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The cyclically-adjusted budget balance in EU fiscal policy making: A love at first sight turned into a mature relationship

Martin Larch and Alessandro Turrini

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Martin Larch and Alessandro Turrini ⁽¹⁾

Abstract

The cyclically-adjusted budget balance (CAB) plays a key role in the fiscal surveillance framework of the Economic and Monetary Union. It started off in a supporting role in the shadow of the headline deficit and, before long, turned into the linchpin of the rules and requirements of the Stability and Growth Pact. The steep ascent was driven by high hopes and expectations which, with the passing of time were only partly met. The everyday practice of the EU fiscal surveillance rapidly revealed a number of caveats of the instrument which, at times, hampered the effectiveness of fiscal surveillance. This paper provides a comprehensive review of the changing fortunes of the CAB in the EU fiscal surveillance framework. It portrays its main shortcomings and the way they can be dealt with in practice. As an overall conclusion the paper argues that, although the CAB is not devoid of problems and imperfections, it is superior to the headline deficit in most respects.

JEL Classification: E61, H3, H6

Key words: budget balance, cyclical adjustment, EU fiscal surveillance framework

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1. Introduction

Despite its many downsides, which were laid bare almost twenty years ago by Blanchard (1990) and others, the cyclically-adjusted budget balance (CAB) remains to date one of the key indicators for the analysis and conduct of fiscal policy making, in particular in the EU fiscal surveillance framework. The users of the instrument, who abound in both the academic and policy making arena, tend to waver between blind love and deep dissatisfaction. This paper reviews this 'love-hate' relationship. It brings together insights, reflections and lessons related to the implementation of the EU fiscal surveillance framework, which constitutes a particularly taxing testing ground for the CAB.

The main beauty of the CAB lies with its aspiration to measure, at low costs, the underlying budget balance, that is, the fiscal position net of temporary factors that can be expected to even out over time. The CAB is used for several purposes in the analysis and conduct of fiscal policy: (i) to separate the contribution of discretionary fiscal policy to a given change in the headline deficit from the effect of the economic environment, (ii) to assess fiscal impulse; and (iii) to examine whether a given fiscal policy is sustainable

The prominence and use of the CAB in policy making, especially but not exclusively in the EU, has strongly increased over the years. Before the Stability and Growth Pact (SGP) was revised in 2005, the CAB had mostly been used as an analytical tool to better analyse the fiscal situation of the EU Member States. With the reform of the Pact, the CAB has moved to centre stage of the EU fiscal surveillance framework. All key fiscal requirements to be met by Member States under the provisions of the revised Pact are expressed and assessed net of cyclical conditions and one-off and other temporary measures.

As so often, the ascent of the CAB has attracted an increasing degree of attention and, with time, revealed a number of shortcomings which would have been easily pardoned to a purely analytical tool, but which raised pressing questions when the instrument started to play a crucial role for deriving concrete policy conclusions.

In particular, the conceptual beauty of the indicator hides a number of practical issues, notably the uncertainty attached to the measurement of cyclical conditions in real time

as well as the assessment of short-term fluctuations in the tax content of GDP. The history of the implementation of the SGP is littered with examples where estimates of the CAB have either given rise to discussions between the guardian of the Treaty, the European Commission, and the EU Member States, or to policy conclusions which, with the benefit of hindsight, turned out to be off the mark.

However, the evident caveats of the instrument have only marginally affected the loyalty of the economic profession and of policy makers; partly because of policy inertia, but mainly owing to its striking simplicity which trades-off favourably with the costs of a higher precision. Moreover, in spite of its drawbacks the CAB still constitutes a better measure for assessing the underlying orientation of fiscal policy than the headline deficit. As a result, the CAB still serves as a widely-used reference in fiscal policy making. However, the initial degree of devotion is now accompanied with an increasing awareness of measurement issues.

The remainder of this paper is organised as follows. Section 2 provides a brief biographic review of the CAB covering its origins and its main functions. Section 3 takes a closer look at the anatomy of the indicator shedding light on its main components and pieces. Section 4 gives a detailed account of whether and how it fulfils the CAB fulfilled its purpose in practice. Section 5 looks into ways to overcome or limit the shortcomings of the indicator, while preserving one of its main virtues, namely simplicity. Section 6 summarises and concludes.

2. Love at first sight: the virtues of the CAB

Keynes' *General Theory* has had a far-reaching impact on economic thinking and economic policy making. One of the key contributions of his *chef d'oeuvre* was to make clear that rigidities in the labour or other markets can give rise to unwelcome macroeconomic imbalances, most prominently unemployment, which take time to recede. Since then, when making sense of economic developments, economists and policy makers accept that variations of observed macroeconomic variables such as GDP are in part temporary. Inspired by Keynes' insights, a large body of literature has emerged trying to better understand and measure the temporary part of economic fluctuations primarily with a view to gauging the scope for economic policy making

aimed at ironing out the cyclical folds around the long-term path of economic expansion, early examples are Okun (1962) and Kuh (1966).

In the realm of fiscal policy making, the understanding that economic fluctuations are at least partly temporary had an important impact on the reading and assessment of fiscal developments. It made clear that nominal budget figures could not be taken at face value as they concealed two types of factors - temporary and permanent. Disentangling the two elements, so as to reveal the underlying budget position or in operational terms the cyclically-adjusted budget balance (CAB), was recognised as crucial for fiscal policy making. The idea was to target a level of the CAB which would ensure long-term sustainability of public finances while at the same time permitting automatic stabilisers to dampen cyclical fluctuations. However, the use of the CAB went beyond the issue of sustainability. The annual change of the CAB also became a common measure of the impact of discretionary fiscal policy on both the budget and on total aggregate demand.

Overall, the CAB was seen as a handy instrument, which, like an X-ray machine, gave the possibility to reveal important information to policy makers. Against this background many hopes and expectations were projected into the CAB. A detailed portrayal of the initial faith bestowed in the CAB is provided in Blinder and Solow (1974).

3. The anatomy of the indicator: Methods to measure the CAB

At the beginning, the relationship was largely platonic. Economists and fiscal policy makers were enchanted by the idea and prospect that there would be a solution to their predicament, namely to unveil the underlying budgetary position hidden behind the veil of the headline deficit. However, the implementation of this attractive intellectual framework in practice proved to be rather thorny. A number of practical issues emerged. The first issue related to the choice of the relevant benchmark against which to adjust the headline deficit for temporary effects.

The first attempts to extract the underlying budget balance from observed data go back to the 1950s. Brown (1956) was among the first to calculate the full employment surplus, the predecessor of the CAB, which measured the level of the budget balance that would prevail if the economy was operating at full employment. Brown showed that the assessment of US fiscal policy of the 1930s would have changed significantly

when instead of using the headline budget balance it had been adjusted for the effect of unemployment. Periods of large deficits, which had worried President Hoover at the beginning of the great depression, looked less alarming after accounting for the temporary effect of higher unemployment on the budget. One of the main pitfalls of the full employment surplus was that, on average, economies operate below full employment. As a result, and with the aim to capture the budget around the mid-point of the cycle, full employment was replaced by potential output or trend output.

The conceptual superiority of potential output over full employment as a benchmark did not simplify things in practice. On the contrary, the calculation of potential output or trend output turned out to be a highly speculative issue. A wide range of methods were developed yielding diverging estimates of the unobserved variable and in turn diverging estimates of the CAB.

The fundamental problem of gauging a benchmark that is intellectually convincing yet hidden away below the surface of available data has not abated since the early days of the CAB. Following the proliferation of the full employment surplus and the CAB in the 1970, and thanks also to the progress in statistics and computing technology, a wide range of methods have been advanced to decompose macroeconomic and fiscal variables into temporary and permanent components. In practice, the range of existing methodologies for computing the CAB boils down to essentially two alternative approaches. The first, developed by Blanchard (1990), consists in estimating cyclically-adjusted measures of expenditures and revenues directly from regression-based analysis. More recent applications of this first approach make use of structural VAR methodologies (Dalsgaard and de Serres, 1999) and unobserved component models (Camba-Mendez and Lamo, 2002).

The second approach for computing the CAB is a two-stage procedure: a cyclical component of the budget balance CC is first estimated and subsequently subtracted from the nominal budget (BB), so that

$$(1) \quad CAB = BB - CC$$

where all variables are expressed in percent of GDP. This second approach has come out on top in practice and is the one generally used by national governments and international institutions for the purpose of budgetary surveillance, including the European Commission, the OECD, the IMF and the ECB.

The estimation of the cyclical component CC requires two inputs: (i) a measure of the cyclical position of the economy and (ii) a measure of the link between the cycle and the components of the budget. As for (i), the cyclical position is generally measured by the output gap, the distance between actual and potential output.⁽²⁾ Concerning (ii), the link between the economic cycle and the budget balance is summarised by elasticity parameters representing the percentage change in budgetary items associated with percentage changes in the level of economic activity. Concerning (ii), the link between the economic cycle and the budget balance is summarised by elasticity parameters representing the percentage change in budgetary items associated with percentage changes in the level of economic activity. Such elasticities are generally derived from national tax codes as well as from regression analysis.⁽³⁾ The specifics of how the CAB is calculated in the EU fiscal surveillance framework are provided in Box 1.

Box I: The Commission methodology for calculating the CAB

In the framework of the EU budgetary surveillance the cyclically-adjusted budget balance (CAB) is derived as:

$$CAB_t = BB_t - CC_t = BB_t - \varepsilon \cdot OG_t$$

where BB_t is the nominal budget balance-to-GDP ratio in year t , ε the budgetary sensitivity parameter and OG_t the output gap in year t . The output gap is a measure of an economy's cyclical position and is defined as the distance between actual and potential output.⁽ⁱ⁾ Potential output can either be derived from purely statistical methods (like the Hodrick-Prescott filter) or structural, production function-based methods. While the production function method is preferable in that it allows to identify the different supply components of potential output, statistical filters might be the best or the only alternative in case of serious problems related to data quality or data availability.⁽ⁱⁱ⁾

In a bid to avert methodological disputes and to put the measurement of the CAB on a solid footing, on 12 July 2002 the ECOFIN Council officially adopted a production function approach as a reference method for the implementation of the Stability and Growth Pact.

⁽²⁾ Generally, the cyclical component CC is derived using an aggregate estimate of the output gap. The ECB follows an alternative approach involving different output gaps for individual tax and expenditure bases. For a detailed presentation of the ECB method see Bouthevillan et al. (2001).

⁽³⁾ Useful references for the estimation of tax elasticities are Bouthevillan et al. (2001), Van den Noord (2002), Girouard and André (2005) and Wolswijk (2007).

The key features of the production function methodology for estimating potential output are: (i) A Cobb-Douglas production function; (ii) NAIRU estimates based upon multivariate Kalman-filtering, the cyclical component follows a Phillips curve type relationship, the NAIRU a random walk with stochastic drift term; (iii) total factor productivity of potential output is obtained as the HP-filtered Solow residual. The same filtering method is used to estimate the non-cyclical rate of labour force participation. A detailed description of the Commission methodology is in Denis, Mc Morrow and Roeger (2002).

The overall sensitivity parameter \mathcal{E} is obtained by aggregating the elasticities of individual budgetary items estimated on the basis of a methodology developed by the OECD and agreed by the OGWG.⁽ⁱⁱⁱ⁾ The individual revenue elasticities, $\eta_{R,i}$, are aggregated to an overall revenue elasticity η_R using the share of each in the total current taxes (R_i / R) as weight:^(iv)

$$\eta_R = \sum_{i=1}^4 \eta_{R,i} \frac{R_i}{R}.$$

As for the expenditure elasticity, η_G , it can be expressed as

$$\eta_G = \eta_{G,U} \frac{G_U}{G}$$

where $\eta_{G,U}$ is the elasticity of unemployment-related expenditures, again estimated on the basis of the agreed OECD methodology, and G_U / G is the share of unemployment related expenditure in total current primary expenditure.^(v)

Budgetary sensitivity parameters							
	Revenues	Expenditure	Budget balance		Revenues	Expenditure	Budget balance
BE	0.47	-0.07	0.54	HU	0.45	-0.01	0.46
BG	0.35	-0.01	0.36	MT	0.35	-0.01	0.36
CZ	0.36	-0.01	0.37	NL	0.39	-0.17	0.55
DK	0.50	-0.15	0.65	AT	0.43	-0.04	0.47
DE	0.40	-0.11	0.51	PL	0.33	-0.06	0.40
EE	0.29	-0.01	0.30	PT	0.41	-0.04	0.45
EL	0.42	-0.01	0.43	RO	0.28	-0.02	0.30
ES	0.38	-0.05	0.43	SI	0.42	-0.05	0.47
FR	0.44	-0.06	0.49	SK	0.27	-0.02	0.29
IE	0.36	-0.05	0.40	FI	0.41	-0.09	0.50
IT	0.49	-0.02	0.50	SE	0.48	-0.10	0.58
CY	0.39	-0.01	0.39	UK	0.40	-0.02	0.42
LV	0.26	-0.02	0.28				
LT	0.26	-0.01	0.27	Euro area	0.42	-0.06	0.48
LU	0.48	-0.01	0.49	EU27	0.39	-0.04	0.43

Source: OECD, DG ECFIN

The empirical estimates of the individual tax and expenditure elasticities for all EU Member States are reported in Table 1 together with the overall tax and expenditure elasticities.

As budgetary variables are generally expressed in percent of GDP, the revenue and expenditure elasticities η_R and η_G (which measure the change in the *level* of a budgetary item with respect to the output gap) are transformed into sensitivity parameters as follows:

$$\varepsilon_R = \eta_R \frac{R}{Y}, \quad \varepsilon_G = \eta_G \frac{G}{Y},$$

where R/Y is the share of current taxes in GDP and G/Y is the share of primary current expenditure on GDP. ^(vi)

The difference $\varepsilon_R - \varepsilon_G$ yields the sensitivity parameter of the overall budget balance ε used in the equation defining the CAB.

-
- (i) Generally, the cyclical component CC is derived using an aggregate estimate of the output gap.
 - (ii) A comprehensive review of available methods is provided in Gibbs (1995) and Giorno et al. (1995).
 - (iii) The OECD method for estimating budgetary elasticities is described in detail in Girouard, N. and C. André (2005).
 - (iv) The weights are computed by the Commission services as an average over recent years. The period over which the average is computed for the new and updated values of the budgetary elasticities is 1995-2004 (or 1995-2003 in case 2004 was not available).
 - (v) The share is computed using OECD data or data from national source for non-OECD countries. The reference year is 2003 (2002 if not available).
 - (vi) Both weights are computed by the Commission services using 2003 as the reference year.

4. The disenchantments of every-day live: the shortcomings of the CAB

In the early years of the EU fiscal surveillance framework, the provisions of the SGP focused exclusively on headline figures. With the overall aim of achieving and safeguarding macroeconomic stability, Member States were required to reach and sustain a fiscal position close to balance or in surplus (CTBOIS) in the medium term. The compliance with the CTBOIS requirement in terms of (i) the budgetary plans presented in the annual updates of the stability and convergence programmes (SCPs) and (ii) budgetary outcomes was formally assessed on the basis of nominal budget figures. The CAB, although available and in use, played only an informal role. ⁽⁴⁾

The shortcomings of monitoring budgetary policy in nominal terms manifested themselves relatively quickly. It became clear that the budgetary ‘noise’ stemming from cyclical variations in economic activity precluded sensible conclusions about the

⁽⁴⁾ The only official reference to the CAB was in the 1998 and 2001 Code of Conduct on the content and format of stability and convergence programmes defining the CAB as useful working instruments.

underlying stance and thrust of fiscal policy. Concretely, the medium-term objective of CTBOIS turned into a moving target: it seemed to come within reach in one year and walk away in another depending on the prevailing stage of the cycle.

Discontented with the adverse experience in guiding fiscal policy towards medium-term positions safeguarding sustainability, the ECOFIN Council, following the November 2002 Commission Communication ‘Strengthening the co-ordination of budgetary policies’, adopted a report in March 2003 which formally changed the status of the CAB from a complementary analytical tool to a key element to assess compliance with a number of SGP provisions.⁽⁵⁾ Specifically, the report considered that the compliance with the CTBOIS requirement of the SGP should be assessed in cyclically-adjusted terms and that countries with a deficit must improve their cyclically-adjusted budget position and, in the case of euro area countries, by a minimum annual reduction of 0.5% of GDP.

While this upgrade was without doubt an important step forward, the use of the CAB gradually revealed a number of pitfalls.. Most of these pitfalls had been known or anticipated since the early days the fiscal policy indicator made his debut in policy making (see Blinder and Solow, 1974). However, their extent became visible only after the CAB had been put through its paces at the frontline. The CAB deluded its early admirers with respect to its two major applications: the measurement of fiscal adjustment and the underlying fiscal position.

Monitoring fiscal adjustment

In principle, monitoring the budgetary adjustment may appear a purely mechanical exercise. The CAB can be calculated for each year and the resulting annual change in the indicator across years simply and effectively traces improvements or deteriorations in the underlying budget balance. This has been regularly done in various stages of the EU surveillance process, in line with the at the time prevailing practice according to which changes in the CAB were taken to gauge the effect of discretionary fiscal policy.⁽⁶⁾ However, in the early 2000s this practice gave rise to disagreement between a number of Member States exhibiting budgetary slippages and the European

⁽⁵⁾ ECOFIN Council Report 6877/03 of 7 March 2003, endorsed by the European Council of March 21 and 22 March 2003.

⁽⁶⁾ The IMF in its World Economic Outlook and the OECD in its Economic Outlook regularly comment on fiscal positions in structural terms as measured by the CAB associating changes in the structural deficit with discretionary policy interventions.

Commission. Divergent interpretations were brought forward about why Member States repeatedly missed budgetary plans laid out in the annual updates of the stability and convergence programmes (SCPs). National fiscal authorities maintained that they had stuck to their budget plans, and especially that they had not increased discretionary spending. The European Commission, conversely, inferred from the deterioration of the CAB that the fiscal stance had become expansionary and blamed excessive deficits on discretionary fiscal policy.

With hindsight, these conflicting interpretations appear to be related to two sets of misperceptions. On the side of national governments, medium-term growth was frequently overestimated, with the implication that sustainable level of revenues were overstated as well (Larch and Salto, 2005). On the side of the European Commission, the interpretation of cyclically-adjusted budgetary slippages did not discount the fact that shortfalls in potential economic growth could also affect the CAB expressed as percentage of potential output via a revision in the denominator.

Disagreements in the interpretation of observed changes of the CAB as an indicator of discretionary fiscal policy measures became apparent when examining in detail the budgetary execution in order to directly identify the supposedly expansionary measures implemented by national government. In some cases none could be identified, or they were not sufficiently strong to account for the slippage observed, for the simple fact that whenever potential output turns out lower or higher than assumed, observed changes in the CAB are off the target even if budgetary plans were implemented correctly.⁽⁷⁾

The difficulties and discussions in implementing the budgetary adjustments under the SGP can be viewed as a reflection of a latent disagreement about "conditional" as opposed to "unconditional compliance". The initial interpretation was based on the understanding that Member States were to deliver the planned or agreed adjustment in the CAB independently of macroeconomic conditions. Following the 2003 downturn, some Member States raised the issue of whether compliance was to be interpreted conditional upon the macroeconomic scenario underpinning budgetary targets, without "penalty" in case potential growth turned out lower than planned.

⁽⁷⁾ A detailed analytical discussion of this issue is provided in the Annex 1.

Monitoring the level of the underlying fiscal position

In the EU fiscal surveillance framework, the assessment of the Member States' fiscal position *inter alia* addresses two key questions: (i) how big is the risk in a given year to breach the 3% of GDP threshold of the Treaty under normal cyclical fluctuations; and (ii) how distant is the budget balance from the medium-term objective (MTO) that ensures sustainable public finances in the long-run. In both cases the CAB plays a pivotal role. The risk of breaching the 3% of GDP threshold is assessed by means of the minimum benchmark that is the level of the CAB which, under normal cyclical fluctuations, ensures that the working of automatic stabilisers does not push the deficit above the 3% of GDP limit.⁽⁸⁾ As regards the second key question, the SGP explicitly states that the budgetary objective to be achieved in the medium term is defined in structural terms i.e. net of cyclical, one-off and other temporary factors.

While the CAB has generally been useful in providing answers to both questions above, there was one particular episode in the implementation of the EU fiscal surveillance framework where, with the benefit of hindsight, the CAB turned out to be off the mark and both economists and policy makers started to be somewhat disillusioned about the accuracy of the indicator. In the late 1990s, towards the end of the 'ICT bubble' and right after the formal inception of the SGP, most EU Member States run comparatively favourable fiscal positions. This was the result of important adjustment efforts implemented in the run-up to the euro coupled with high economic growth, which at the time was expected to continue over the medium-term.⁽⁹⁾ In addition, a number of countries benefited from a sort of tax bonanza linked to a tax-rich composition of economic growth.

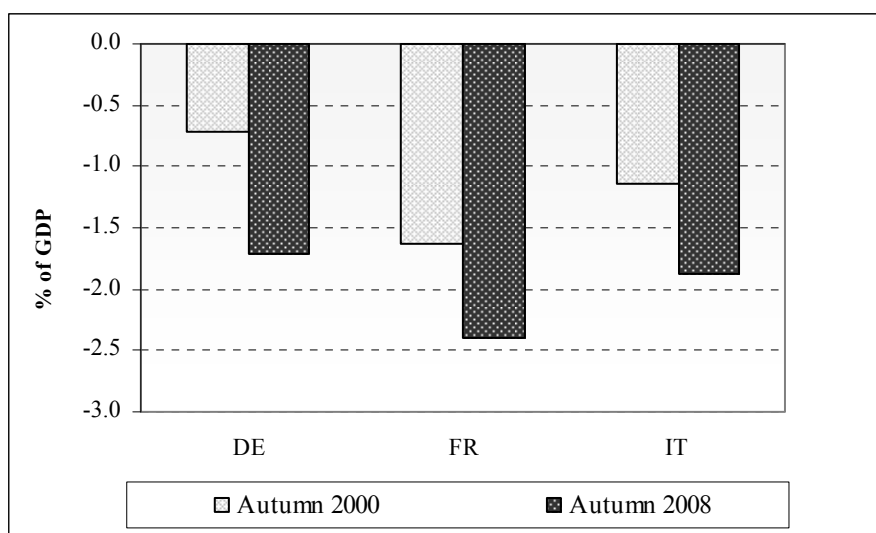
The assessment of public finances carried out at the time did not point to any major risks vis-à-vis the requirements of the SGP. The radar screen of EU fiscal surveillance was broadly clean. In particular, available CAB figures indicated very healthy fiscal positions. In autumn 2000 and still in spring 2001, the general government budget net of cyclical factors of both the euro area and the EU as a whole were estimated to stay broadly in balance over the two-year forecast horizon, as compared to a deficit of more than 5% of GDP in the first half of the 1990s. Against this backdrop, and based on the

⁽⁸⁾ See European Commission (2006) for the technical details of the minimum benchmark.

assumption that economic growth and high tax returns would persist, a number of Member States decided to reduce taxes and/or to increase discretionary expenditure. However, shortly afterwards the prevailing conjecture about economic and fiscal prospects turned out to be wrong. The bursting of the ICT bubble in the second half of 2001 and the ensuing economic slowdown made it clear that fiscal policy plans had been based on an erroneous assessment of the underlying situation. Countries like Italy, France and Germany suddenly found themselves in a situation in which they struggled to stay within the remits of the SGP and had no fiscal leeway to lean against the economic slowdown.

Ex-post, it became clear that the underlying fiscal situation at the end of the 1990s and early 2000s was by far not as rosy as assumed at the time: the output gap was abundantly positive and the fiscal stance too lax. Based on today's assessment, the headline deficit of 2000 recorded for Germany in autumn 2000, would have shown an underlying deficit of close 2% of GDP as compared to less than 1% of GDP at the time. A similar picture emerges for France and Italy (see Figure 1).

Figure 1. The CAB estimates for 2000 across time – autumn 2000 and autumn 2008



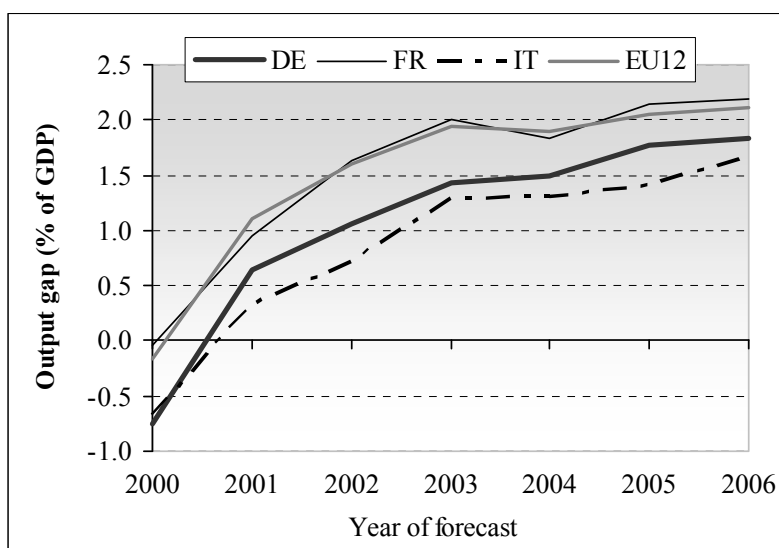
Source: Commission services

⁽⁹⁾ In 1998-2001, euro area GDP grew on average by around 3% per year. In autumn 2000, shortly before the bursting of the ICT bubble, available forecasts - including the one of the services of the EU Commission - expected this rate to carry on into the medium-term.

An attentive examination of the marked swings of the CAB estimates revealed two weak spots of the indicators: (i) the assessment of potential output and cyclical conditions in real time and (ii) significant fluctuations in the elasticity of taxes with respect to GDP (see European Commission, 2007).

Starting with the uncertainty surrounding real-time output gap estimates, Figure 2 depicts output gap estimates for the year 2000 in successive Commission services forecasts for the large EU Member States as well as for the euro area as a whole. In the beginning, estimates of the cyclical position of the economies did not point to particularly favourable economic conditions. Since medium-term growth prospects were generally assessed to be very bright, the prevailing conditions were taken to be average or slightly below average. With the arrival of new data, indicating that the sanguine growth projections for the medium-term did not materialise, the assessment of cyclical condition in 2000 changed significantly.

Figure 2. Output gap estimate for 2000 in successive Commission Services' forecasts



Source: Commission services

The uncertainty surrounding real-time estimates of potential output and the output gap is not new. It was first empirically explored and discussed in connection with US monetary policy making by Orphanides and van Noord (2002) and Orphanides (2003). More recently, similar work was carried out in the field of fiscal policy for OECD countries (e.g., Forni and Momigliano, 2004; Cimadomo, J., 2007, Golinelli and Momigliano, 2008). The fundamental problem in assessing the cycle in real time can be interpreted as a problem of forecasting. In order to make an assessment of where in the

cycle the economy stands today, its necessary to make assumption about where one believes the economy will end up in the future; i.e. real-time output gap estimates are derived from expectations about future economic growth, which typically and inevitably deviate from the actual outturn. ⁽¹⁰⁾ The inherent uncertainty attached to economic forecasts, and in turn to output gap estimates, clearly weighs on the assessment and conduct of fiscal policy making.

The second Achilles' heel of the cyclical adjustment method used in the EU fiscal surveillance framework is the assumption of constant tax elasticities. As indicated in Box 1 the link between the cyclical component of GDP and the budget is taken to be invariant over time. This simplification is justified by the forward-looking nature of the EU fiscal surveillance exercise: the best predictor for tax elasticities in future years is the average of the past.

Constant tax elasticities are an acceptable approximation as long as short-term variations in the tax content of economic growth remain small. In that case, the advantages in terms of methodological simplicity clearly outweigh the costs of additional precision. However, past experience has shown that in some years tax elasticities can depart quite substantially from their 'normal values' (see Figure 3) and produce unwelcome effects on the surveillance and conduct of fiscal policy.

Concretely, the aforementioned tax windfalls during the economic boom of the late 1990s, coupled with the use of constant tax elasticities in the calculation of the cyclical component of the budget, resulted in an overestimation of the underlying budgetary position and, in sequence, misled the fiscal authorities in some EU Member States to conclude that there was room for tax cuts and/or expenditure increases. When tax cuts and expenditure increases turned out to be unsustainable in the subsequent years, fiscal restraints had to be tightened in a pro-cyclical manner. The ensuing tensions were part of

⁽¹⁰⁾ The estimate of potential output in year t estimated in the current year T , generally involves a centred and symmetric function of

actual GDP y or parts of actual GDP: $y_{t|T}^P = b_0 + \sum_{j=0}^{\infty} b_j y_{t-j} + \sum_{j=1}^{\infty} b_j y_{t+j}$ For estimates of potential output in year T or

beyond this involves the use of forecasts i.e. $y_{T+i|T} = b_0 + \sum_{j=0}^{\infty} b_j y_{T+i-j} + \sum_{j=1}^{\infty} b_j E y_{T+i+j|T}$

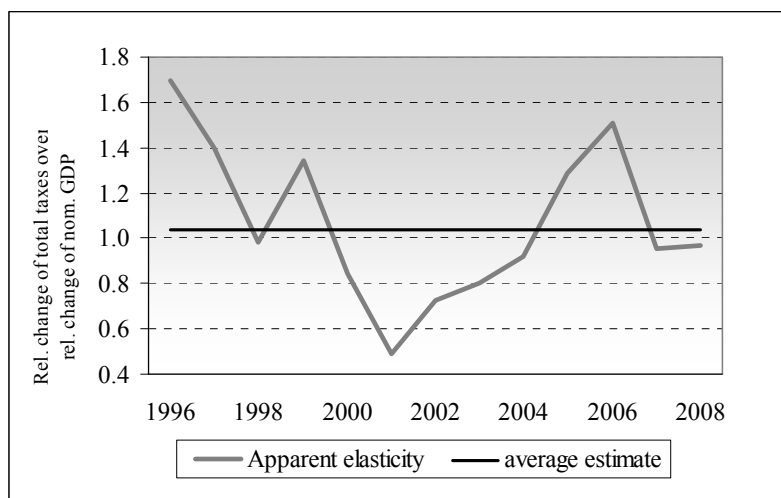
Taking the difference between the 'final' estimate of potential output, the one obtained after the arrival of new data, and the forecast

yields $y_{T+i|T+i} - y_{T+i|T} = b_0 + \sum_{j=1}^{\infty} b_j (y_{T+i+j} - E y_{T+i+j|T})$ which means that the revision of potential output and

the output gap estimate reflects the forecast errors for real GDP.

the November 2003 crisis of the EU fiscal framework and, later on, to the reform of the Pact in 2005.

Figure 3: Apparent tax to GDP elasticity in the euro area (1995-2007)



Source: Commission services

The renewed rebound of tax elasticities in 2006 and 2007 filled again general governments' coffers and triggered a number of tax cuts and expenditure increases in the EU just before the economic growth in Europe started to slow in the wake of the US sub-prime residential mortgage market crisis. This time, however, the episode did not come as a surprise. Surveillance tools were sharpened thanks to the lessons from the past and the Commission services started highlighting the potential risks at an early stage.⁽¹¹⁾

One-off and other temporary measures

The abrupt economic slowdown following the bursting of the ICT bubble in 2001 was the first such episode after the inception of the SGP in Europe in 1999. Annual economic growth, which in the euro area had been averaging at around 3% in 1997-2000, dropped sharply and remained subdued, especially in the large euro area countries, up until and including 2004. In the wake of the economic downturn, public finances quickly started to deteriorate and in a number of Member States the headline deficit approached the 3% of GDP threshold of the Treaty. Working on the rather optimistic assumption that the economy would soon return to the steep path of

⁽¹¹⁾ A first clear message about the risks related to the spending of revenue windfalls was included in the Commission services' 2006 autumn forecast.

expansion observed at the end of the 1990s, a number of governments resorted to temporary deficit decreasing measures - more or less innovative in nature - to bridge the supposedly short-lived deterioration of public finances and, more importantly, to stay within the nominal limits of the SGP. Typical expedients implemented at the time comprised sales of real assets and tax amnesties or settlements. A detailed analysis of the link between the constraints imposed by the SGP and the recourse to one-off and temporary factors can be found in Koen and Van den Noord (2006). At times, fiscal gimmicks resulted also into a stretched interpretation of the ESA95 and EDP accounting rules so as to temporarily embellish budgetary figures. Consistently, empirical evidence suggests that after introduction of the EU fiscal framework reported deficits became less closely linked to debt developments (Von Hagen and Wolff, 2006; Buti, Nogueira Martins and Turrini, 2007).

The relevance of one-off measures went clearly beyond the academic interest. They were not only invasive and pervasive in terms of number of cases; their actual budgetary impact was far from marginal. As shown in European Commission (2004), which provides a meticulous survey of the phenomenon for the period 2000-2004, deficit decreasing one-off measures, excluding sales of UMTS licences, could reach 1% of GDP or more in one single year.

Abstracting from the issue of 'creative accounting' - some of the more innovative one-off measures exploited grey areas of national accounting rules - the increasing recourse to one-off measures gave rise to a number of problems in the fiscal surveillance framework. First and foremost, since they were temporary but not cyclical, they seriously impaired the effectiveness of the CAB as a measure of the underlying budgetary position and of the lasting consolidation effort.

For instance, revenues from real estate sales, which in some cases reached significant levels in successive years, would embellish all key indicators of the EU fiscal surveillance framework, i.e. the headline deficit, the CAB and the change in the CAB yet not have a lasting effect on the medium-term orientation of public finances.

The obvious fix, that is to simply exclude one-offs from the CAB, was not without problems. Apart from revenues accruing from the sale of UMTS licences, views

frequently diverged with regard to the actual impact over time.¹² Such non homogenous views were reflected in the March 2003 European Council conclusions on the November 2002 Commission communication ‘strengthening economic policy coordination’, reporting that one-off measures had to be considered "on their own merits on a case-by-case basis".

5. Fix it don't break it: living with compromises

In retrospect, the difficulties encountered with the effective implementation of the CAB materialised bit by bit and were, as highlighted in the previous sections, generally linked to specific economic or policy episodes. At the level of the EU fiscal surveillance, the response to the gradual emergence of caveats was dominated by a sense of pragmatism. Instead of abandoning the CAB for alternatives altogether, targeted attempts were made to better understand the reasons for the practical shortcomings and to look for ways to improve the accuracy of the instrument.

To follow this line of compromise was not always easy. Sometimes criticisms on the CAB, both from academia and fiscal policy makers, were radical, and hinted to scrapping the CAB as a way forward. The fact that, at the end of the day, this did not happen proves that in fact there was no better alternative available. In particular, it was relatively undisputed that in a fiscal surveillance framework geared towards the achievement of medium-term objectives the CAB, in spite of its shortcomings, provided better guidance than the headline deficit. After all, it was the volatility of the headline budget balance that motivated the decision to ditch the headline budget balance as reference for fiscal surveillance under the preventive arm of the SGP.

A simple back-of-the-envelope calculation illustrates the point. In most euro area countries the cyclical component of aggregate economic activity, as measured by the output gap, has exceeded +/- 3% of GDP at least once and has frequently reached levels of more than +/- 1% of GDP. Using the average budgetary sensitivity for the euro area as a whole of around 0.5, the nominal budget balance can include in a given year between 0.5 and 1.5 % of GDP of purely transitory elements which obstruct the view on

¹² By way of example, tax amnesties, combined with the intention to strengthen tax controls, were argued to produce a permanent improvement in the budget. To prove the contrary from an ex ante point of view was not always obvious.

the underlying budgetary situation. Transitory elements of this size clearly preclude a reliable judgement about the medium-term orientation of fiscal policy and would seriously affect any policy recommendations. While the actual size of the distortion in real time may be somewhat smaller, because real-time output gap estimates tend to be of a lower magnitude than those derived ex post, the nominal budget balance is definitively more volatile than the CAB.

Evidently, the successive and gradual improvements of the CAB have not eliminated the caveats of the indicator. Rather, a workable *modus vivendi* has been found which in our view is more than just a makeshift. On the one hand, the enhanced CAB preserves the simplicity and low costs of the assessment exercise and guarantees a uniform and consistent application across countries. The last point is of particular importance in EU fiscal surveillance where, in view of equal treatment, great care is taken that the assessment is carried out on the basis of comparable data and methods. At the same time, the enhanced CAB sharpens the view for potential upside or downside risks to the underlying fiscal position of Member States.

The following sections discuss in turn how the pitfalls of the CAB have been tackled in practice.

Conditional versus unconditional fiscal adjustment

Before the 2005 reform, the SGP was not explicit about whether compliance with target fiscal adjustment in cyclically-adjusted terms was to be interpreted unconditionally, irrespective of differences between expected and actual macroeconomic conditions, or alternatively whether the adjustment was conditional on the expected macroeconomic outlook.

Discussions in the competent Council committees contributed to clarify technical aspects of how conditional compliance with target budgetary adjustment could have been implemented in practice and with which implications (see European Commission, 2004). The principle of conditionality was finally and formally incorporated into the EU fiscal surveillance framework with the 2005 reform of the Pact. Specifically, the report of the European Council of 20 March 2005, which lays out the foundations of the

reformed SGP, stresses that policy errors should be clearly distinguished from forecast errors in the implementation of the excessive deficit procedure. ⁽¹³⁾

The decision to assess fiscal adjustment in conditional terms is not immaterial on the path of budgetary consolidation. As the budgetary impact of unexpected variations in growth is not charged to the fiscal authorities' account, the duration of the consolidation process cannot be established with certainty. Hence, unexpected departures from the projected growth outlook can delay or accelerate the budgetary adjustment. This mechanism is made explicit in the provisions of the reformed SGP, which foresees the repetition of certain steps in the excessive deficit procedure if effective action has been taken, but unexpected adverse economic events have an unfavourable impact on government finances.⁽¹⁴⁾

Ideally, a conclusive assessment of conditional fiscal adjustment would have to rely on detailed information about the fiscal measures effectively taken by fiscal authorities and on their actual impact on the deficit or surplus. However, if appropriately corrected, observed changes in the CAB convey relevant information to assess conditional compliance. The correction is needed to account for the effect on the denominator of the CAB due to higher or lower than expected growth. As shown in the Annex a convenient approximation for the corrected ex-post variation in the CAB is given by

$$(2) \quad \Delta CAB_t^{corrected} = \Delta CAB_t + \frac{G_{t-1}^S}{Y_{t-1}^P} (E_{t-1}\omega_t - \omega_t).$$

Expression (2) states that in order to monitor conditional compliance the observed change in the CAB should be corrected by adding a term equal to the ratio of non-cyclical expenditures over potential output at time $t-1$ times the forecast error of potential output growth ($E_{t-1}\omega_t - \omega_t$). This correction is based on the assumption that fiscal authorities plan non-cyclical expenditures on the basis of projected potential output growth and can not or do not adjust expenditure in the execution of the budget to account for higher or lower than expected growth. Under these assumptions, the adjustment given in (2) effectively eliminates variations in the CAB purely associated with growth surprises.

⁽¹³⁾ A detailed overview of the 2005 reform is presented in European Commission (2005).

⁽¹⁴⁾ See Council regulation (EC) No 1056/2005 of 27 June 2005 amending Regulation (EC) No 1467/97 on speeding up and clarifying the implementation of the excessive deficit procedure.

However, since the correction term to be applied to the observed change in the CAB increases in the size of the forecast error, adjustment for the growth effect can give rise to a moral hazard issue. In particular, the adjustment may create an incentive for countries to overestimate growth in order to obtain a greater discount in the assessment of the required budgetary adjustment. To disclose and maybe prevent the risk of moral hazard, the assessment of conditional compliance is to be anchored to an unbiased forecast of economic growth. In practice, the part of that anchor is played by the Commission services forecasts. The accuracy of Commission services' growth forecasts is document and in Keereman (1999) and Jonung and Larch (2006). Strauch et al. (2004) and Jonung and Larch (2006) also provide evidence for a systematic tendency in some Member States to overestimate potential growth, confirming the risk of moral hazard in practice and hence bearing out the need to have an independent anchor for growth forecasts.

Improving the assessment of cyclical condition in real-time

One useful way to address the uncertainty attached to output gap estimates available in real time is to broaden the assessment of prevailing cyclical conditions with a battery of complementary indicators that are taken to reflect cyclical developments. The move towards such an approach is motivated by the observation that in some cases the indications of the output gap estimates derived from the production function method used in the EU fiscal surveillance framework tend to contrast sharply with some elements of the prevailing macro economic conditions. Concretely, negative output gap estimates happened to go along with increasing rates of inflation and other aspects which are generally observed in economies operating above potential.

A first attempt to broaden the assessment and to bring on board complementary indicators was made in the 2006/07 assessment round of the stability and convergence programmes. The approach was purely descriptive and judgemental in nature. ⁽¹⁵⁾

In a bid to make the assessment more systematic a quantitative method has recently been tested. It is an extension of the commonly agreed production function method for

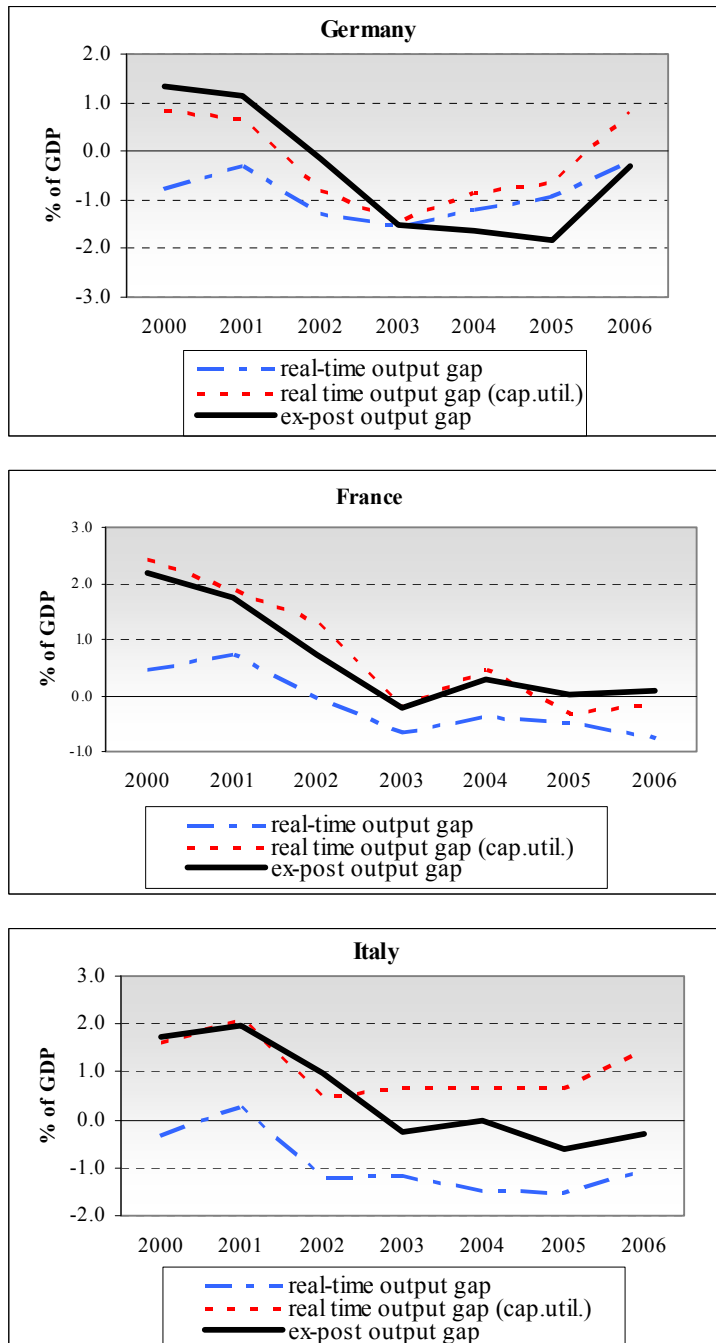
⁽¹⁵⁾ Commission services' economic assessment of the 2006/07 vintage include short paragraphs comparing output gap estimates with the indications emerging from complementary indicators.

The assessments can be found at:

http://ec.europa.eu/economy_finance/netstartsearch/pdfsearch/pdf.cfm?mode=m2

calculating potential output and the output gap aimed at incorporating the degree of capacity utilization of labour and capital.

Figure 4: Comparing alternative output gap methods (DE, FR, IT)



Source: Commission services

One of the major difficulties in the commonly agreed method is to correctly identify total factor productivity (TFP), which generally represents the largest part of GDP growth. This is generally achieved by resorting to the simplifying assumption that the existing stocks of capital and labour are always fully utilised across different phases of the cycle. The price paid for the simplification is straightforward. To the extent that the degree of capacity utilisation increases during upswings and decreases in downswings, TFP may be over- or underestimated, which in turn may affect the accuracy of the output gap estimate in real time.

One way to overcome the problem is to relax the simplifying assumption about the constant degree of utilisation of capital and labour by making use of available survey indicators such as the rate of capacity utilisation or indicators of economic sentiment. These complementary indicators are embedded into the commonly agreed production function approach, so as to track the variations in the use of the existing capital stock during up- and downswings periods.

Simulations designed to test the relative merits of such an extended production function approach vis-à-vis the 'standard' approach yield encouraging results (see Figure 4). Although findings vary across countries, the inclusion of the rate of capacity utilisation or other survey indicators tends on average to reduce the uncertainty surrounding real-time output gap estimates (see European Commission, 2008). The extended production function approach has not official status yet. It is currently being discussed with the Member States in the competent Council committees.

Tracking short-term fluctuations of tax elasticities

Compared to the other caveats of the CAB, tackling short-term fluctuations of tax elasticities has so far proved more difficult. While progress has been made on how to get a grip on the problem, work is still ongoing.

To improve the measurement of tax elasticities in the EU fiscal framework and in turn to enhance the appraisal of the structural budget balance, two separate questions have been addressed. Firstly, what drives the year-to-year fluctuations of tax elasticities. Secondly, how big or important are changes in the tax content of growth for the assessment of the CAB?

The standard approach established in the literature to understand the behaviour of tax revenues are econometric regressions where annual tax data are linked to measures of

economic activity and a series of other variables that are expected to affect the level of taxation (see for instance Morris and Schuknecht, 2007, Wolswijk, 2007). A variant of the standard approach, outlined in Appendix 3, was examined by European Commission (2008). The specificity of the approach is that it explicitly allows for composition effects which lead to a higher or lower-than-normal tax-to-GDP ratio, such as changes in the consumption or wage share of GDP, or significant changes in asset and commodity prices. The results obtained from the estimated models are encouraging. They provide a relatively persuasive account of the drivers which in the past led to an upward or downward shift of the tax content of GDP. By way of example, at the end of the 1990s and early 2000s, the particularly marked increase of the elasticity of current taxes with respect to GDP can be mainly attributed to an increase in the consumption share in total income in Germany and to a combination of a higher wage share, rising imports and high asset prices in France. These findings are in line with both anecdotal evidence and more educated conjectures related to the respective episodes. Additionally, tax elasticities appear to be lower in correspondence with decelerations in nominal GDP, other things being equal. This finding is consistent with the fact that revenue windfalls tended to be greater in the recent past at the peak of the cycle (1999 and 2006 especially), i.e. when nominal output, after having grown above trend, starts growing at a slower pace. Such behaviour of total government revenues is most probably related to that of corporate taxes, which react not only to current output developments but also to past ones.

Although the identification of the drivers of tax elasticities is intrinsically useful as it provides an understanding of what lies beneath composition effects, its findings are not sufficient to understand the impact on the underlying fiscal position. In order to assess more precisely whether composition effects are of a temporary nature or not, it is necessary to analyse the behaviour of individual tax bases. A disaggregated approach is crucial because individual tax bases, such as household consumption, wages and profits may (and in practice do) follow a different pattern compared to overall GDP. If all tax bases were fully synchronised with cyclical fluctuations of the aggregate level of economic activity, composition effects would not play any role.

In a bid to disentangle the composition effect into a permanent and temporary part the European Commission (2008) applied a variant of the disaggregated approach

developed and used by the European System of Central Banks (ESCB).⁽¹⁶⁾ Tax revenues are broken down into four categories (indirect taxes, personal income taxes, corporate income taxes and social security contributions) and linked to their corresponding tax bases or approximations of them, that is household consumption, gross operating surplus and wages. The temporary component of tax revenues is calculated on the basis of the standard elasticity of each tax category and the deviation of the tax base relative to its trend.⁽¹⁷⁾ In the absence of a theory of the structural level of the wage share and the consumption share in GDP consistent with the production function, the trend for each tax base is extracted as the Hodrick-Prescott (HP) filter (see Annex 2 for the technical details).

The disaggregated approach yields a direct estimate of the CAB by subtracting the temporary component from the actual yield of each tax category. The difference between the traditional CAB and this alternative calculation provides a proxy of the impact of composition effects.

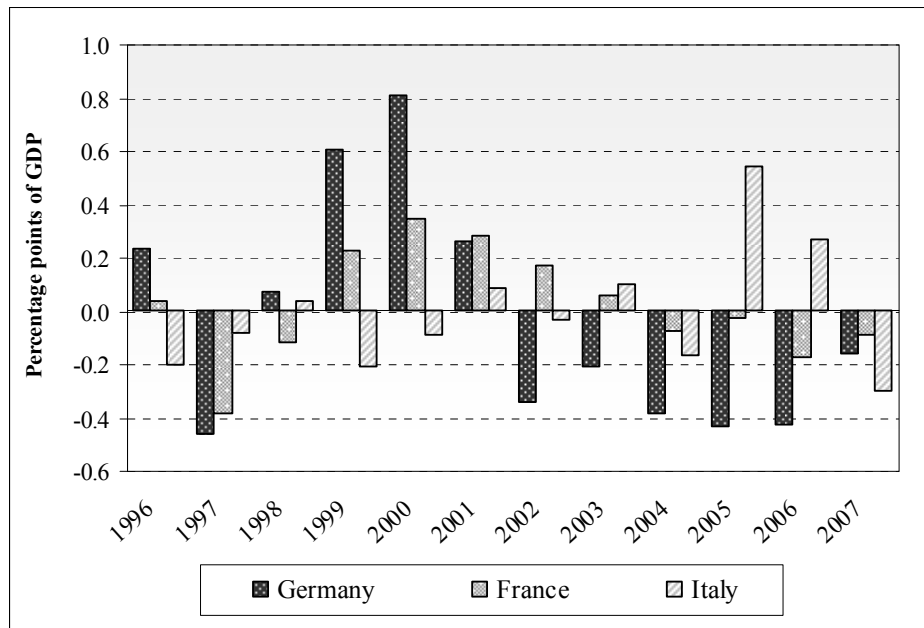
An empirical application of this approach to a set of large EU countries, notably Germany, France, Italy and the Netherlands in 1996-2007 gives interesting results which are in line with expectations. In particular, composition effects had a strong and positive impact in the late 1990s and early 2000s, while they were rather negative in 2003-2006. In numerical terms, the impact of the composition effect was particularly strong in 2000, when it implied an overvaluation of the improvement of the CAB in the large EU countries mentioned above. The details covering the period 1996-2007 are shown in Figure 5. Needless to say that an assessment based on headline deficits would have been even more off the mark.

The practical lessons to be learned from such an exercise are straightforward. In the late 1990s and early 2000s, taking into account composition effects would have shown significantly lower improvements in the structural budget balances. Conversely, during the protracted slowdown following the bursting of the ITC bubble in 2001 composition effects have excessively darkened the reading of the conventional CAB in some countries, notably Germany but also the Netherlands and the UK.

⁽¹⁶⁾ For a detailed description of the method see Bouthevillan et al. (2001).

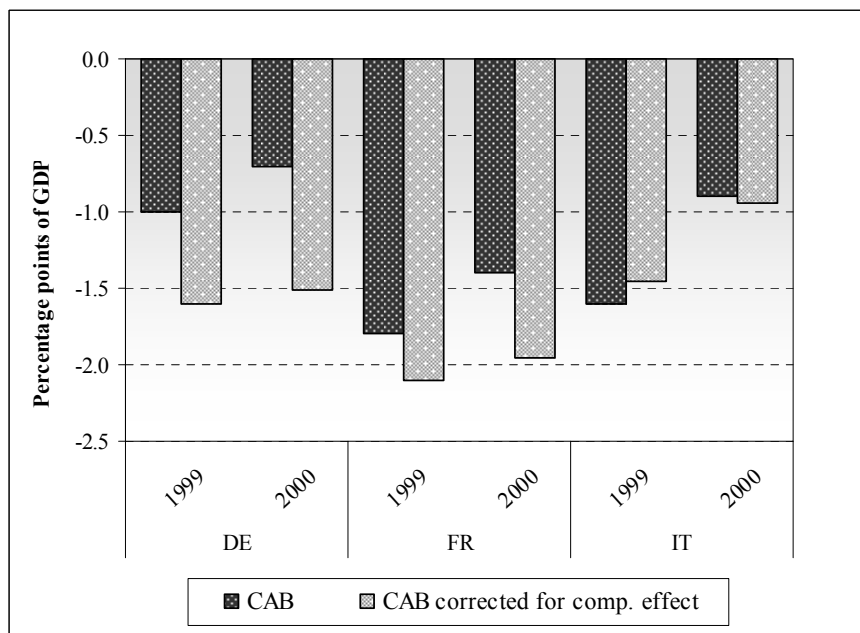
⁽¹⁷⁾ To limit the differences with the traditional approach, we use the same decomposition of taxes, the same tax bases and the same elasticity of taxes vis-à-vis the tax base used in the commonly agreed methodology to calculate the CAB. The only difference relates to the different tax bases which are no longer synchronized with GDP.

Figure 5. Impact of composition effects on the change in the CAB (1996-2007)



Source: Commission services

Figure 6. Change of the CAB net of composition effects



Source: Commission services

As regards the implementation of the EU fiscal surveillance, a detailed assessment of government tax revenues along the lines outlined above is currently not part of the commonly agreed framework. For the moment, the reference method for the assessment of tax revenues remains the one relying on time-invariant elasticities. However, in a bid

to have a better assessment of the risks that large variations in the tax content of economic activity may entail for fiscal adjustment the Commission services are complementing, on an informal basis, the standard analysis with a more detailed approach. A first step into this direction is presented in European Commission (2008).

Accounting for one-off and temporary measures

The fourth and methodologically least demanding adjustment of the CAB relates to temporary elements of the budget that are not linked to changes in the economic environment but result from discretionary decisions taken by fiscal authorities. Once an agreement is reached about what 'one-off and temporary' measures are, they should simply be netted out from the CAB so as to reveal the more permanent or 'structural' budgetary position. The importance of abstracting from one-off and temporary measures when assessing fiscal performance was also acknowledged in the Council report of March 2005, which underpins the revised SGP, and explicitly recorded in the Code of Conduct, i.e. the Specification on the implementation of the SGP.⁽¹⁸⁾ In fact, all key requirements of the revised SGP such as the required annual adjustment and the medium-term budgetary objective are defined in cyclically-adjusted terms *net of one-off and temporary measures*. The Code of Conduct even includes a definition which says, that "*one off measures are measures having a transitory effect that does not lead to a sustained change in the intertemporal budgetary position*"

In practice, however, and in spite of a commonly agreed definition, finding a common understanding about one-off and temporary measures was not always easy. In view of the relative novelty of the phenomenon, at least in terms of its extent, there was no established taxonomy to refer to. Apart from very obvious cases, such as the sale of UMTS licences, each measure had to be assessed individually, which recurrently gave rise to debate: Member States would insist that the measures produced permanent effects, whereas the Commission, as the Guardian of the Treaty, generally took a more cautious view.

Experience accumulated over the years shows that because of the large variety of instruments and the progressive introduction of innovative measures, the assessment of

⁽¹⁸⁾ Council report on "Improving the implementation of the Stability and Growth Pact" was included in the Council conclusions of 23 March 2005, 7619/1/05 REV 1. The code of conduct on "Specifications on the implementation of the Stability and Growth Pact and guidelines on the format and content of stability and convergence programmes", endorsed by the ECOFIN Council on 11 October 2005.

whether specific measures are to be considered one off or temporary will inevitably involve judgments. However, in order to avoid arbitrary decision making and ensure equality of treatment across Member States, the Commission in collaboration with the competent committees of the Council (i.e. the Economic and Financial Committee) has agreed a number of principles (see European Commission, 2006). In particular, with a view to making the above definition of one-off and temporary measures operational the following common features are to be taken into account:

- (i) As a general principle, only measures having a significant impact on the general government balance should be considered, whereby significant is meant to be above the level of one decimal point of GDP;
- (ii) The temporary nature of fiscal measures is born out by its impact on the general government budget balance in time; i.e. the impact is to be concentrated in one single year or a very limited number of years.
- (iii) One-offs and temporary measures are non-recurrent and should be assessed in the context of a sequence of related measures. For instance, although each investment project is unique, it is to be seen in the context of a continuity of established investment decision over time.
- (iv) Deficit-increasing measures should not be counted as one-offs, and hence, not be excluded from the CAB, because the assessment of the non-recurring nature of certain expenditure is particularly difficult. Measures intended to be temporary often become permanent.

Although the above features and elements do not allow for an exhaustive identification of one-off and temporary measures, they serve as guidelines to make sure that a case-by-case assessment of one-off measures corresponds to consistent and transparent principles.¹⁹

¹⁹ On top of such guidelines the following indicative list of deficit-reducing one-off measures has emerged from the implementation of the EU fiscal surveillance framework: Tax amnesties involving one-off payment by tax payers; sales of non-financial assets (real estate, publically owned licences and concession) securitisation operations with a positive impact on the general government budget balance; temporary legislative changes in the timing of outlays or revenues with a positive impact on the general government budget balance, exceptional revenues from State owned companies with a positive impact on the general government budget balance; exceptional revenues linked to the transfer of pensions obligations; Changes in revenues or expenditure consecutive to a Court or other authorities rulings.

6. Conclusions

The cyclically-adjusted budget balance (CAB) is an established and commonly used fiscal indicator. It is also used in the EU fiscal surveillance framework where it has gained 'official status' with the reform of the Stability and Growth Pact (SGP) in 2005. In clear contrast to the SGP mark I, which very much focused on headline figures, most of the requirements of the revised Pact are now expressed in cyclically-adjusted terms.

In the beginning, great hopes were attached to the change in focus. The basic and perfectly reasonable expectation was that by removing temporary or cyclical elements from the budget one would get a clearer view of the actual fiscal situation of a country and hence be able to derive more robust policy conclusions. Such expectations developed in the wake of the rather difficult experience with a fiscal surveillance based on nominal figures. Relatively soon after the inception of the SGP in 1999 it became clear that nominal budget figures were too volatile to be used as a yardstick or anchor of fiscal policy making. A country that in one year seemed to be close to or steadily moving towards the target of a balanced budget, would suddenly find itself off track when cyclical conditions changed. In light of this, and in spite of its more or less known weaknesses, all eyes turned to the CAB. It seemed to offer all the virtues that headline figures were evidently lacking.

Unluckily, the honeymoon effect did not last long. Not least because of the increased level of attention given to the indicator, a number of frictions emerged in the new relationship: (i) changes in the CAB turned out not always to accurately capture discretionary fiscal policy and (ii) the level of the CAB provided erroneous signals about the underlying fiscal position of EU Member States. However, instead of abandoning the CAB in a rage of frustration, substantial efforts were made to understand and correct the weaknesses.

Not only the CAB was not scrapped from EU fiscal surveillance, but its role became over time increasingly relevant. This outcome was surely the result of awareness that the alternative of turning back to a fiscal surveillance centred around headline deficit figures was not a superior alternative. However, it was also rooted in the understanding that some of the problems encountered with the use of the CAB are probably, in the spirit of Goodhart's law, intrinsic to any rules-based surveillance framework, rather than to the indicator itself. In this respect, it was understood that gradual and transparent

improvements in the construction of the CAB, in the reading and communication of figures, and in their use in fiscal surveillance, would be the way forward.

Thanks to the intense and gradual work on the CAB carried out at the EU level, a much better and disillusioned understanding prevails today about the virtues and vices of the indicator. Progress has been made in the identification and measurement of Member States' fiscal efforts, the measurement of cyclical conditions in real time and the assessment of tax developments. Some of these improvements have officially been incorporated in the surveillance framework, such as the concept of conditional versus unconditional compliance with fiscal adjustment or the understanding that fiscal adjustments need to be assessed net of one-off measures and other temporary measures. Other methodological advances, notably the assessment of composition effect of government taxes and the use of complementary indicators for the real-time assessment of the output gap have as yet an informal status: they are still being discussed in the competent Council committees with the Member States but are used by the Commission services to form a comprehensive and well-informed view about budgetary developments.

Overall, the experience with the EU rules-based fiscal surveillance testifies that the CAB, like most simple indicators, is far from perfect. The fact that rising awareness of the limitations of the CAB rather than leading to a rejection of cyclically-adjusted fiscal indicators triggered useful technical work at EU level to improve the measurement and the reading of the CAB figures is to be considered an achievement.

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Annex 1: Changes in the CAB as a measure of budgetary adjustment

Changes in the CAB are commonly used as an indicator of discretionary fiscal policy. This annex shows that this reading needs to be qualified in the presence of higher or lower than expected growth.

The budget and the CAB ex-ante

Expenditure plans for the year t are generally fixed in advance in year $t-1$ based on projections for economic growth and price inflation. Apart from discretionary fiscal policy measures, that are decided separately each year, the following link between budgetary aggregates and economic activity is assumed to hold in the planning phase of the budget:

(i) *Revenues:* Any variation in economic growth will automatically translate into a corresponding variation in governments' receipts as, under unchanged fiscal policy, tax bases should bear a stable relationship with the level of economic activity. For the sake of simplicity taxes are assumed to be proportional to GDP.

(ii) *Expenditure:* Fiscal policy makers are assumed to increase non-cyclical expenditure in line with projected potential GDP growth.⁽²⁰⁾

As a result of (i) and (ii) the planned non-cyclical expenditure to potential output ratio expected for year t is:

$$E_{t-1} \left. \frac{G_t^S}{Y_t^P} \right|_{E_{t-1}Y_t} = \frac{G_{t-1}^S (1 + E_{t-1}\omega_t^P + E_{t-1}\pi_t) + \Delta^d G_t^S}{E_{t-1}Y_t^P} \Bigg|_{E_{t-1}Y_t}$$

where $\Delta^d G_t^S$ denotes the planned discretionary component in non-cyclical expenditure in period t . $E_{t-1}\omega_t^P$ and $E_{t-1}\pi_t$ are expected potential output growth and expected inflation respectively. The ratio is conditional on the expected level of actual GDP

⁽²⁰⁾ In contrast to the revenue side of the budget, there is no evident or stable link between non-cyclical expenditure and the level of economic activity. A wide range of alternative relationships could be used. However, the assumption of proportionality with respect to potential output has a relatively long tradition in the economic literature and is referred to as neutral fiscal policy. It can be found in Heller et al. (1986) and more recently von Halleberg et al. (2001) and Buti and van den Noord (2003). It essentially implies that under unchanged fiscal policy expenditure is set to keep the size of Government constant over the cycle.

$E_{t-1}Y_t$, as potential output is extracted from observed real GDP (see Footnote 10). Non-

cyclical expenditure is obtained as $\frac{G_t^S}{Y_t^P} = \frac{G_t}{Y_t} + \varepsilon'_G \cdot OG_t$.

Since the tax system is assumed to be proportional, the tax to GDP ratio will remain constant except for discretionary measures.⁽²¹⁾

Based on the above, the expected change in the CAB in year t with respect to year $t-1$ is

$$E_{t-1}\Delta CAB_t = \frac{\Delta^d R_t^S - \Delta^d G_t^S}{Y_t^P} \Big|_{E_{t-1}Y_t} - \frac{G_{t-1}^S}{Y_{t-1}^P} \left(\frac{1 + E_{t-1}\omega_t^P + E_{t-1}\pi_t}{1 + E_{t-1}\omega_t^P + E_{t-1}\pi_t} - 1 \right) \Big|_{E_{t-1}Y_t} = \frac{\Delta^d R_t^S - \Delta^d G_t^S}{Y_t^P} \Big|_{E_{t-1}Y_t}$$

implying that the expected change in the CAB will be equal to the discretionary fiscal

policy intervention $\frac{\Delta^d R_t^S - \Delta^d G_t^S}{Y_t^P} \Big|_{E_{t-1}Y}$.

The budget and the CAB ex post

The ratio of non-cyclical expenditure to potential GDP in year t results from the implementation of expenditure plans, discretionary fiscal policy corrections and actual economic growth.

$$\frac{G_t^S}{Y_t^P} \Big|_{Y_t} = \frac{G_{t-1}^S (1 + E_{t-1}\omega_t^P + E_{t-1}\pi_t) + \Delta^d G_t^S}{Y_t^P} \Big|_{Y_t}$$

The ratio is conditional on actual level of real GDP in year t as opposed to expected real GDP in the case of budgetary plans. Hence, if actual real GDP in year t differs from the forecast, it will also affect potential output and the output gap compared to what was expected ex-ante. Both the denominator and the nominator of the ratio are affected.⁽²²⁾

⁽²¹⁾ The assumption of proportionality is made for the sake of simplicity. If the tax system is regressive or progressive economic growth also affects the revenue side of the budget and hence the CAB:

$$E_t \frac{R_t^S}{Y_t^P} \Big|_{E_{t-1}Y_t} = \frac{R_{t-1}^S \phi (1 + E_{t-1}\omega_t^P + E_{t-1}\pi_t)}{Y_{t-1}^P (1 + E_{t-1}\omega_t^P + E_{t-1}\pi_t)} \Big|_{E_{t-1}Y_t} \neq \frac{R_{t-1}^S}{Y_{t-1}^P} \Big|_{E_{t-1}Y_t}$$

where ϕ is the degree of progressivity or regressivity of the tax system.

⁽²²⁾ In addition, lower or higher than expected growth not only affects potential output in year t , it also impacts on potential output of previous years as potential output is either estimated as a kind of moving average of the actual output series or involves a moving average of a component of actual output (see Footnote 10).

Consequently, assuming again that the tax system is proportional, the change in the CAB in year t with respect to year $t-1$ is

$$\Delta CAB_t = \frac{\Delta^d R_t^S - \Delta^d G_t^S}{Y_t^P} \Bigg|_{Y_t} - \frac{G_{t-1}^S}{Y_{t-1}^P} \left(\frac{(1 + E_{t-1} \omega_t^P + E_{t-1} \pi_t)}{(1 + \omega_t^P + \pi_t)} - 1 \right) \Bigg|_{Y_t}$$

The observed change in the CAB will exclusively reflect discretionary fiscal policy interventions only if non-cyclical expenditure follows potential output growth. However, given that expenditure plans are fixed in advance based on economic projections inertia in the budgetary processes will lead to a departure from the projected change in the CAB ex-ante. This effect may be called passive fiscal policy. In particular, if growth is overestimated $(1 + E_{t-1} \omega_t^P + E_{t-1} \pi_t) > (1 + \omega_t^P + \pi_t)$ a full implementation of expenditure plans results into a deterioration of the CAB, even in the absence of discretionary fiscal policy measures. There is empirical evidence that forecast errors on potential output are significant in explaining the CAB.⁽²³⁾

Denoting the degree with which spending plans are adjusted to unexpected changes in potential output by λ we can distinguish between two extreme cases:

- $\lambda = 0$ signals full inertia or adherence to budgetary plans in volume terms,
- $\lambda = 1$ stands for no inertia or full adjustment,

The change in the CAB can be written as

$$\Delta CAB_t \approx \frac{\Delta^d R_t^S - \Delta^d G_t^S}{Y_t^P} \Bigg|_{Y_t} - (1 - \lambda) \left(\frac{G_{t-1}^S}{Y_{t-1}^P} \left([E_{t-1} \omega_t^P - \omega_t^P] - [E_{t-1} \pi_t - \pi_t] \right) \right) \Bigg|_{Y_t}$$

The change in the CAB can be taken to be equal to the effect of discretionary fiscal policy only if we assume:

1. Perfect foresight on the side of fiscal policy makers, implying that potential output and inflation turn out to be exactly as foreseen when setting the budgetary plan. In such a case, inertia would not even come into play; or
2. No inertia in the implementation phase of the budget with fiscal policy makers ‘being on call’ i.e. adjusting non-cyclical expenditure plans with respect to higher or lower than expected economic growth.

⁽²³⁾ Larch and Salto (2005), Strauch et al. (2005), and Jonung and Larch (2006).

Taking into account the relatively long recognition lags, the complexity and slowness of budgetary processes and the political economy of political inaction, a viable working hypothesis over the short term, for instance one year, is to assume full inertia or full adherence to spending plans i.e. to assume that spending is not adjusted for unexpected shortfalls or windfalls of growth.

The difference between ex-ante and ex-post

The effect of lower than expected growth and passive fiscal policy also plays a role in explaining the difference between plans and actual results. Specifically, planned changes in the CAB and actual outturns will generally differ even if expenditure plans and discretionary fiscal policy measures are fully implemented. Simplifying the notation and assuming again that the tax system is roughly proportional, the difference between ex-ante and ex-post changes in the CAB can be written as:

$$\left[\frac{\Delta^d B_t^S - G_{t-1}^S (1 + E_{t-1} \omega_t + E_{t-1} \pi_t)}{Y_t^P} + \frac{G_{t-1}^S}{Y_{t-1}^P} \right] \Big|_{Y_t} - \left[\frac{\Delta^d B_t^S}{Y_t^P} \right] \Big|_{E_{t-1} Y_t} =$$

ex-post change in the CAB

ex-ante change in the CAB

where $\frac{\Delta^d B_t^S}{Y_t^P}$ is the discretionary fiscal policy intervention $\frac{\Delta^d R_t^S - \Delta^d G_t^S}{Y_t^P}$. Rearranging

the difference between ex-post and ex-ante yields

$$\begin{aligned} &= \frac{\Delta^d B_t^S \Big|_{Y_t} - \Delta^d B_t^S \Big|_{E_{t-1} Y_t}}{Y_t^P \Big|_{Y_t}} + \left(\frac{\Delta^d B_t^S \Big|_{E_{t-1} Y_t}}{Y_t^P \Big|_{E_{t-1} Y_t}} \right) \frac{Y_t^P \Big|_{E_{t-1} Y_t} - Y_t^P \Big|_{Y_t}}{Y_t^P \Big|_{Y_t}} - \frac{G_{t-1}^S}{Y_{t-1}^P} \Big|_{Y_t} \left(\frac{1 + E_{t-1} \omega_t + E_{t-1} \pi_t - 1}{1 + \omega_t + \pi_t} \right) \approx \\ &\approx \frac{\Delta^d B_t^S \Big|_{Y_t} - \Delta^d B_t^S \Big|_{E_{t-1} Y_t}}{Y_t^P \Big|_{Y_t}} + \left(\frac{\Delta^d B_t^S \Big|_{E_{t-1} Y_t}}{Y_t^P \Big|_{E_{t-1} Y_t}} \right) \frac{Y_t^P \Big|_{E_{t-1} Y_t} - Y_t^P \Big|_{Y_t}}{Y_t^P \Big|_{Y_t}} - \frac{G_{t-1}^S}{Y_{t-1}^P} \Big|_{Y_t} ((E_{t-1} \omega_t + E_{t-1} \pi_t) - (\omega_t + \pi_t)) \end{aligned}$$

Hence, if expenditure plans and discretionary fiscal policy measures are fully implemented in volume terms, the difference between ex-ante and ex-post is a function of

- the effect of the revision of growth on the output gap and, in turn, on the discretionary component of the budget (first term). A revision in the output gap entails that budgetary items, which ex-ante were thought to be cyclical, turn out to be structural or vice versa. Empirically, this term will tend to be fairly negligible;

- the effect of the revision of growth on the level of potential output and, via the assumption of adherence to plans, on the size of the discretionary correction expressed in percent of potential GDP (second term);
- the effect of the revision of growth on the level of potential output and, in turn, on the non-cyclical expenditure to potential GDP ratio (third term). Numerically, this term clearly dominates as the non-cyclical expenditure to potential GDP ratio is generally around 0.4-0.6, whereas discretionary corrections tend to be comparatively small.

Annex 2: Modelling time-varying tax elasticities

Tracking short-term variations

The prevailing approach in the empirical literature to examine determinants of tax revenues is the error-correction model. In line with this tradition, the following set up provides a useful way to track short-term fluctuations of the elasticity of taxes with respect to GDP. Changes in the total tax burden T are modelled as

$$d\ln T_t = \alpha + \beta_0 d\ln Y_t + \lambda Z_{t-1} + \sum_i \beta_i D_i d\ln Y_t + \varepsilon_t$$

where Y denotes nominal GDP and Z the error correction term. The latter is obtained from the long-term relationship that links the level of total taxes to its determinants:

$$\ln T_t = \alpha + \ln Y_t + \sum_j \theta_j R_t + Z_t$$

The long-run elasticity of taxes with respect to nominal GDP is exogenously set equal to 1. ⁽²⁴⁾ R_t stands for a time trend which a priori is not linked to the intrinsic features of the tax system but is expected to capture policy decisions to change the size of government. Time breaks in the trend capture such shifts.

⁽²⁴⁾ This choice can be defended on the ground that except for discretionary shifts in the size of government, the ratio between taxes and GDP should remain constant in the long run. A long-run elasticity higher (lower) than one would have the rather unintuitive implication that the tax ratio would consistently keep on increasing (decreasing) as a share of GDP. There may be arguments such as those underlying the Wagner's law suggesting that the size of government in the total economy tends to increase. However, it is difficult to determine *a priori* whether such a trend is the result of automatic mechanisms or the reflection of discretionary fiscal policy decisions. In view of this 'indeterminacy' the long-run elasticity for total taxes is set equal to one.

D_i in the equation describing changes in tax revenues ($d\ln T_i$) stands for a series of slope dummies linked to variables that may determine variations in the 'normal' short-term tax-to-GDP elasticity represented by β_0 . The determinants included in the baseline specification of our model are: the share of consumption, the share of wages in GDP, property and equity prices. We choose these four variables for the baseline for the following reason. The first two are expected to capture the main composition effects, i.e. of aggregate demand and the primary distribution of income. As regards the asset price variables there is a strong presumption that they may have a significant impact on taxes and hence on fiscal policy making, especially boom-bust cycles of asset prices. The data for the two asset price variables were provided by the Bank of International Settlements (see Borio et al., 1994). Depending on the country, additional variables were added that are also expected to affect total taxes but which may be rather country specific, such as oil prices or real exchange rates.

The slope dummies take the value -1, 0 and 1 to capture three different stylised states of the determinants: 1 and -1 are supposed to denote significant deviations of tax determinants from their 'normal' configuration indicated by the value 0. The exact definition of the three states for each of the variables concerned is described in Table A2.1 below.

The use of slope dummies, instead of the untransformed variables to capture composition effects serves two purposes. Firstly, the use of slope dummies facilitates the interpretation of the results in the sense that the time varying tax-to-GDP elasticity is simply given by the sum of β_0 , the individual β_i 's and the error correction term. Secondly, slope dummies turned out to give statistically more robust results compared to specifications where the untransformed variables are used. The use of slope-dummies also comes at a price: the link between total taxes and their potential determinants is not continuous. Rather, it reveals the average impact of a given explanatory variable. This caveat is acceptable as the purpose of the exercise is to identify the source of observed variations in total taxes with respect to GDP.

The equation describing changes in tax revenues ($d\ln T_i$) includes a number of different channels. The first channel is via changes in nominal GDP and refers to the rate of economic growth. The second channel is via the set of other variables captured by the slope dummies D_i which are expected to measure changes in the composition of GDP

growth. The third and last channel works via the error-correction term which pushed tax revenues back to the equilibrium level with an annual rate equal to λ , independently of the rate and the composition of growth.

Table A2.1. Definition of GDP slope dummies D_i the error-correction approach

Variable X	Value of slope-dummy D_i		
	-1	0	1
(wages, consumption, equity prices, residential housing prices)	$d\log(X)-d\log(GDP) < 25\%$ quantile	25% quantile $<d\log(X)-d\log(GDP) < 75\%$ quantile	$d\log(X)-d\log(GDP) > 75\%$ quantile
real effective exchange rate, oil prices	$d\log(X) < 25\%$ quantile	25% quantile $< d\log(X) < 75\%$ quantile	$d\log(X) > 75\%$ quantile
trade balance	$d(X/GDP) < 25\%$ quantile	25% quantile $< d(X/GDP) < 75\%$ quantile	$d(X/GDP) > 75\%$ quantile
inflation	$X - HP(X) < 25\%$ quantile*	25% quantile $< X-HP(X) < 75\%$ quantile*	$X - HP(X) > 75\%$ quantile*
nominal GDP growth	$d(d\log(X)) < 25\%$ quantile	25% quantile $< d(d\log(X)) < 75\%$ quantile	$d(d\log(X)) > 75\%$ quantile

The slope dummies take the value 1, 0, -1 depending on whether the change of the corresponding variable in the upper quartile, the two intermediate quartiles or the lower quartile respectively.

Notes: * HP(X) stands for the cyclical component of X obtained using the Hodrick-Prescott filter.
Source: Commission services.

The simulated time-varying elasticity and its drivers of a given year t are obtained as:

$$\frac{d \ln \hat{T}_t}{d \ln Y_t} = \frac{\hat{\alpha} + \hat{\beta}_0 d \ln Y_t + \sum_i \hat{\beta}_i D_i d \ln Y_t + \hat{\lambda} \hat{Z}_{t-1}}{d \ln Y_t}$$

where variables with a hat (^) indicate estimated values.

An important issue with estimating tax elasticities is the impact of discretionary measures. Tax revenue data typically include the effect of both changes in the economic environment and the impact of deliberate policy decisions on the side of national fiscal authorities. Conceptually, tax elasticities should solely gauge the effect of the first and abstract from the latter. Possible ways to circumvent the problem are (i) to derive tax elasticities on the basis of institutional information, especially the tax code, or (ii) to simply assign a specific value, for instance 1 for the elasticity of indirect taxes to private consumption (see for instance Girouard and Andre, 2005). Another possibility, which however stands or falls with the availability of data, is to remove the estimated effects

of discretionary measures on tax revenues (see for instance Wolswijk, 2007). Since the impact of discretionary measures is not available over a long period for all Member States, this route cannot be followed in general. As a result, empirical analyses are typically carried out with 'raw' tax revenue data keeping in mind that this could affect the quality of our estimates.

Gauging the size of composition effects

The methodology for calculating the CAB used in the EU fiscal surveillance framework is built on the assumption that the fluctuations of the different tax bases (wages, gross operating surplus and consumption) around their structural level follow the same cycle as output. The amount of 'cyclical' taxes is therefore directly proportional to the output gap:

$$\frac{Taxes - Taxes^*}{GDP} = \sum_{i=1}^4 \frac{Tax_i}{GDP} \times \underbrace{\eta_{tax_i / taxbase_i}}_{(A)} \times \underbrace{\eta_{taxbase_i / gdp_i}}_{(B)} \times OG$$

where the sub-index i denotes individual tax categories, the asterisk the structural level of taxes and OG the output gap. The parameter η is an elasticity and comes in two parts: part A is the elasticity of a given tax category to the tax base; part B is the elasticity of the tax base to GDP (the breakdown of overall taxes in individual tax categories and the corresponding tax bases used for the calculation of the CAB are reported in Table A2.2). Naturally, the assumption of full synchronisation of individual tax bases with the aggregate level of economic activity rules out composition effects. In practice, however, individual tax bases are all but fully synchronised with GDP. The intensity of the tax bases in GDP changes over time and produces an impact on the budget. In order to gauge such composition effects the following approach can be applied.

Table A2.2. Individual tax categories for the calculation of the CAB

	Tax	Tax base	Elasticity of taxes vis-à-vis the tax base (A)	Elasticity of the tax base vis-à-vis the output gap (B)
1	Indirect taxes	Private consumption	1	1
2	Corporate income taxes	Gross operating surplus	1	
3	Personal income taxes	Wages	Tax code	Estimated econometrically
4	Social security contributions	Wages	Tax code	

Source: OECD 2005

The elasticity of the tax vis-à-vis the tax base (A) is taken to be same as in the commonly agreed methodology but the traditional cycle derived from the output gap

and the elasticity of the tax base vis-à-vis the output gap is replaced by a 'tax base gap' determined with a HP filter for each tax.

$$\frac{Taxes - Taxes^*}{GDP} = \sum_{i=1}^4 \frac{Tax_i}{GDP} \underbrace{\times \eta_{tax_i / taxbase_i}}_{(A)} \times \frac{TaxBase_i - TaxBase_i^{HP}}{TaxBase_i^{HP}}$$

This enables to calculate an alternative CAB; the difference of this alternative CAB and the traditional CAB approximates the impact of changes in the composition of GDP. Importantly, the three different tax bases are deflated by the same price (GDP deflator), so as to take into account different price dynamics across GDP components. For example, in case of a deterioration of the terms of trade, consumption prices will increase more than GDP prices, leading to an increase in indirect taxes as a share of GDP, if the share of consumption in GDP remains unaffected by the shock.