmark	2.20	0.70	0.60	1.00	1.00	0.90	0.0
Greece	2.50	1.10	0.50	1.00	1.00	0.92	0.6
Sweden	2.40	1.40	1.20	1.00	1.00	1.22	0.7
United Kingdom	6.50	1.00	1.00	1.40	0.90	0.70	0.2

Source: OECD and IMF staff estimates.

1/ Figures represent the share of the current year's corporate tax liability paid in the current year.

¹⁰ A unitary elasticity of unemployment insurance benefits with respect to the gap between the actual rate of unemployment and the NAIRU is thus assumed implicitly.

Dividing both sides of equation (6) by Y^* yields the structural budget balance as a ratio to potential output, the measure published by the Fund in the *IMF World Economic Outlook*.

(iii) *Recent estimates*

The most recent estimates of the structural budget balances of members of the European Union are shown in Table 4 and in Chart 1. As can be seen, the 1990s have witnessed reasonable progress toward fiscal consolidation in the EU, owing in part to the fiscal requirements for participation in the monetary union. Nevertheless, the budget balances of most countries remain in structural deficit--to a fairly significant degree in some - and substantial further progress is widely considered to be needed over the medium term, for several reasons¹¹. First, recent improvements in some countries are attributable to one-off measures, the effects of which are expected to dissipate over time. Second, participants in EMU are committed--via obligations spelled out in the SGP--to achieving a medium-term budget balance that will enable them to absorb adverse cyclical shocks while nevertheless avoiding a breach of the 3 percent of GDP reference value for the deficit agreed in the Maastricht Treaty. Third, only through sustained budgetary consolidation can the very high levels of gross public debt relative to GDP in a number of countries be brought down to the 60 percent of GDP reference value spelled out in the Maastricht Treaty through sustained budgetary consolidation. Fourth, although it is estimated--based on experience over the past three decades or so--that an actual deficit of ½ to 1 ½ percent of GDP when the economy is operating at potential may be sufficient to absorb the adverse effects of cyclical shocks to output, a smaller deficit could potentially be warranted as a buffer against the risk of future shocks. This may be particularly important for individual Euro Area countries in the event of an asymmetric shock, given the fact that the advent of monetary union has effectively eliminated the monetary policy lever at the country level. Fifth, the well-known budgetary consequences of the ageing of populations are widely perceived as requiring significant budgetary consolidation over the next two decades or so¹².

¹¹ See IMF (1998a), Chapter V.

¹² See Chand and Jaeger (1996), Group of Ten (1998), and OECD (1998).

Table 4
General Government Structural Budget Balances in the Euro Area and Other EU Countries
(as a percent of potential GDP)

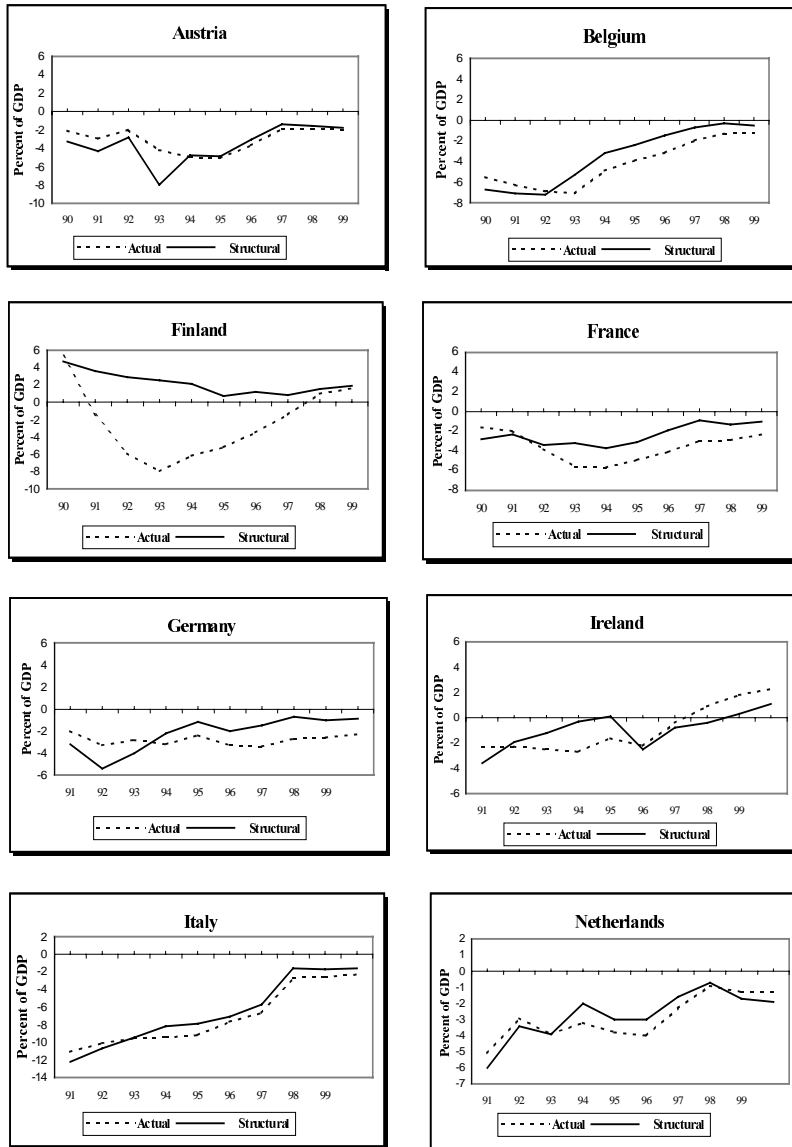
	1990	1991	1992	1993	1993	1995	1996	1997	1998 1/
Euro Area countries									
Austria	-3.3	-4.3	-2.8	-3.7	-4.8	-4.9	-3.1	-1.4	-1.6
Belgium	-6.7	-7.1	-7.2	-5.3	-3.2	-2.4	-1.5	-0.7	-0.3
Finland	4.7	3.6	2.9	2.5	2.1	0.7	1.2	0.8	1.5
France	-2.8	-2.3	-3.4	-3.2	-3.7	-3.1	-1.9	-0.9	-1.3
Germany 2/	-3.2	-5.4	-4.0	-2.2	-1.2	-2.0	-1.5	-0.7	-1.0
Ireland	-3.6	-1.9	-1.2	-0.3	0.1	-2.5	-0.8	-0.4	0.3
Italy	-12.2	-10.7	-9.5	-8.2	-7.9	-7.1	-5.7	-1.6	-1.7
Netherlands	-6.0	-3.4	-3.9	-2.0	-3.0	-3.0	-1.6	-0.7	-1.7
Portugal	-6.8	-7.6	-4.3	-5.4	-5.0	-4.6	-2.4	-2.1	-2.6
Spain	-6.7	-7.2	-4.8	-5.0	-4.3	-5.0	-2.8	-1.5	-1.8
Other EU countries									
Denmark	-0.4	-1.8	-0.9	-0.6	-1.1	-2.1	-1.2	-0.6	0.4
Greece	-16.6	-12.5	-13.3	-13.0	-9.3	-9.6	-7.1	-4.0	-2.6
Sweden	0.1	-2.9	-6.5	-7.0	-7.0	-6.0	0.5	1.8	4.0
United Kingdom	-3.9	-2.7	-3.7	-4.4	-4.3	-4.2	-3.6	-1.8	-0.6

Source: IMF (1998a) Table 16, p. 193.

1/ Projection.

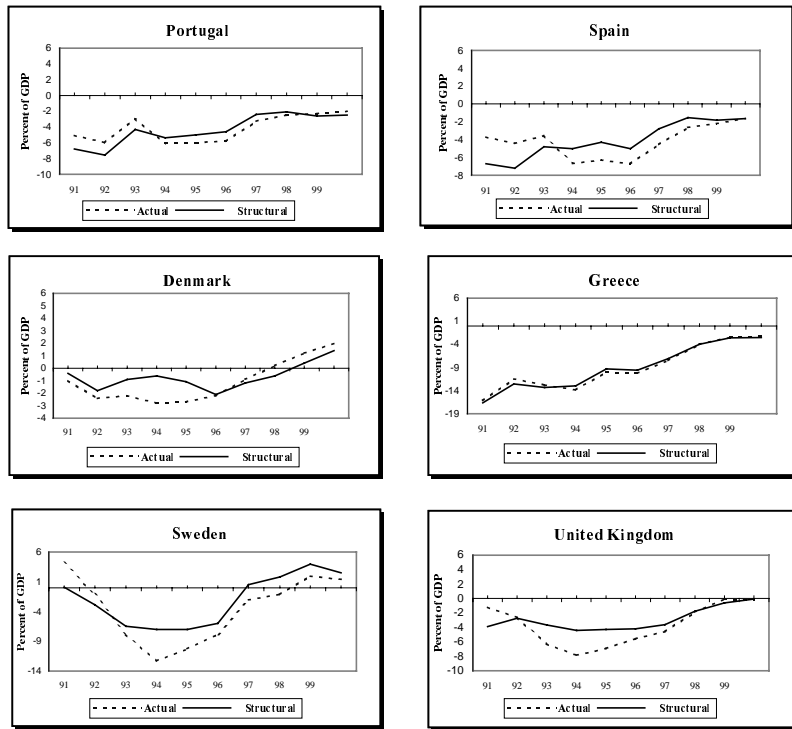
2/ Estimate for 1990 applies to west Germany only. The estimate for 1995 is affected by the assumption by the federal government of the debt of Treuhand other agencies, which were formerly held outside the general government sector.

Chart 1. Actual and Structural Budget Balances in the Euro Area
and Other EU Countries: 1990-1999 1/



Source: IMF World Economic Outlook, September 1998.
1/ 1998 and 1999, forecast.

Chart 1 (continued). Actual and Structural Budget Balances in the Euro Area and Other EU Countries: 1990-1999 1/



Source: *World Economic Outlook, September 1998*.
1/ 1998 and 1999, forecast.

3. Interpreting the structural budget balance

As is true of any constructed indicator of fiscal policy, interpretation of the structural budget balance requires a degree of caution; its use as an indicator of the medium-term orientation of fiscal policy rests on several, mostly implicit, assumptions. First, latent pressures on spending and/or revenues are assumed to be absent or offsetting over time. It has been well established, however, that most governments will need to adopt yet further reforms to public pension and health care systems than undertaken heretofore in order to avoid large prospective deficits in these programs, which are sensitive to the demographic makeup of the country. Second, it is assumed that the budgetary elasticities used in the calculation of the SBB will continue to be appropriate over the medium-term. Substantial structural changes in the economy and/or important tax or expenditure reforms could result in significant changes in the sensitivity of the budget to cyclical swings in the future. Attempts could be made to anticipate or project the effects of structural changes or tax policy reforms on elasticities, but this would require a projection of future structural budget balances rather than reliance on current estimates. Third, the SBB captures the direct budgetary effects of changes in interest rates, changes which normally are not under the immediate control of fiscal authorities. Thus, for instance, an increase in budgetary interest payments consequent to a generalized increase in interest rates translates into an increase in the structural budget balance and may be misinterpreted as a discretionary deterioration in the budget balance. Where the SBB is interpreted as an indicator of the discretionary element of fiscal policy¹³, this will obviously be problematic. A short-hand adjustment to the SBB in such circumstances, however, is to subtract interest outlays from the SBB and assess the medium-term orientation of fiscal policy on the basis of the primary structural budget balance. Fourth, and relatedly, the effects of inflation are ignored¹⁴. Abstracting from the economy-wide consequences of inflation-related distortions, however, omitting the

¹³ But see footnote 1.

¹⁴ An expansionary fiscal stance will tend to put upward pressure on real and--in part via effects on inflation expectations--nominal interest rates.

budgetary effects of inflation should in principle have little impact on the assessment of fiscal policy using the SBB if revenues and expenditures are affected to the same degree and in the same direction. Fifth, in some countries in which institutional or legal budget rules are operative (e.g., a balanced budget rule), the budgetary effects of automatic stabilizers are systematically offset by discretionary actions to ensure compliance with the rule. Interpretation of the SBB is correspondingly complicated. For instance, in a recession, a rule-based offsetting of automatic stabilizers will result in an unchanged actual deficit, an increase in the cyclical deficit, and an equal and offsetting decline in the SBB. This may lead some observers to conclude that fiscal policy is pro-cyclical, when a more appropriate interpretation is that the effect of automatic stabilizers is simply nil.

It is also important to stress that the SBB should not be interpreted as an indicator of the effects of fiscal policy on the economy. A straightforward and specific reason is that, by construction, the SBB excludes the budgetary effects of automatic stabilizers, which are intended to smooth income over the business cycle. More generally, the impact of fiscal policy on aggregate demand hinges on the degree of foresight affecting consumers' decisions (about which there remains some uncertainty), the size of the effect of the deficit on interest rates and, in turn, the sensitivity of investment to changes in the user cost of capital. Thus, an indicator of the impact of fiscal policy on the economy requires far more theory than does the structural budget balance.

4. Implications for the Stability and Growth Pact

Interpreted with caution, the structural budget balance can play a useful role in assessing and formulating fiscal policy¹⁵. For current and prospective participants in EMU, the structural budget balance is a critical tool in determining the level of the cyclically-adjusted budget balance in each country that will allow automatic stabilizers to operate fully (or allow some use of discretionary counter-cyclical policies) while avoiding a breach of the 3 percent of GDP reference value for the deficit

¹⁵ For a more thorough treatment of this issue, see Kopits and Symansky (1998).

specified in the Maastricht Treaty. A cyclically-adjusted budget balance is clearly implied in the SGP's provisions for ensuring budgetary discipline of EMU countries:

Each member State will commit itself to aim for a medium-term budgetary position of close to balance or in surplus. This will allow the automatic stabilizers to work, where appropriate, over the whole business cycle without breaching the 3% reference value for the deficit¹⁶.

To reinforce their commitment to this objective, EMU participants also agreed to surveillance procedures designed to assess implementation of each country's stability program and, where there was a breach of the reference value, to determine whether the breach was due to exceptional circumstances, defined as an annual decline of GDP of 2 percent or more. Exceptional circumstances also include an unusually abrupt decline of less than 2 percent, or a large accumulated output loss relative to past trends.

The concept of a structural budget balance thus unavoidably underpins any quantitative assessment of the medium-term orientation of each country's fiscal policy. Participants in EMU need to achieve a budgetary position which, adjusted for the cycle, simultaneously leaves room for manoeuvre to allow the full operation of automatic stabilizers (or some use of discretionary counter-cyclical fiscal policies) and safeguards against a breach of the ceiling.

¹⁶ European Commission (1996), "Annexes to the conclusions of the Presidency" (Paragraph 21).

REFERENCES

- Blanchard, O. and S. Fischer (1989), *Lectures on Macroeconomics*, (Cambridge, MIT Press).
- Sheetal, C. and A. Jaeger (1996), "Aging Populations and Public Pension Schemes", IMF Occasional Paper, No. 147, December.
- Chouraqui, J.C., R. Hagemann and N. Sartor, (1990), Indicators of Fiscal Policy: A Re-examination", OECD Economics and Statistics Department Working Paper, No. 78.
- De Masi, P. (1997), "IMF Estimates of Potential Output: Theory and Practice", IMF Working Paper, No. WP/97/177.
- European Commission (1995), "Technical Note: The Commission Services' Method for Calculating the Cyclical Adjustment of Government Budget Balances," *European Economy*, No. 60, Directorate-General for Economic and Financial Affairs.
- _____, (1996), *Bulletin of the European Union*, No. 12.
- Group of Ten (1998), *The Macroeconomic and Financial Implications of Ageing Populations*.
- Heller, P. S., Haas, R., Mansur A. S.(1986), "A Review of the Fiscal Impulse Measure", IMF Occasional Paper, No. 44.
- International Monetary Fund (1993), *World Economic Outlook*, October.
- _____, (1995), *World Economic Outlook*, May.
- _____, (1996), "United Kingdom - Recent Economic Developments", *IMF Staff Country Report* N. 96/130, December.
- _____, (1997), *World Economic Outlook*, October.
- _____, (1998a), *World Economic Outlook*, October.
- _____, (1998b), "Austria: Selected Issues and Statistical Appendix", *IMF Staff Country Report*, No. 96/130, October.
- _____, (1998c), "Ireland: Selected Issues," *IMF Staff Country Report* No. 96/130, December.

Kopits, G. and S. Symansky, (1998) “Fiscal Policy Rules”, IMF Occasional Paper, No. 162.

OECD (1998), *Maintaining Prosperity in an Ageing Society*, Paris.