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Testing the EU fiscal surveillance: How sensitive is it to variations in output gap estimates?

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Abstract

Real-time estimates of the potential output are essential in the EU fiscal surveillance framework. They are used for the calculation of the cyclically-adjusted budget balance, one of the main indicators in the assessment of the fiscal performance of EU Member States.

The estimation of potential output involves a decomposition of actual output into a cyclical and a potential component based on to some extent arbitrary assumptions about the statistical properties of the two unobserved components. Depending on those assumptions, the potential output estimate may exhibit a higher or lower degree of smoothness which in turn affects the assessment of the underlying budgetary position. With a very high degree of smoothing, variations in GDP are mostly taken to be temporary as are the ensuing changes in the headline deficit. Conversely, with a low degree of smoothing, variations in GDP are mostly taken to be permanent. In this case, deteriorations of the headline deficit will be interpreted differently and lead to different policy conclusions.

Our paper examines whether and how different degrees of smoothness of potential output would have supported different decisions in the EU budgetary surveillance in terms of both timing and substance. The results of our simulations show that, the accuracy of the diagnostic instruments especially those that measure the risk of breaching the 3% of GDP reference value of the Treaty is surprisingly robust. Only a very high and excessive degree of smoothing of potential output would significantly reduce the reliability of the surveillance indicators.

In the light of our results, a somewhat higher degree of smoothing compared with the current practice would not seem to be harmful for EU fiscal surveillance. During economic upturns it would guaranty a higher degree of caution by signalling larger and possibly longer periods of economic 'good times' which would in turn warrant more fiscal consolidation.

[1] We thank the participants of the ECB Public Finance Workshop held in Frankfurt on 12 December 2006 for helpful comments. We are particularly grateful to Matthias Mohr and Mikko Spolander and for insightful suggestions. Comments by Marco Buti were equally useful.

1. Introduction and motivation

The cyclically-adjusted budget balance (CAB), i.e. the budget balance net of cyclical factors, plays an important role in the EU fiscal surveillance framework, the Stability and Growth Pact (SGP). It is a key diagnostic instrument in both the preventive and corrective arm of the Pact. In the preventive arm it is used to guide and assess budgetary developments in the Member States through the economic cycle towards a medium-term budgetary objective that ensures sustainability in the long term. The main idea is to track the underlying as opposed to the nominal budgetary position so as to let automatic stabilisers smooth the fluctuations of economic activity without breaching the 3% of GDP threshold of the Treaty for the nominal deficit. In the corrective arm of the Pact the change of the CAB is used as a measure of the fiscal effort taken by Member States with a view to correcting an excessive deficit.

One of the major uncertainties surrounding the calculation of the CAB is the estimation of the potential output and the output gap, unobserved measures for respectively the permanent and transitory component of GDP. The uncertainty *inter alia* mirrors the ambiguous nature of economic fluctuations. As highlighted by Orphanides and Van Norden (2002) potential output and output gap estimates will typically depend on the professed model of the economy i.e. whether economic activity is thought to evolve around a stable trend or whether GDP is taken to be largely driven by a sequence of permanent shocks. Depending on whether fluctuations in economic activity are thought to be more or less cyclical in nature, one and the same change in the headline budget balance will give rise to completely different interpretations and potentially to different policy conclusions. In case potential output was thought to be very smooth, improvements or deteriorations in a given headline deficit would have a minor impact on the assessment of the underlying budget position. In particular, as long the deficit remained below the 3% of GDP reference value of the Treaty a deterioration would not give rise to concerns in terms of the medium-term orientation of fiscal policy. By way of contrast, if potential output was thought to be subject to frequent permanent shocks, a deterioration of the headline deficit would also affect the assessment of the underlying budgetary position and hence warrant corrective measures.

This paper investigates how different measurements of potential output would have affected the diagnostic accuracy of the CAB in the framework of the EU budgetary surveillance. Using the Hodrick-Prescott (HP) filter - the most popular estimation method for potential output and the output gap in practice - we analyse whether and to what extent different values for the smoothing parameter λ would have supported different assessments of fiscal policy in the euro area Member States. The smoothing parameter λ can be taken to reflect different views about the underlying economic model, where a higher (lower) value would be consistent with the idea of a smoother (less smooth) potential output estimate.

Our main interest lies in the typical assessment cycle of the EU fiscal surveillance framework. Twice a year, in spring and autumn, the Commission services publish fully-fledged macroeconomic forecasts, which form the basis for the assessment of fiscal policy in the EU Member States. The autumn forecast is of particular importance. First because it takes a farther look into the future: It covers two years beyond the current period, as opposed to one year in the spring forecast. Second and more importantly it serves as a benchmark for the Commission services' assessment of the budgetary plans outlined in the stability and convergence programmes. In particular, the indications emerging from the forecast serve as benchmark when assessing whether official plans, which typically include the most recent budget, do or do not comply with the requirements of the Pact.

The window of opportunities for the Commission to take steps under the provisions of the Pact on the basis of the autumn forecast in a given year t ahead of the actual occurrence of an

excessive deficit is relatively short. It essentially covers the remainder of the year *t* in which the autumn forecast is made as well as the forecast for the year after i.e. *t+1*. The two-year-ahead forecast is generally less binding or informative: first, because of the larger degree of uncertainty attached to projections of more distant years, and second because of the underlying no-policy-change assumption. Since the draft budget for year *t+2* is only revealed in the second half of *t+1*, the two-year-ahead forecast produced at the end of year *t* merely provides indications about what the budget balance would be if the fiscal authorities remained completely inactive.

In terms of diagnostic instruments the focus of the paper will be mainly on three measures: (i) the so-called safety margin, which in a given year measures the risk of breaching the 3% of GDP reference value of the Treaty with normal cyclical fluctuations and (ii) the level of the cyclically-adjusted budget balance, which indicates the distance to the medium-term budgetary objective and (iii) the change in the CAB which is used to assess the fiscal adjustment effort planned or implemented by Member States. All three indicators are a function of real-time output gap estimates and hence will take on different values depending on the size of the smoothing parameter λ. The ultimate aim is to better understand the trade-off between safeguarding against the risk of breaching the 3% of GDP threshold on the one hand and fiscal stabilisation on the other.

The remainder of this paper is organised as follows. Section 2 briefly reviews the use of the output gap and the CAB in the EU fiscal surveillance framework. Section 3 outlines the set-up and design of our numerical simulation. Section 4 summaries first the general results of the simulation and then examines some particularly interesting country examples showing whether and how the assessment of fiscal policy in real-time would have changed for different estimates of potential output and the output gap. Section 5 concludes.

2. The use of the cyclically-adjusted budget balance and the output gap in the EU fiscal surveillance

Potential output and the output gap are widely used measures to determine an economy's position in the cycle. In the area of fiscal policy they are commonly used to estimate the transitory elements in the budget resulting from cyclical fluctuations in economic activity so as to disclose the underlying fiscal position, which is generally referred to as cyclically-adjusted budget balance (CAB). In the EU fiscal surveillance the CAB is defined as:

(1) $$CAB = BB - CC = BB - \varepsilon \cdot OG$$

where *BB* stands for the nominal budget balance in percent of GDP and OG for the output gap, which in turn is defined as the percentage difference between actual GDP (Y) and potential GDP (Y^*), both expressed in real terms, i.e. $(Y - Y^*)/Y^* \cdot 100$. The parameter ε denotes the budgetary sensitivity, i.e. the change of the budget balance with respect to changes in the output gap.

The maximum level of the CAB which allows a country to let automatic stabilizers work freely without risking breaching the 3% of GDP reference value under normal cyclical circumstances is referred to as minimum benchmark. It is obtained as the difference between

the 3% of GDP reference value of the Treaty and the so-called safety margin, the budgetary impact during particularly weak cyclical conditions.[2]

The minimum benchmark is applied under the provisions of the preventive arm of the SGP, which through regular surveillance of fiscal developments and plans aims at (i) preventing budget deficits going above the 3% reference value of the Treaty and (ii) ensuring that Member States adjust their budgets towards sustainable positions in the medium-term. If the estimated CAB of a given year is found to be lower than the minimum benchmark, it is generally taken as an indication of a tangible or imminent risk for the nominal deficit to exceed the 3% of GDP reference value. Similarly, if Member States do not sufficiently improve or do not plan to sufficiently improve their underlying budgetary position each year, this may also be found to run afoul of the provisions of the preventive arm of the Pact.

Up until 2003 the Commission services had been regularly using the CAB and the minimum benchmark only as informal analytical tools for the analysis of the budgetary situation.[3] In March 2003, following the November 2002 Commission Communication 'Strengthening the co-ordination of budgetary policies', the ECOFIN Council adopted a report upgrading the status of the CAB from a complementary analytical tool to a key element to assess compliance with a number of SGP provisions.[4] Specifically, the report considered that the compliance with the close-to-balance or in surplus requirement of the unreformed Pact 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.[5] The official endorsement of the CAB resulted from the rather unsatisfying experience of monitoring budgetary policy in nominal terms. It became clear that the budgetary 'noise' stemming from cyclical variations precluded sensible conclusions about the underlying stance and thrust of fiscal policy. To overcome the problem of moving targets it was necessary to resort to a benchmark against which to measure and isolate the operation of automatic stabilisers, i.e. trend or potential output.

For many years the measure of the output gap used by the Commission services to calculate the CAB was exclusively based upon potential output estimates derived from the Hodrick-Prescott (HP) filter (see equation (2) below). In line with common practice, the smoothing parameter λ used by the Commission services to filter actual real GDP was set equal to 100. In terms of the distribution of different frequencies between trend and cycle λ=100 implies

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[2] Formally, the minimum benchmark MB is defined as $MB = -3 - \varepsilon \cdot ROG$ where ε denotes the budgetary sensitivity and ROG the 'representative output gap' capturing a particularly weak position in the cycle. Up until July 2006, the 'representative output gap' was computed as the simple average of the three following alternatives: (i) the largest negative output gap observed in the sample period; (ii) the un-weighted average of the largest negative output gaps in the EU Member States in the sample period; (iii) two times the standard deviation of the output gap taken with minus sign. On 29 July 2006 the Economic and Financial Committee (EFC) adopted a new method to be applied in the future, which we do not consider for our backward-looking simulations.

[3] The only official reference was in the 1998 and 2001 Code of Conduct on the content and format of stability and convergence programmes defining the CAB and, linked to it, the minimal benchmark as useful working instruments.

[4] ECOFIN Council Report 6877/03 of 7 March 2003, endorsed by the European Council of March 21 and 22 March 2003.

[5] Based on the Council report of March 2005, the one-size-fits-all close-to-balance or in surplus requirement was replaced by the requirement to achieve a country-specific medium-term objective which safeguards against the risks of breaching the 3% of GDP reference value of the Treaty and ensures long-term sustainability of public finances taking into account the impact of ageing populations.

that all cycles of up to eight-years are almost fully included into the cyclical component. Longer frequencies go into potential output.

In July 2002, based on work carried out by the Commission services together with the Member States, the Council of the European Union decided to move to a production function approach as reference method for calculating the output gap and to use the HP as a backup method during a transition period. Except for Spain, for which the Commission services are still using the HP filter as a backup method, the transition period was effectively closed in May 2004. [6]

In spite of the relatively recent change in methodology, our simulation described in detail in the next section is centred on the HP-filter for two reasons. Firstly, it allows for a longer sample period. Secondly, while providing a more structural setting to the calculation of potential output and the output gap the production function approach also involves the use of the HP filter, specifically, when calculating trend total factor productivity (TFP). Total factor productivity typically accounts for a very large part of GDP. Hence, *mutatis mutandis*, most of the conclusions of our simulation with the HP-filter are likely to carry over to the production function approach as well.

3. Simulation

Our data set covers the autumn forecasts for the EU15 countries, excluding Luxembourg, from 1998-2006.[7] For each calendar year t we have the budgetary projections over successive vintages of Commission services' autumn forecasts starting in year $t-2$ up until and including the outcome recorded in year $t+1$. Figure 1 below illustrates the structure of our data set.

For each Commission services' autumn forecast in year t, we use the historical figures of real GDP up until year $t-1$ available at the time of the forecast plus the Commission services' projections for real GDP, to construct alternative forecasts of potential output and the output gap for three different values of the smoothing parameter λ, notably λ=10, λ=1600 and λ=16000. The choice of the alternative values of the smoothing parameter λ is somewhat arbitrary. The value of 10 was chosen because according to the statistical literature (see Ravn and Uhlig, 2001) for annual data it roughly corresponds to the value of 1600 recommended by Hodrick and Prescott (1997) for quarterly figures. Conversely, the value of 16000 was simply chosen with a view to explore the effect of an 'excessive' degree of smoothing; it essentially amounts to the assumption that potential output follows a linear trend.

Apart from the variations in the smoothing parameter the estimation of potential output and the output gap carried out in our simulation fully replicates the approach followed by the Commission services'. First, we use the same starting point for the historical real GDP series, namely 1965. Second, in order to address the so called end-point problem of the real GDP series, the forecasts have been extended on the basis of country-specific time-series models for the next three year. The specification of the models is the one used by the Commission services.[8]

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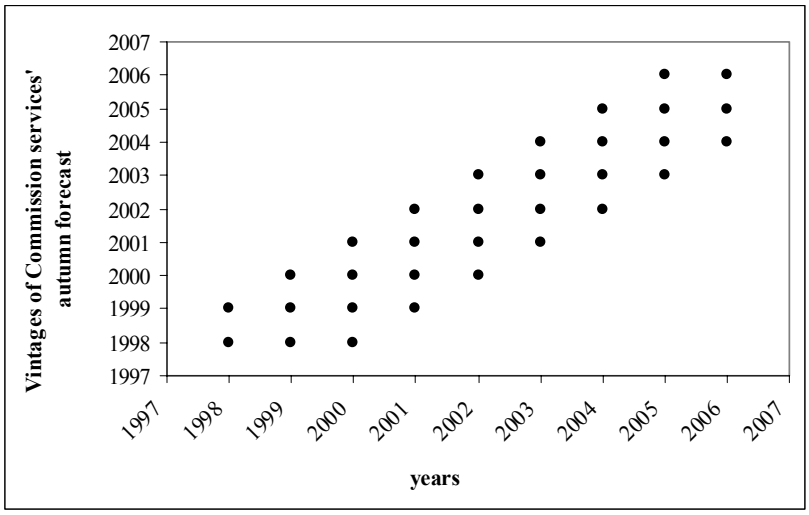
[6] For the sake of completeness, the Commission services continue to estimate potential output with both methods for all countries.

[7] We do not include Luxembourg because no estimates for the budgetary sensitivity parameter ε were available before autumn 2000.

[8] The Commission services' use ARIMA models to extent the GDP series beyond the last year of the forecast. They are country specific and in view of the annual frequency of the data generally very parsimonious.

Figure 1: Structure of the data set – Projections of specific years in successive vintages of Commission services' autumn forecasts



The output gap series obtained for different values of λ are in turn used to calculate alternative CABs and safety margins. Given that none of the alternative CAB series are *a priori* superior we judge them with respect to their potential implications for fiscal surveillance. The key questions are:

- What is the impact of different smoothing parameters on the assessment of the underlying budgetary position?
- How do alternative smoothing parameters affect the ability of the CAB and the safety margin to anticipate the occurrence of an excessive deficit?
- How does the assessment of the projected fiscal adjustment, as measured by the change in the CAB, evolve over successive forecasts for different λs?

As regards the first question, the litmus test for the CAB and safety margin of alternative λs will be whether the occurrence of an excessive deficit in subsequent years is anticipated or not, while preserving some leeway for fiscal stabilisation/smoothing. The emphasis on fiscal smoothing is important because a trivial way of maximising the probability of anticipating deficits in excess of 3% of GDP in practice would be to set λ equal to zero, which effectively amounts to focusing attention on nominal budget balances only.[9] Hence, it will be interesting to see how much cyclical smoothing is acceptable before the diagnostic accuracy worsens.

In actual practice the implications of different λs for a typical assessment cycle are assessed as follows. We compare the fiscal outturn of year *t-1* as recorded at the moment of the Commission services' autumn forecast of year *t,* with the projections for the same year *t-1* in the two preceding Commission services' forecasts, i.e. in year *t*-1 and *t-2*. We do not consider the two-year-ahead forecast, for two reasons. First, as mentioned before, its information content about the actual outturn can be taken to be relatively limited because it does not

[9] Note that lower levels of λ perform better in maximising the probability of anticipating excessive deficits in economic bad times when growth is below past trend values as has been the case in the recent experience. However, in case of temporary positive growth shocks, higher values of λ tend to give more cautious signals.

include the fiscal measures of future budgets. Second, it would reduce the size of our sample by one year; it is not available for the year 1999. Overall, this leaves us with 6 cases per country and for each choice of λ, in total 98 cases.

4. Results of the numerical simulation

The presentation of the results of our numerical simulation is in two parts. The first part reviews the general implications of different degrees of smoothing for the EU budgetary surveillance. It highlights the effects on the key diagnostic instruments. The second part looks more closely at whether and how the assessment of some specific country cases would have changed. Specifically, as regards the corrective arm of the Pact the focus will be on Germany, France and the Netherlands. In relation to the preventive arm we look at Germany, Spain, Ireland, the Netherlands, Portugal and the United Kingdom.

4.1 General results

The HP-filter is a purely statistical method. Due to its simplicity it is particularly popular in practice to separate a given time series into a trend and a cyclical component. This is achieved by minimising the following expression:

$$\textbf{(2)} \qquad \min_{Y_t^*} \sum_{t=1}^{T} \left(\left(Y_t - Y_t^* \right)^2 + \lambda \left(\Delta Y_{t+1}^* - \Delta Y_t^* \right) \right).$$

The parameter λ is the relative weight attached to the variability of the trend component Y^* vis-à-vis the deviation from the trend. This implies: the smoothness of the trend component Y^* increases with λ. In the frequency domain, the size of the smoothing parameter λ determines the distribution of frequencies between the trend and the cyclical component. A higher λ allocates a lower share of high frequency components to the trend Y^*; the rest goes into the cycle which tends to increase in size. In other words, a higher λ yields larger output gaps.

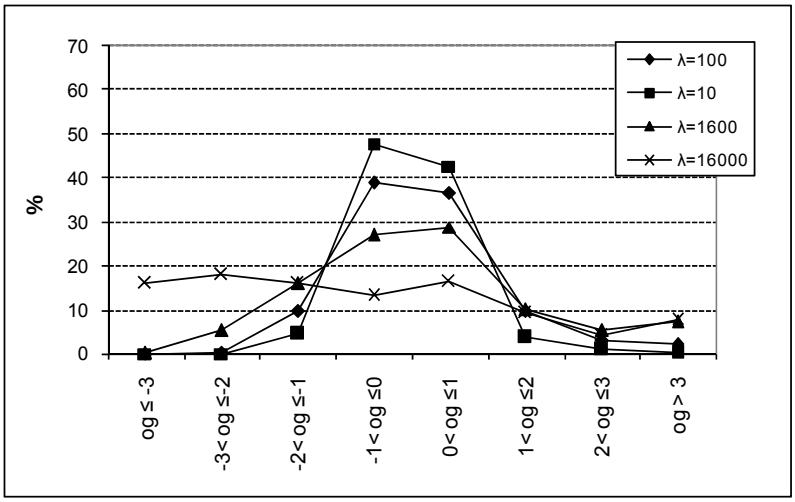
In the context of our numerical simulation, this general property is illustrated in Figure 2. It shows the frequency distributions of the output gap estimates of the fourteen euro area countries for the entire forecast period of the successive vintages of the Commission services' autumn forecast in 1998-2006; in total 504 observations (14 countries over 8 successive autumn forecasts, and 4 years per forecast with some missing data points at the beginning and the end of the sample).

The number of large output gap estimates, positive and negative, increases with the smoothing parameter λ. For λ=100 - the default value used by the Commission services – only 25% of the output gap estimates are larger than 1 or smaller than –1. This share drops to around 10% for λ=10 and climbs to slightly above 40% when λ=1600. In all three cases the frequency distribution remains broadly bell-shaped suggesting symmetry of the cycle. This feature disappears when λ reaches the extreme value of 16000. The frequency distribution is essentially flat and markedly skewed towards negative values. The reason for the thick negative tail is sample specific. It reflects the loss of economic momentum during the protracted economic downturn recorded after 2000, which due to the excessive degree of smoothing of the trend is taken to be largely cyclical.

In each successive autumn forecast the trend is adjusted only marginally in spite of the slowing of actual growth, giving rise to a consistently unfavourable assessment of the cyclical conditions, on the assumption that economic activity will bounce back to the original trend.

For the 504 data points of our sample λ=16000 yields only 188 positive output gaps as compared to around 240-260 for the other three values of the smoothing parameter.

Figure 2: Frequency distribution of output gap estimates of successive Commission services' autumn forecasts (1998-2006) for different λs: Euro area countries excluding Luxembourg.



In essence, an excessive smoothing virtually excludes the possibility of permanent shocks. This is particularly evident in terms of the estimates of potential output growth which, as shown in the country-specific Figure 3, are adjusted only very gradually for λ=16000 compared to lower values of the smoothing parameter. Such a pattern is at odds with perceived wisdom that the post-2000 downturn was largely permanent at least in the larger countries such as Germany, Italy and to some extent France. While the downward adjustment of potential growth estimates was quicker with a lower degree of smoothing, Figure 3 shows a rather volatile pattern in potential output growth for λ=10 and λ=100, which clashes with the common intuition according to which potential output growth should adjust rather gradually. The saw like pattern obtained with a low degree of smoothing reveals a recurring behaviour in economic forecasting observed during the post-2000 downturn. Since the downturn was thought to be short-lived, forecasters, including the Commission services, typically projected a quick and significant rebound of economic growth in the outer years of the forecast period. With a low degree of smoothing such hopes were passed on to estimates of trend output.

Figure 3: Real-time potential output growth projections of successive Commission services' autumn forecasts (1998-2006) for different λs: Germany, France and Italy.

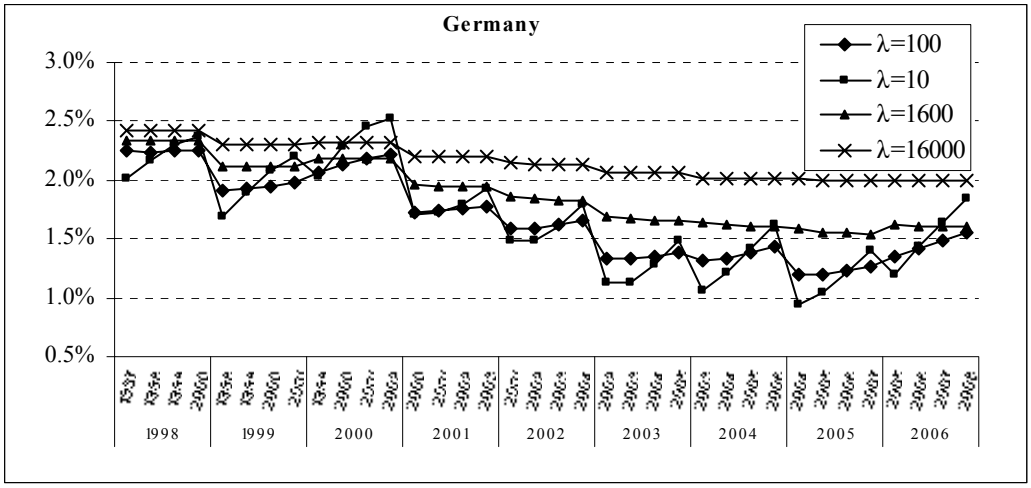
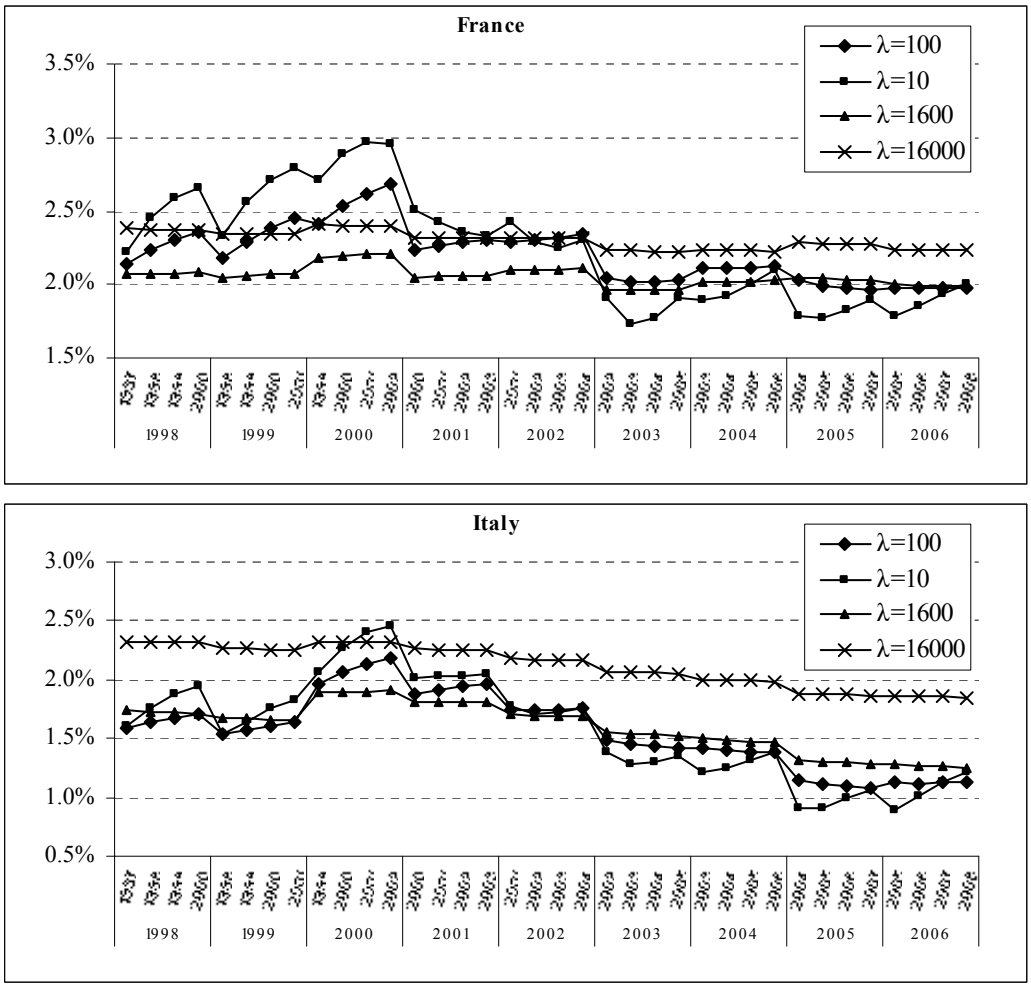
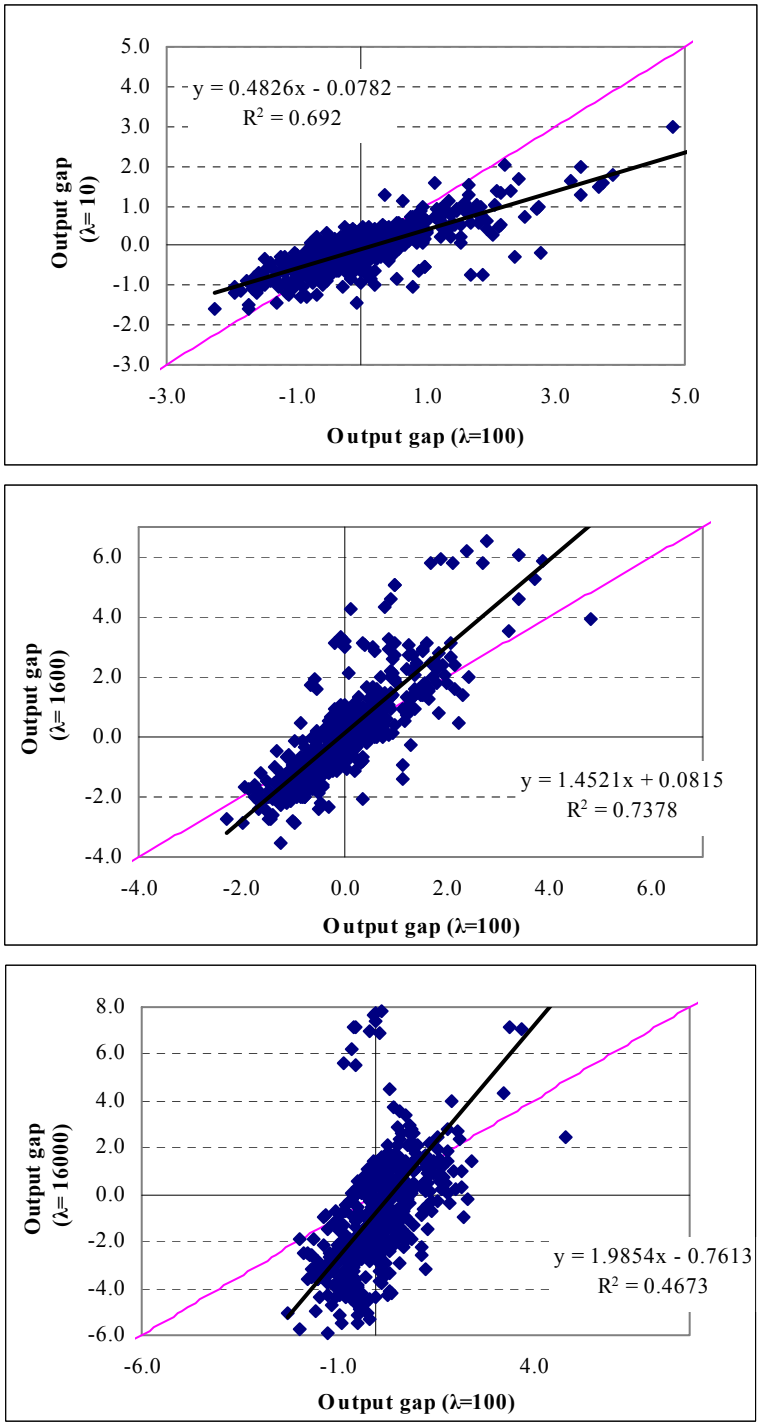


Figure 3 (continued): Real-time potential output growth projections of successive Commission services' autumn forecasts (1998-2006) for different λs: Germany, France and Italy.



An alternative way of illustrating the impact of different degrees of smoothing is presented in Figure 4, which plots the output gap estimates for λ=10, 1600 and 16000 against those of the default value of 100. The 45-degree line splits the two-dimensional space into the south-eastern area, which hosts output gap estimates that are higher for λ=100 and the north-western area where output gap estimates are lower for λ =100.

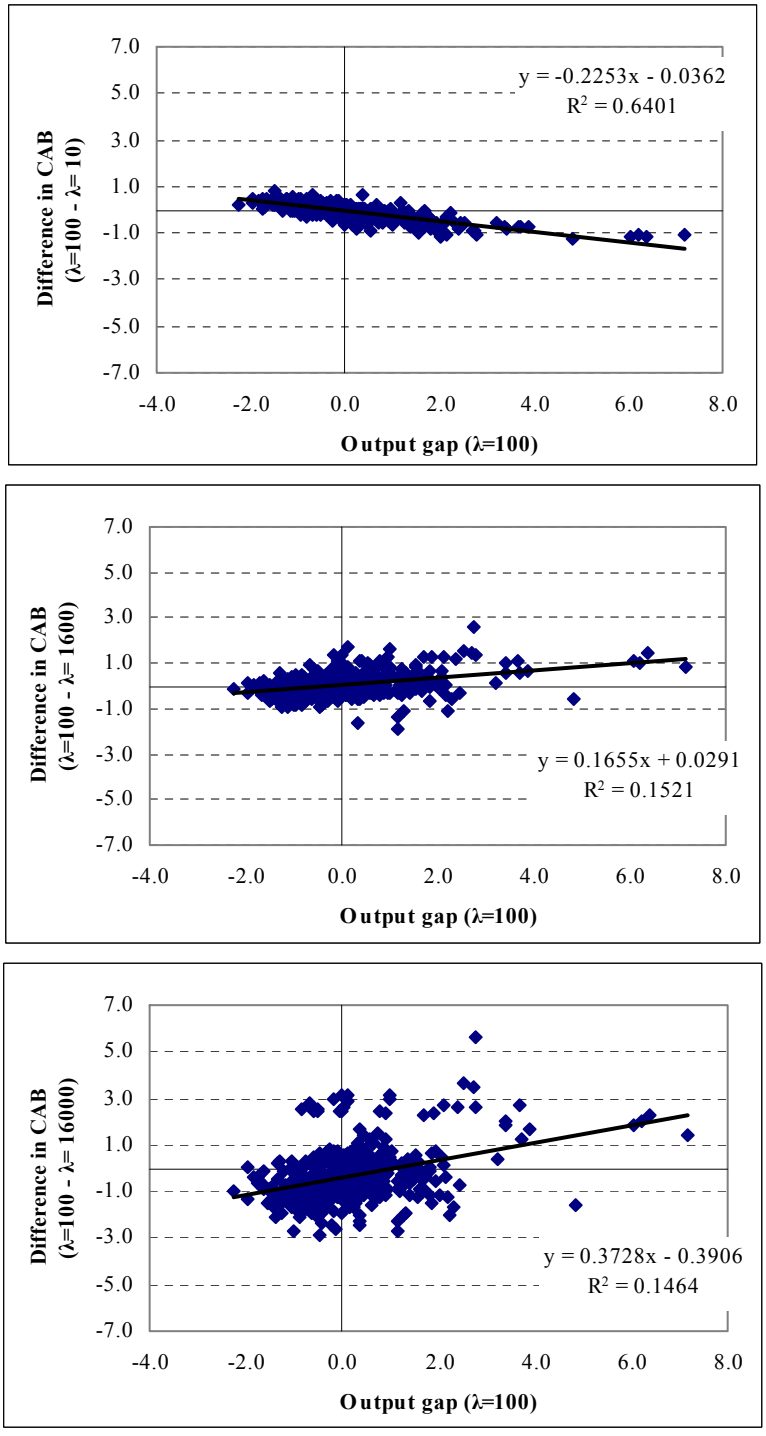
Figure 4: Output gap estimates in successive Commission services' autumn forecasts (1998-2006) for different λs: Euro area countries excluding Luxembourg.



The patterns emerging from our simulation are fairly clear: higher (lower) smoothing tends to amplify (dampen) the estimated output gaps. The size of the output gap is roughly halved when λ is reduced to 10 and is inflated by about 50% when λ is increased to 1600. In both cases the variation of the smoothing parameter leads to a rotation around the origin of the Cartesian-cross. This element of symmetry is not preserved when λ is increased to 16000. On top of the amplification of negative and positive output gaps there is a clear shift of the average output towards negative territory corresponding to the thicker negative tail in the

frequency distribution, hence reflecting the persistent pessimism about the cycle and, equivalently, the persistent optimism about the trend.

Figure 5: Real-time estimates of the CAB in successive Commission services' autumn forecasts (1998-2006): The impact of alternative values of the smoothing parameter *λ*.



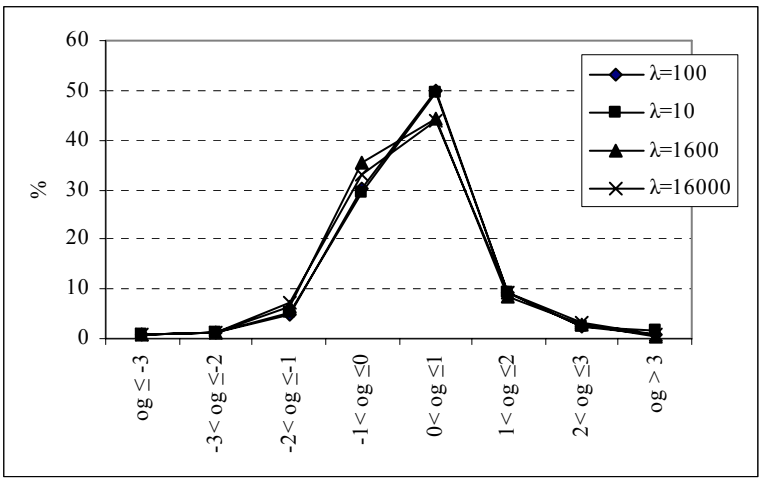
Variations of the output gap associated with different degree of smoothing impact the CAB in a dual way. For a given nominal budget balance, a larger negative output gap has an improving effect, a larger positive output gap a deteriorating effect on the assessment of the underlying budgetary position. Figure 5 illustrates the numerical effects in our sample. The size of the impact is typically dampened by the budgetary sensitivity of the budget, the parameter ε in Equation 1, which in practice is generally estimated at around between 0.5 (see

Girouard and Andre, 2005). Hence, for λ=10 the CAB deteriorates as compared to the default value of the smoothing parameter by only around 0.2 percentage point for each percentage point of the output gap when actual output is below potential; it improves by the same proportion for positive output gaps. The sign of the effect changes for λ=1600, i.e. the CAB improves (deteriorates) for negative (positive) output gaps, yet is similar in size. In case of an excessive smoothing (λ=16000), the effect is significantly larger and goes along with a more general improvement of the CAB.

Under the provisions of the SGP, the effect of different degrees of smoothing on the CAB would overall be relatively moderate, yet could have measurable implications for the assessment of a country's position with respect to its medium-term budgetary objective. A higher degree of smoothing would lead to a somewhat laxer judgment in economic bad times, and it would be consistent with a stricter judgment in economic good times. In particular, the required fiscal adjustment to achieve the medium-term budgetary objective could be assessed to be somewhat lower when economic conditions are less favourable and higher when they are favourable.

At first sight, the uncertainty about the level of the CAB does not seem to carry over to its change over time. Different λs, even extreme values, make little or almost no difference in terms of the frequency distribution of the estimated changes in the CAB. As shown in Figure 6 the lines are very close for the four degrees of smoothing considered and hence seem to confirm the to practitioners familiar observation that changes in the CAB are relative robust across different methods. However, this picture is somewhat deceiving. While the frequency distributions are very close, the distribution across time is significantly affected by the choice of the smoothing parameter λ. This will become clear when discussing country-specific cases below. [10]

Figure 6: Frequency distribution of changes in the CAB in successive Commission services' autumn forecasts (1998-2006) for different λs: Euro area countries excluding Luxembourg.



Turning to the objective of forestalling the occurrence of excessive deficits during a typical assessment cycle of the SGP our sample includes 18 cases in which the nominal deficit in year *t-1* was estimated above 3% of GDP in the Commission services' forecast of year *t*, which would normally trigger the excessive deficit procedure, more specifically the Commission would present a report according to Article 104(3) of the Treaty. As shown in

[10] The similarity of the frequency distribution of changes in the CAB for different smoothing parameters is linked to the fact that the application of two filters i.e. the HP and first differences, tend to remove the same type of variations in the frequency domain.

Table 1, for the default value of λ=100 all those 18 cases where correctly anticipated by a negative safety margin in the Commission services' forecast of the preceding year, that is year *t-1*. The same would have been true for λ=*10* and λ=1600, suggesting that alternative degrees of smoothing do not seem to affect the diagnostic accuracy for the forecast of the current year. Only when λ is set equal to 16000 one of the 18 cases of nominal deficit in excess of 3% of GDP would have escaped attention. However, the leakage increases significantly for the one-year-ahead forecast, when with λ=16000 only 11 out the 18 cases are correctly anticipated by a negative safety margin. The score is markedly better yet not optimal for the three other values of the smoothing parameter.

Table 1: Nominal deficit in excess of 3% of GDP and negative safety margins in preceding Commission services' forecasts (1998-2006): Euro area countries excluding Luxembourg.

	Nominal deficit in excess of 3% of GDP	**Safety margin < 0**							
		Smoothing parameter λ							
		100		10		1600		16000	
Reporting year	*t-1*	*t-1*		*t-1*		*t-1*		*t-1*	
Commission autumn forecast	*t*	*t*	*t-1*	*t*	*t-1*	*t*	*t-1*	*t*	*t-1*
Count	18	18	16	18	15	18	17	17	11

The diagnostic accuracy of the CAB for different degrees of smoothing can also be tested by estimating a binary choice model, which in addition to the safety margin can control for other variables affecting the odds of exceeding the 3% of GDP threshold. For our purposes the following *probit*-model was used:

(3) $$ex_{t-1,t} = \beta_0 + \beta_1 sm_{t-1,t-i} + \beta_2 \Delta cab_{t-1,t-i} + \beta_3 (pw_{t-1,t} - pw_{t-1,t-i}) + e_t \quad for\ i=1,2.$$

where $ex_{t-1,t}$ takes the value 1 when the nominal deficit of year *t-1* as estimated in year *t* is higher than 3% of GDP, and 0 otherwise. $sm_{t-1,t-i}$ and $\Delta cab_{t-1,t-i}$ denote the safety margin and the change in the CAB for year *t-1*, respectively, both projected in year *t-i*. The third explanatory variable measures the revision of potential output growth in year *t-1* as projected in year *t-i*.

Our *a priori* concerning the coefficients in Equation (3) are that they should all have a negative sign: β_1 because a higher safety margin for year *t-1* projected in year *t-i* is expected to decrease the probability of a nominal deficit in excess of 3% of GDP; β_2 for the reason that an improvement in the underlying budgetary position should help stem the risk of exceeding the 3% of GDP threshold for the deficit; β_3 because an upward revision of growth should *ceteris paribus* go along with an improvement of the budgetary position.

The estimation results, which are summarised in Table 2, broadly confirm these *a priori*. This is particularly true for the safety margin. The estimate for β_1 has the expected negative sign and is statistically significant. It has the largest size for λ =100 and is only slightly lower for λ=10 and λ=1600. Conversely, it is essentially halved for λ =16000. The coefficients of the

change in the CAB and the revision of potential output growth, while mostly carrying the expected algebraic sign, do not turn out to be statistically significant at conventional levels.[11]

Table 2a and 2b: *Probit* model for nominal deficit above or below the 3% of GDP threshold Results of maximum likelihood estimation.

	Estimated coefficients					
Smoothing parameter λ	β_1	*prob. value*	β_2	*prob. value*	β_3	*prob. value*
10	-1.49	0.00	-0.38	0.33	21.11	0.82
100	-1.14	0.00	-0.38	0.35	1.12	0.99
1600	-1.21	0.00	-0.28	0.37	19.38	0.88
16000	-0.67	0.00	-0.04	0.86	-240.03	0.32

Note: The estimates reported in the table refer to the following Probit equation $ex_{t-1,t} = \beta_0 + \beta_1 sm_{t-1,t-i} + \beta_2 \Delta cab_{t-1,t-i} + \beta_3 (pw_{t-1,t} - pw_{t-1,t-i}) + e_t$ for i=1,2 where $ex_{t-1,t}$ takes the value 1 when the nominal deficit of year t-1 as estimated in year t is higher than 3% of GDP, and 0 otherwise. $sm_{t-1,t-i}$ and $\Delta cab_{t-1,t-i}$ denote the safety margin and the change in the CAB for year t-1, respectively, both projected in year t-i. The third explanatory variable measures the revision of potential output growth in year t-1 as projected in year t-i. Sample period: 1998-2006. Countries: EU15 excluding Luxembourg.

	Estimated coefficients					
Smoothing parameter λ	β_1	*prob. value*	β_2	*prob. value*	β_3	*prob. value*
10	-0.61	0.00	-0.15	0.42	-37.86	0.51
100	-0.47	0.00	-0.17	0.38	-17.66	0.68
1600	-0.68	0.00	-0.20	0.27	-25.08	0.78
16000	-0.34	0.00	-0.02	0.87	0.16	0.26

Note: The estimates reported in this table refer to a variation of the Probit model shown in the note to Table 2a. Specifically, the sum of the safety margins and the sum of the change in the CAB over two successive Commission services' forecasts are used as explanatory variables: $ex_{t-1,t} = \beta_0 + \beta_1 (sm_{t-1,t-1} + sm_{t-1,t-2}) + \beta_2 (\Delta cab_{t-1,t-1} + \Delta cab_{t-1,t-2}) + \beta_3 (pw_{t-1,t} - pw_{t-1,t-2}) + e_t$ for i=1,2.

As a last point in this section we focus on the revisions of the output gap and the CAB estimates across time. Real-time estimates of the output gap and in turn of the CAB tend to be significantly revised with the arrival of new data of the successive years, which generally has implications for the assessment of fiscal policy. For instance, an output gap that was estimated to be close to zero or negative in real time may turn out to actually have been sizeably positive. In that case, hindsight may show that the fiscal policy stance chosen at the time may not have been appropriate.

[11] Both the results of the counting exercise reported in Table 1 as well as the estimates displayed in Table 2 are based on the assumption that the minimum benchmarks remain constant for different smoothing parameters λ. This is a simplification taking into account that the estimates of the minimum benchmark incorporate estimates of the output gap (see footnote 2). Hence, a different choice of λ not only affects the CAB, it should also have an impact on the minimum benchmark. Specifically, a higher (lower) λ tends to increase (reduce) the size of the output gap estimates which in turn increase (reduce) the safety margin that protects against the risk of breaching the 3% of GDP threshold. In practice, the CAB and the minimum benchmark should actually move into the same direction: a more favourable assessment of the underlying budgetary position should go along with a stricter benchmark. Against this backdrop our simulations may actually exacerbate the effect of different λs for budgetary surveillance. Taking explicitly account of the effects of different λs on the minimum benchmark is a possible extension to our work.

In our simulation two different perspectives are of interest: (i) the revisions throughout a typical assessment cycle of the EU surveillance framework i.e. the revision of a given year in three successive Commission services' autumn forecasts; and (ii) the revisions between the first estimate in real time and the estimate based on the latest available information.[12]

In both cases the main conclusions turn out to be similar: choosing a smooth trend for GDP increases the degree of uncertainty attached to output gap estimates. This is already evident over a period of three years or three successive Commission services' autumn forecasts. In our sample, both the average of the absolute value of the revisions as well as the variance increase with the value of the smoothing parameter λ (see Table 3). In terms of the algebraic sign of the output gap estimates, a high smoothing parameter seems, at first glance, to yield more stable results. However, this is simply due to the fact that the estimates tend to be much bigger in size, so that even large revisions may leave the algebraic sign of the estimate unaltered at least over a short period of time.

Table 3: Revisions of output gap for a given year *t* between Commission services' forecast in year *t-1* and year *t+1* (1998-2006): Euro area countries excluding Luxembourg.

		Smoothing parameter λ			
		100	10	1600	16000
Output gap	average absolute revision	0.8	0.6	1.1	1.1
	variance of absolute revision	0.5	0.2	0.7	0.9
	sign change	32.7%	27.6%	22.4%	17.3%
CAB	average absolute revision	1.2	1.1	1.2	1.2
	variance of absolute revision	0.9	0.8	0.9	0.9

The volatility of the output gap estimates for λ=16000 becomes even more clear-cut as data of additional years arrive. The estimates of the years 1999, 2000 and 2001 in successive Commission services' autumn forecasts including the latest available one (autumn 2006) are particularly striking examples. Figure 7 shows the respective numbers for the three largest euro area countries Germany, France and Italy. In all three cases a very high degree of smoothing goes along with particularly large swings in the output gap estimates for a given year, implying that from an *ex post* point of view fiscal policy will almost certainly be judged to have been wide off the mark. The revisions are not exactly negligible for lower values of λ either, yet their size is more contained. Conceptually, the big 'surprises' are *inter alia* a reflection of the type of underlying economic model that goes with a very high degree of smoothing. It essentially assumes that actual output evolves around a virtually stable trend, a pattern that does not fit the data. In line with the original findings of Nelson and Plosser (1982) for the US, the by now prevailing view is that economic activity follows a stochastic trend; i.e. shocks produce permanent effects. Choosing a very large smoothing parameter essentially amounts to denying the existence of permanent shocks. The findings of Nelson and Plosser (1982) about the nature of economic fluctuations have been confirmed for most EU countries; see for instance Darne and Diebolt (2004).

[12] For the purpose of our simulation the latest available estimates were those of the Commission services' autumn 2006 forecast.

Figure 7: Output gap estimates in successive Commission services' autumn forecasts (1998-2006): Germany, France and Italy.

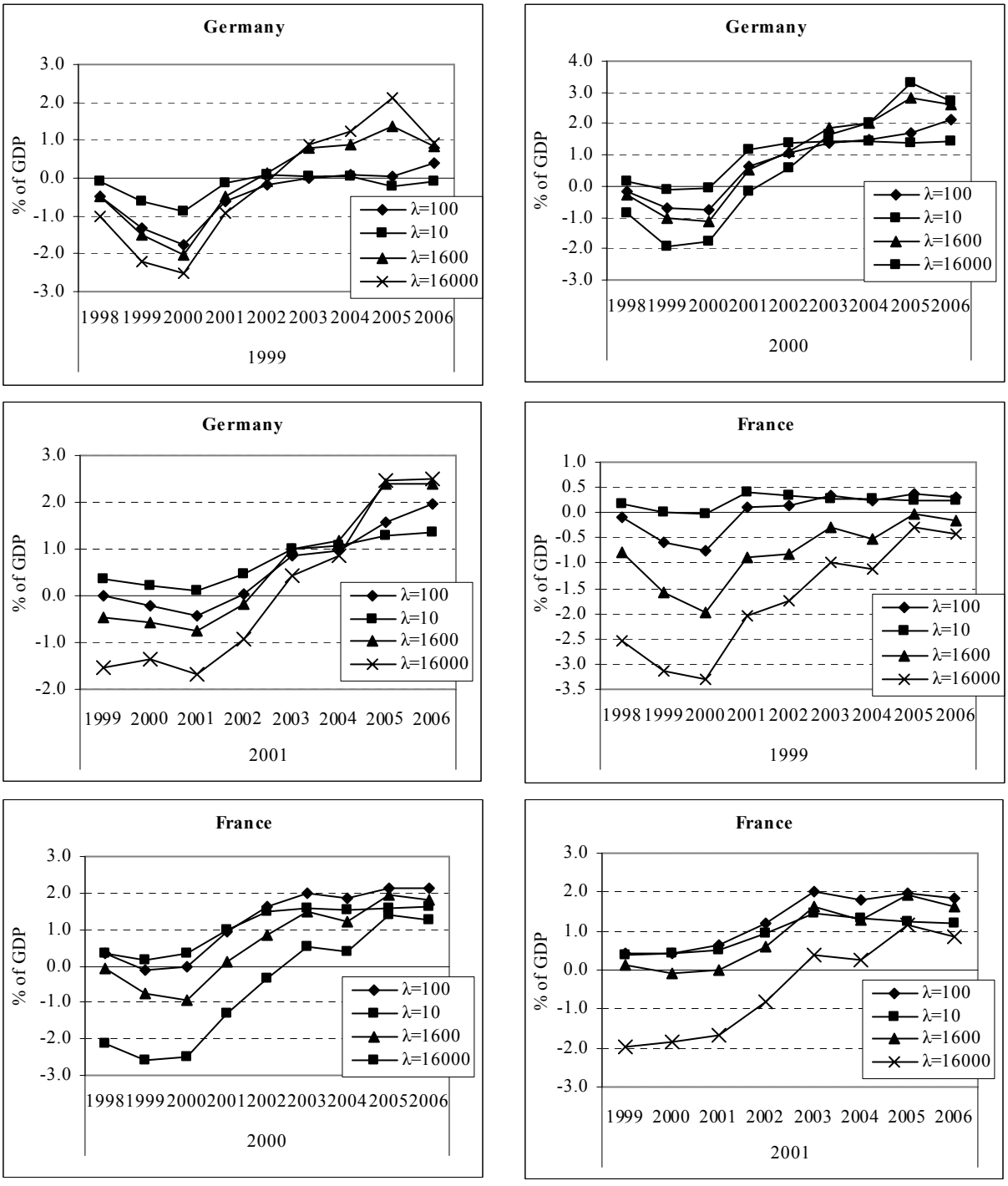
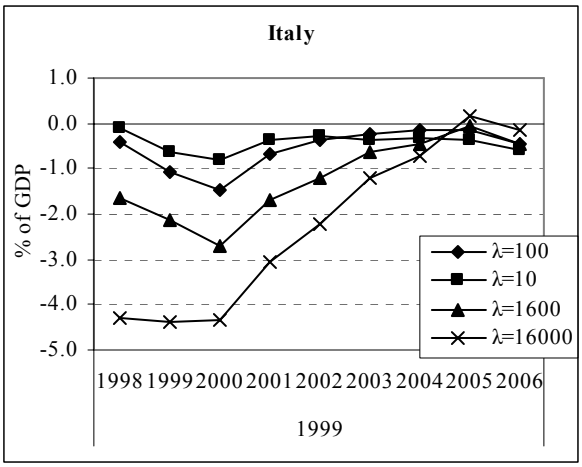
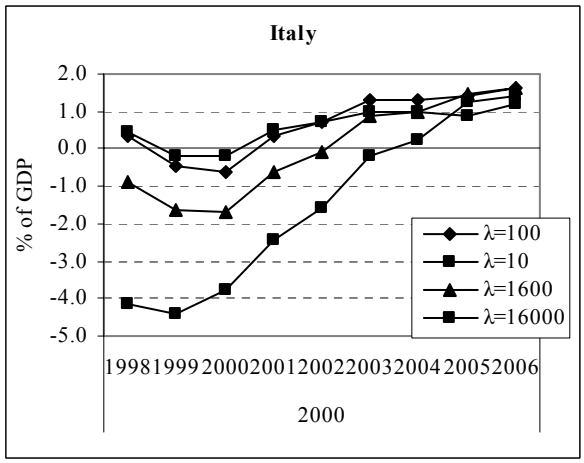
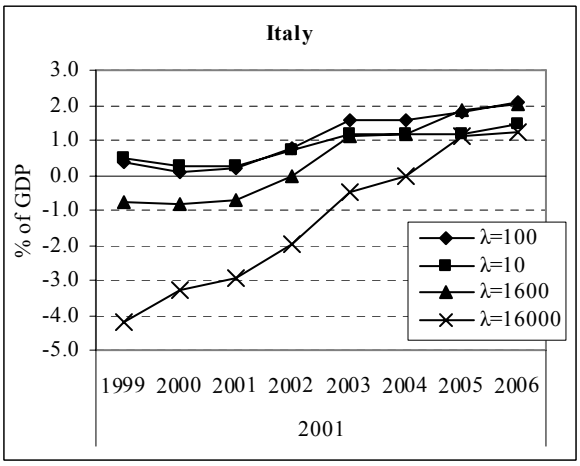


Figure 7 (continued): Output gap estimates in successive Commission services' autumn forecasts (1998-2006): Germany, France and Italy.







4.2 Prominent country cases: Would a different degree of smoothing have made a difference?

In this section we will tentatively assess whether a different degree of smoothing could have made a difference in fiscal surveillance under the SGP in some selected country cases. First, we look at the corrective arm of the SGP. As the entry into and exit out of the excessive deficit procedure is guided by nominal deficit figures, we focus on the required fiscal efforts in the policy recommendations and the assessment of compliance with these recommendations. Secondly, we consider whether a different degree of smoothing would have sent different signals in the preventive arm of the Pact.

4.2.1 Corrective arm

If the Council decides on the existence of an excessive deficit, it recommends an annual fiscal effort to the Member State in order to ensure that the nominal deficit is reduced below the reference value in a sustainable manor by the set deadline. Since the 2005 reform of the Pact, a change in the structural balance (i.e. cyclically adjusted balance net of one-off and temporary measures) of at least 0.5% is required. While the reason for failure to take the deficit below the reference value by the deadline for correction of the excessive deficit had no material impact on the procedure before the 2005 SGP reform, it does play an important role in the revised SGP. If a Member State achieves the fiscal effort, but does not reduce the deficit below the reference value by the deadline set by the Council solely due to unforeseen

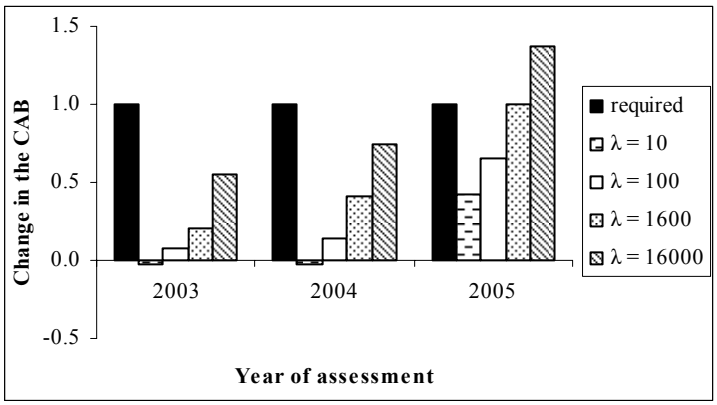
economic developments outside the control of the government, a move to the following step in the excessive deficit procedure (closer to sanctions) can be avoided and the deadline for the correction of the excessive deficit can be extended. In this way, the revised SGP makes a difference between policy and forecast errors.

We will look at the assessment of the fiscal effort; whether the country in the EDP complied with the recommended improvement in the cyclically-adjusted or structural balances. It should be considered that we do not redo the full assessment, we only analyse to what extent a different degree of smoothing would have affected one important indicator of the fiscal effort (the change of the CAB) and whether it could have given different signals about the fiscal policy effort on the basis of the data in some selected cases. The countries we look at are Germany, France and the Netherlands. We do not look at Portugal in the assessment of compliance with the required fiscal effort, because no explicit fiscal effort in cyclically-adjusted terms had been defined by the Council when it issued its recommendation in 2002. Neither do we look at the more recent cases, for which the time frame is rather short to make an assessment of the impact of different degrees of smoothing.

Germany

Following evidence of a government deficit above 3% of GDP in 2002, the Council decided in spring 2003 that an excessive deficit existed in Germany and it adopted a recommendation under Article 104(7) of the Treaty with a view to bring this situation to an end by 2004. To this end, Germany was required to take measures amounting to an improvement in the structural balance (i.e. the cyclically-adjusted budget balance net of one-off and temporary measures) by 1 % of GDP cumulated over 2003 and 2004.

Figure 8: Germany - Cumulated change in the CAB over 2003 and 2004.



In autumn 2003, the Commission considered that the actions taken by Germany were inadequate to correct the excessive deficit. Figure 8 shows the fiscal effort measured by the change in the CAB.[13] Looking at the projected change of the CAB over 2003 and 2004 when it was assessed in autumn 2003, it fell far short of the required 1 percent of GDP on the basis of all parameters λ considered in our simulation. On the basis of a low λ, the underlying fiscal position showed no improvement at all, while on the basis of very high λ, the improvement was limited to ½ percent of GDP.

The Commission recommended to the Council to move to the next step in the excessive deficit procedure and adopt a decision giving notice to Germany under Treaty article 104(9)

[13] Note that the forecast for the 2004 nominal deficit was at the time, before the reform of the SGP in 2005, the guiding criterion to decide a move to the next step of the procedure.

to take measures to remedy the situation. In the light of the weaker-than-expected economic situation, the Commission recommended that the deadline for correcting the deficit should be extended by one year to 2005. The Council voted on the recommended decisions but did not achieve the required majority.

On the basis of the information available at the time, the Commission's recommendation to move to the next step of the excessive deficit procedure would not have been affected by looking at other measures of the CAB. And, even if the rules of the revised Pact would have applied at the time, a notice under article 104(9) would have been called for by the data, as the required structural effort had not been met.

With the available data in autumn 2004, the overall situation had improved only marginally and the choice of λ would still not have made a difference in the assessment. By that time, the EDP procedure of Germany and France were in an unclear legal situation after the failure of the Council to adopt the Commission recommendation in November 2003.

In 2005, the situation had changed significantly. If the fiscal effort over 2003 and 2004 would have been assessed in 2005, different degrees of smoothing would have led to different conclusions about compliance with the required structural adjustment effort. The commonly used λs of 10 and 100 would have still signalled a significant shortfall of the fiscal effort and indicated that a fiscal policy error or fiscal slippage was at the origin of the failure to correct the excessive deficit. They attribute little of the revenue shortfalls to cyclical effects as the potential growth rate estimate for the period 2003-2005 ranges from 0.9 to 1.1 % for a λ of 10 to 1.2% for a λ of 100. The higher λs, which assume a more stable potential or trend growth, would indicate compliance with the fiscal requirement. The failure to correct the excessive deficit would be attributed to a deterioration of cyclical conditions, as potential growth for a λ of 1600 was estimated at around 1.6%.

France

Like for Germany, the Council decided in spring 2003 that an excessive deficit existed in France following evidence of a government deficit above 3% of GDP in 2002. It adopted a recommendation under Article 104(7) of the Treaty with a view to bring this situation to an end by 2004 at the latest. To this end, France was required to take measures amounting to an improvement in the structural balance (i.e. the CAB net of one-off and temporary measures) of 0.5% of GDP in 2004. For 2003, the recommendation said that the French authorities should achieve a significantly larger improvement in the CAB in 2003 than that planned at the time. As a deterioration in the CAB was forecast in spring 2003, we assume that this recommendation for 2003 implied that the CAB should at least improve. It also recommended that the CAB should be improved by a larger amount if necessary to ensure that the cumulative improvement in 2003-2004 would be enough to bring the nominal deficit below 3% in 2004 at the latest, emphasising that the nominal requirement was the main element in the assessment.

In autumn 2003, the Commission considered that – as in the case of Germany - the actions taken by France were inadequate to correct the excessive deficit. Figure 9 shows the fiscal effort measured by the change in CAB. Looking at the projected change in the CAB over 2003 and 2004 when it was assessed in autumn 2003, it fell short of the required 0.5 % of GDP minimum improvement on the basis of all λs considered. More importantly, the CAB was projected to deteriorate in 2003 (Figure 10). Again the choice of λ made no material difference.

The Commission recommended to the Council to move to the next step in the excessive deficit procedure and to adopt a decision giving notice to France under Treaty article 104(9)

to take measures to remedy the situation. In the light of the weaker-than-expected economic situation, the Commission recommended that the deadline for correcting the deficit should be extended by one year to 2005. The Council voted on the recommended decisions but did not achieve the required majority.

There is however a remarkable difference with the assessment of the German fiscal effort on the basis of the ex-post data available in 2005. While for Germany the choice of λ does lead to a different assessment *ex post* of the fiscal effort in 2003 - 2004, in France the difference between the measures remains rather small.

Figure 9: France- Cumulated change in the CAB in 2003 and 2004.

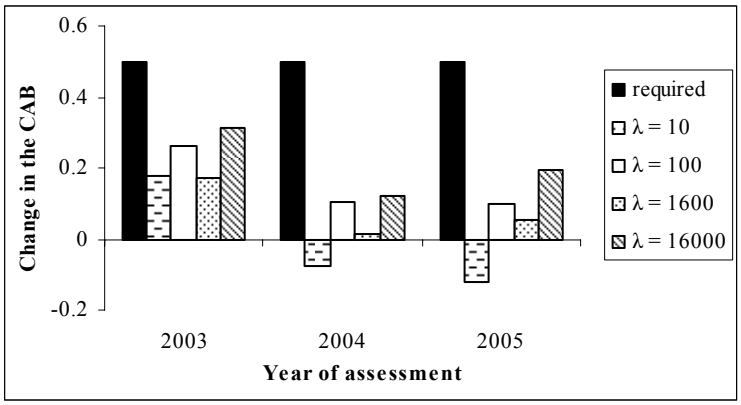


Figure 10: France - Change in the CAB in 2003.

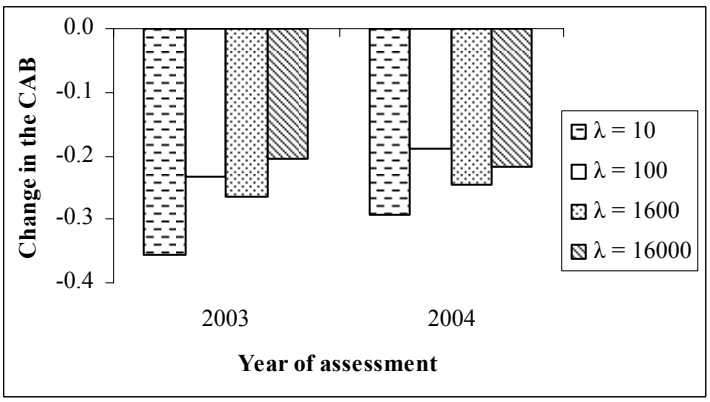
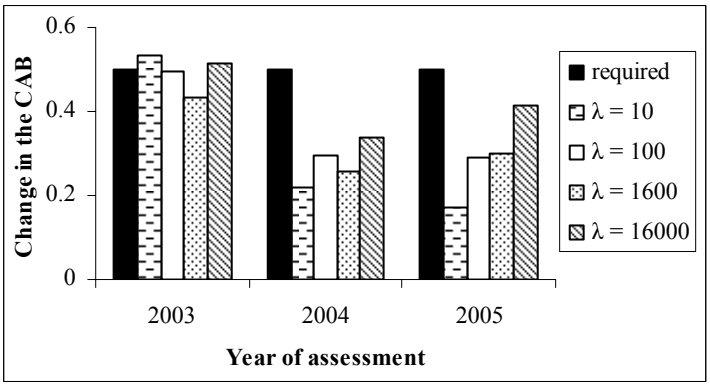


Figure 11: France - Change in the CAB in 2004.



Netherlands

The case of the excessive deficit in the Netherlands is an interesting one, as it arose from a very quick reversal of economic fortunes. The Netherlands came from a prolonged period of high growth and a perception of high growth potential with real GDP growth averaging 3.7% in the second half of the 1990s. In this context, the budgetary position was perceived to be close to balance or in surplus. The deterioration of the budgetary situation in 2003 was abrupt and unexpected and it made the effort to bring the deficit below 3% of GDP larger than expected in the 2003 budget.

In the light of a reported general government deficit of 3.2% of GDP in 2003 and considering the risk that the deficit might stay above 3% of GDP in 2004, the Council decided in spring 2004 that an excessive deficit existed in the Netherlands. It recommended the government to put an end to the excessive deficit by 2005 at the latest. To that end, the government should implement a package of measures that it had adopted shortly before of 0.6% of GDP in 2004 and it should take structural measures amounting to at least 0.5% of GDP in 2005. The Commission and the Council considered in autumn 2004 that the Netherlands had taken effective action.

In this context, there is a remarkable difference in signals coming from the measures of changes in the CAB on the basis of the different smoothing parameters λ. The higher levels of λ, which reflect the assumption that the growth slowdown was largely temporary and potential output growth remained rather high, signal a rather large improvement in the CAB. The lower degrees of smoothing (in particular $\lambda = 10$) reflect the assumption that potential growth declined requiring more fiscal adjustment to avoid rapid deterioration of the CAB. An assessment on the basis of λ=10 in autumn 2004 would have signalled that the fiscal effort in that year would fall far short of the required 0.6% of GDP and further efforts would have been needed. In fact, it showed an improvement in the CAB of merely 0.1% (Figure 13).

In spring 2005, the nominal deficit outcome for 2004 of less than 3% of GDP and the forecasts for a further decline in the deficit led the Commission and the Council to abrogate the excessive deficit procedure for the Netherlands.

Figure 12: The Netherlands - Cumulated change of the CAB over 2004 and 2005.

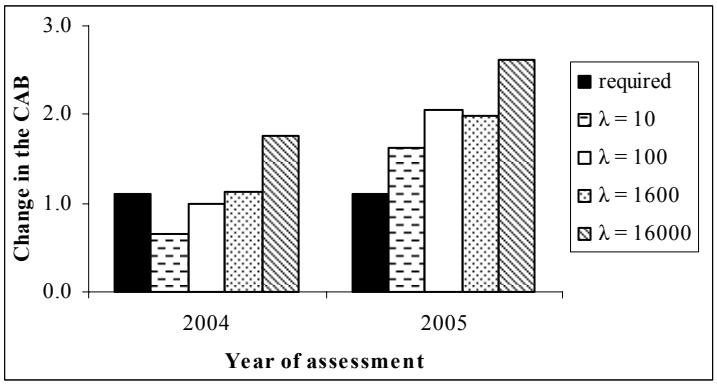


Figure 13: The Netherlands - Change of the CAB in 2004.

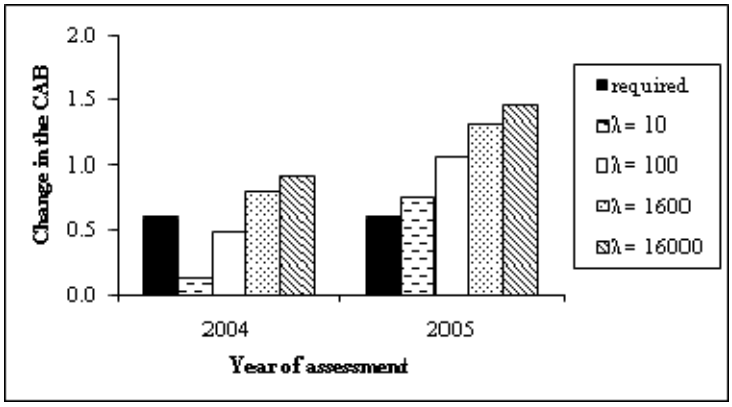
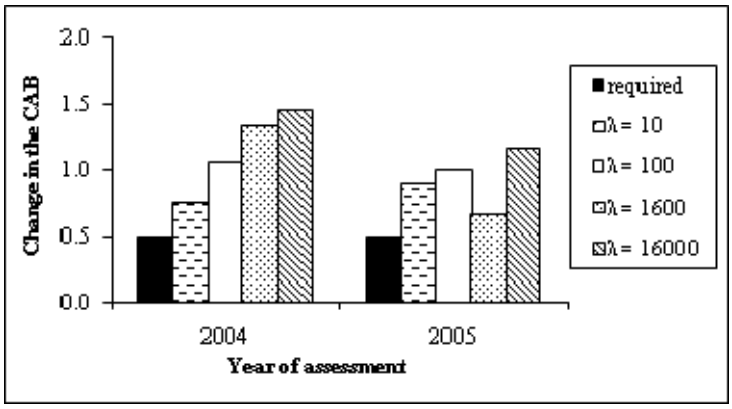


Figure 14: The Netherlands - Change of the CAB in 2005.



4.2.2 The preventive arm of the Pact

The preventive arm of the Pact establishes a requirement for Member States to ensure the necessary room for manoeuvre for cyclical stabilisation through the working of the automatic stabilisers without the 3% of GDP reference value for deficits being breached. It also asks Member States to move towards or maintain sustainable budgetary positions in the medium term (see e.g. Buti and Sapir, 2002).[14]The Council can exert peer pressure and raise its concern about budgetary developments and possibly an increased risk of breaching the 3% of GDP reference value in the future by means of an 'early warning' or in its Opinion on the annual stability or convergence programme update.[15]

Below, we will look at several country cases to assess whether and to what extent alternative degrees of smoothing would imply differences in the CAB and thus different signals about the safety margin and the risk of occurrence of an excessive deficit.

In the case of France, Germany and Italy, CAB estimates for a relatively low degree of smoothing (λ equal to 10 and 100) indicated risks of breaching the reference value in the

[14] In addition, it would lead to a rapid reduction of the government debt to GDP ratio, also lowering the interest burden.

[15] In general, 'early warnings' have been initiated when the forecast for t+1 showed a nominal deficit above 3% rather than on the basis of the CAB and a breach of the safety margin.

year(s) before it occurred. Using higher values for the smoothing parameter, the signals were less strong, especially in France (2000 and 2001) and Italy (2001-2004). In general, in these countries, the underlying budgetary position seemed more sound with smoother potential output measures. In Italy, the difference with the extremely rigid potential growth estimate (λ=16000) is particularly large because the slowdown was sharp and protracted. Conversely, for the Netherlands, the higher levels of λ (especially 1600) proved to be better indicators of the underlying budgetary position in 2002 because unlike in Italy the bust was followed by a relatively quick recovery to comparatively high growth rate. This is an indication that the appropriateness of a specific the degree of smoothing may in principle change over time and across country.

Figure 15: Real time CAB estimates in 1999-2005 with different smoothing parameters λ: Germany, France, Italy and the Netherlands.

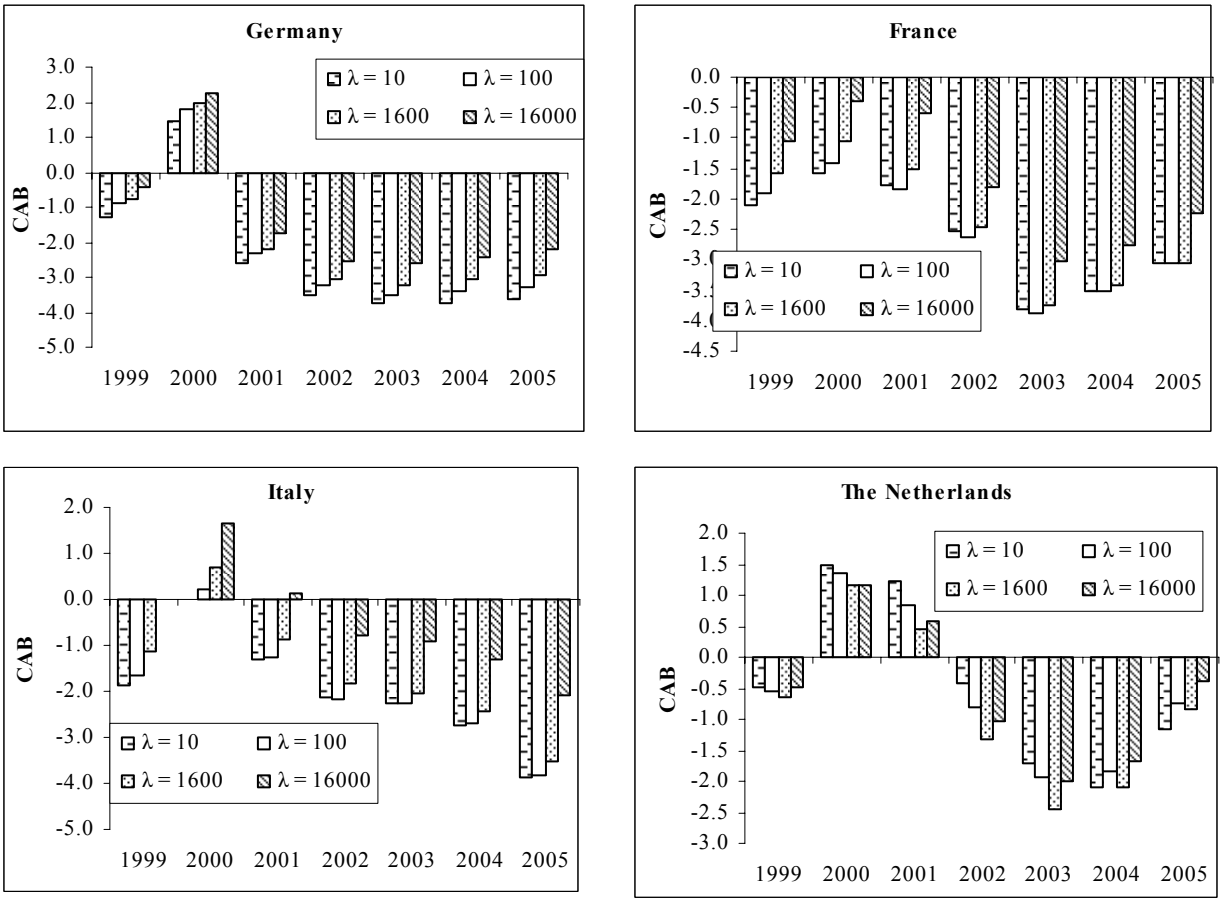
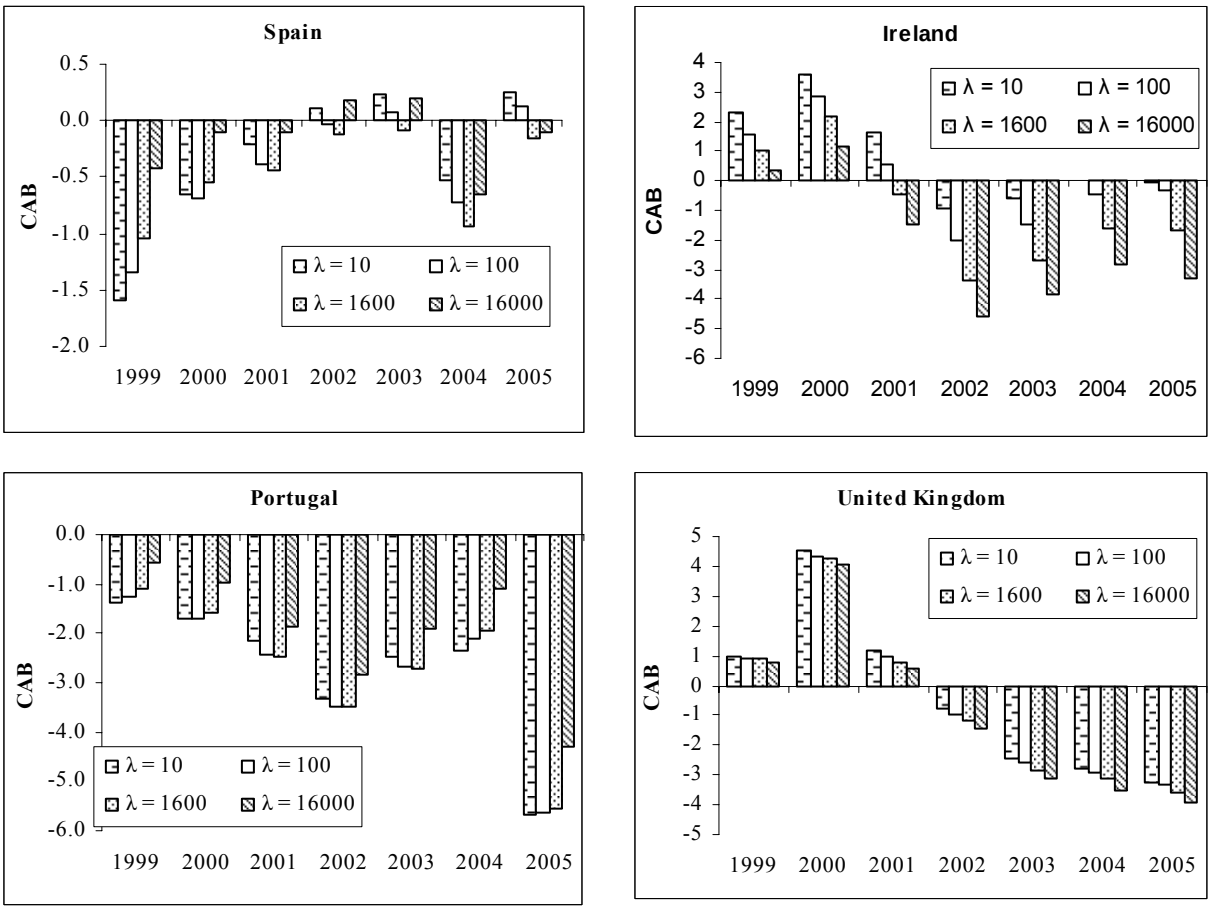


Figure 16 shows the estimates of the CAB in some other countries. The difference between CAB estimates using parameter values 10 and 100 is still rather small. In fact the differences observed in Spain and Ireland may be the largest in our sample between these two parameter values. It indicates that the CAB estimates are rather robust to a choice between these values. The difference is again much more pronounced when looking at the smooth estimates of potential output (λ equal to 1600 and 16000). In particular, in the cases of Spain, Ireland and the UK, and in contrast to the simulations of Germany, France and Italy, the CAB estimates on the basis of less sensitive potential growth give a less rosy picture of the underlying budget balance than the more commonly used parameter settings because the output gaps are estimated to be positive. In the Irish case, the difference is most striking, with values in a range of more than three percentage points depending on the degree of smoothing. The

difference persists over a five year period as the economy is consistently estimated to operate above potential. In the case of Ireland, very high values of λ can be considered not appropriate, as they imply that the growth boom in the second half of the 1990s has been cyclical and still leads to a large output gap.

Figure 16: Real time CAB estimates in 1999-2005 with different smoothing parameters λ: Spain, Ireland, Portugal and the United Kingdom.



The Spanish case may also be of interest, as there is some ongoing discussion on the size of the output gap in that country. The prolonged period of high growth with a sharply deteriorating current account balance and rather high inflation continues to spur discussion on overheating. The conventional potential output estimates are often blamed for not providing the right signals. While there are some differences for alternative values of λ, they are not particularly large compared to other countries. This is essentially due to the fact, that growth has been comparatively smooth over a long period of time. Hence, there is little variation in the series to pack into the cycle even for large λs. Such a growth pattern makes the assessment of the underlying budgetary position particularly difficult. The question of how long the period of high growth can be sustained remains unanswered.

All in all, in most cases, the difference in the levels of the CAB calculated with different degrees of smoothing is rather small, especially for the values 10 and 100 and generally also for 1600.

5. Conclusions

Although very powerful as a theoretical concept, potential output and the output gap are rather elusive yet increasingly important ingredients of the EU fiscal surveillance framework. *A priori* there is no unambiguous way to discriminate between estimates with a higher or lower degree of smoothing.

The assessment criteria of alternative potential output estimates applied in this paper is the diagnostic accuracy in the preventive and corrective arm of the Stability and Growth Pact. Different estimates of potential output and the output gap obtained by the HP-filter and characterized by a different degree of output smoothing are judged by their ability to timely signal the advent of desired or undesired budgetary developments. In this context different degrees of smoothing stand for different assumptions about the underlying model of economic development: prevalence of permanent shocks as opposed to mainly cyclical movements along a stable trend.

Somewhat surprisingly our simulations show that the assessment of the underlying budget balance and the risk of breaching the reference value in fourteen euro-area countries in the 1998-2006 period is relatively stable across a wide range of smoothing parameters. In particular, the signals for fiscal surveillance on the basis of the CAB are robust as long as the degree of smoothing stays within the commonly used ranges. In particular, there is generally little difference between signals on the basis of the parameter settings for λ of 10 and 100, which are used by the ECB and the Commission for annual data. This robustness is somewhat less clear-cut for countries like Ireland with a very volatile history of economic development and when higher values of λ are considered.

The accuracy of the indicators used when assessing the fiscal effort on the basis of the improvement in the CAB eventually depends on the nature of the economic fluctuations. During a protracted economic upturn low values of λ will provide a rosier picture of the underlying budget balance than high values. This may give rise to more pro-cyclical policies.

For example, if the protracted growth slowdown in Germany had to a certain extent been linked to prolonged downward wage and price adjustment (and thus a demand shortfall) which at some point would come to an end, a larger share of the growth slowdown could be attributed to an increase in the output gap. A higher degree of smoothing would then be a more accurate reflection of the underlying fiscal position and commonly-used lower values might give an overly pessimistic estimate of the underlying budgetary situation. A more smooth potential growth measure (higher λ) would also have resulted in less non-policy related changes in the CAB during the economic slowdown and subsequent recovery in the Netherlands, where measures of the CAB rapidly deteriorated and later recovered with commonly used potential growth measures.

However, as long as shocks do not come with a label such considerations remain purely speculative. There is no optimal choice as regards the trade-off between fiscal stabilisation and risks of excessive deficits. Moreover, the implications for fiscal surveillance of different degrees of output smoothing with respect to up- and downturns are not symmetric. A low degree of smoothing may be a better safeguard against excessive deficits during downturns but it may imply a lenient assessment during upturns. Conversely, a high degree of smoothing may indeed carry the risk of accumulating excessive deficits during weak economic conditions but supports a stronger fiscal adjustment in economic good times. At the end, the actual choice of the degree of smoothing will reflect the preferences of the policy makers as regards the type of risk he or she wants to minimise.

Overall, in the light of our simulation results a somewhat higher degree of smoothing compared with the current default value of λ=100 would not seem to have a significant effect on the diagnostic accuracy in the framework of the EU budgetary surveillance. During economic upturns such as the current one a higher degree of output smoothing would imply a stricter assessment of fiscal policy by signalling larger and possibly longer periods of economic 'good times' which would in turn warrant stronger fiscal consolidation. Moreover, a higher degree of smoothing would also diminish the implications of optimism about future growth prospects. Specifically, projected accelerations of economic growth in future years would have a lower impact on current estimates of potential output and hence lead to a more cautious assessment of the underlying budgetary position of a country.

Against this background, and with a view to bringing to light the different types of risks, a key practical conclusion of our simulation could be to assess fiscal policy on the basis of different smoothing parameters especially at particularly uncertain or critical economic junctures. Such an approach would serve as a kind of sensitivity analysis increasing the awareness of the trade-offs involved.

References

Bouthevillain, C., P. Cour-Thimannn, G. Van den Pool, P. Hernandez Decos, G. Langenus, M. Mohr, S. Momigliano and M. Tujla (2001) 'Cyclically Adjusted Budget Balances: An Alternative Approach', ECB Working Paper No. 77.

Buti, M. and A. Sapir (2002) (eds.) 'EMU and Economic Policy in Europe. The Challenges of the Early Years', European Commission and Edward Elgar: Cheltenham.

Camba-Mendez, G. and D. Rodriguez-Palenzuela (2001) 'Assessment Criteria for Output GAP estimates', ECB Working Paper No. 54.

Darné, O. and C. Diebolt (2004) 'Unit roots and infrequent large shocks: new international evidence on output', *Journal of Monetary Economics*, 51 (7), 1449-1465.

European Commission (2002) 'Strengthening the co-ordination of budgetary policies, Commission Communication', COM(2002) 668 final.

Girouard, N. and C. Andre (2005) 'Measuring Cyclically-Adjusted Budget Balances for OECD-Countries', OECD Economic Department Working Paper No. 434.

Hodrick, R.J. and Prescott, E.C. (1997) 'Post-War U.S. Business Cycles: An Empirical Investigation', *Journal of Money, Credit and Banking,* 29(1): 1-16.

Mitchell, J. (2003) 'Should we be surprised by the unreliability of real-time output gap estimates? Density estimates for the Euro zone', National Institute of Economic and Social Research Discussion Paper No. 225.

Nelson, C. R., Plosser, C. I. (1982) 'Trends and Random Walks in Macroeconomic Time Series', *Journal of Monetary Economics*, 10, 129-162.

Orphanides, A. and S. Van Norden (2002) 'The Unreliability of Output-Gap Estimates in Real Time', *The Review of Economics and Statistics*, 84(4):569-583.

Ravn, M.O. and Uhlig, H. (2001) 'On Adjusting the HP-Filter for the Frequency of Observations', Centre of Economic Policy Research, Discussion Paper No. 2858.