

Cyclically Adjusted Budget Balances: an alternative approach Annex 9. Country sections

This annex presents a deeper analysis of the results for the individual EU countries published in the Cyclically Adjusted Budget Balances: an alternative approach, ECB Working Paper n. XX.¹

In the country sections the underlying factors, which affect the size of the budgetary elasticity and sensitivity estimates, are discussed and analysed more carefully. In particular, various reasons, which make them different from the respective OECD estimates, are examined. However, it should be stressed that this comparison should be considered only as indicative, since the definitions of budgetary items deemed cyclical in the Working Paper differ from those used by the OECD. Particularly, in the approach followed in this paper only those revenue and expenditure components which depend on the private sector are cyclically adjusted whereas the OECD adjusts total revenue and total expenditure. This has required to make a specific, but rough, adjustment to the OECD output elasticities of macroeconomic variables in order to make them comparable to those in the alternative approach (see Annex 6 for the derivation of the correction).

In addition, this annex discusses in more detail the results obtained for the cyclical component of the budgets, their sensitivity to different values of the smoothing parameter of the Hodrick-Prescott filter (used to compute the trends of the macroeconomic tax and expenditure bases) and the role of composition effects.

A9.1. Belgium

A9.1.1 Budgetary and macroeconomic elasticities: method description and variable definitions

Methodological remarks

Elasticities of individual budget categories with respect to their macroeconomic bases were generally estimated for Belgium econometrically using the first benchmark specification described in Section 2.1.1 of the working paper. The econometric estimate was only corrected for social security contributions: in that case the elasticity was fixed at 1 based on the tax rule, which is generally proportional. From an econometric point of view, the hypothesis that the elasticity was 1 could not be rejected at the conventional 95 per cent confidence level.

Budget categories and macroeconomic bases

In the Belgian case, some minor deviations from the benchmark list of budget categories and macroeconomic bases described in Section 2.2 were deemed appropriate and feasible. In addition, most elasticities for the final budget categories were obviously also influenced by the exclusion of the public sector.

¹ These country sections have been prepared by the authors of the working paper and by the national central bank representatives, respectively Geert Langenus (Belgium), Allen Andersen (Denmark), Matthias Mohr (Germany), Georgia Kaplanoglou and Basil Manessiotis (Greece), Pablo Hernandez de Cos (Spain), Carine Bouthevillain (France), David Cronin and John Scally (Ireland), Sandro Momigliano (Italy), Philippe Molitor (Luxembourg), Gerrit van den Dool (the Netherlands), Walpurga Koehler-Toegelhofer (Austria), Luis Sarmiento (Portugal), Mika Tujula (Finland and Sweden), Tim Pike and Philippine Cour-Thimann (United Kingdom).

Direct taxes on households were restricted to those that weigh on labour. This implies that the withholding tax on movable income which is part of this category but which does not directly depend on labour income was singled out and given a zero elasticity. The same was done for other current taxes on households, which are also classified as direct taxes on households and comprise a number of less important taxes mainly related to the possession and the use of a car.

As for indirect taxes, only those that are levied on goods and services were retained. Hence, withholding taxes on immovable property, which are not directly related to consumption of goods and services, were singled out and given a zero elasticity. The same was done for vehicle taxes paid by companies, the special tax on insurance companies and a few other taxes of lesser importance which are also classified as indirect taxes.

Direct taxes paid by companies were restricted to those that are actually levied upon company profits. The tax on the reserves of insurance funds for industrial accidents and one other tax of minor importance was therefore taken out of this category and given a zero elasticity.

Social security contributions were restricted to those paid on wages and paid by the self-employed. Contributions paid by the inactive population, some 2.5 per cent of total contributions, were given a zero elasticity.

As early retirement schemes can be used as a close substitute for unemployment, expenditure for early retirement was taken together with genuine unemployment expenditure in the unemployment-related expenditure category.

In order to have a more meaningful match between tax and tax base, investment in housing, which can also generate VAT revenue and other indirect taxes, was added to private consumption whereas consumption categories that are exempt from VAT such as financial services, rent and health-care were taken out of private consumption. The tax base for indirect taxes, determined in this way, was renamed household expenditure.

Gross primary company income rather than operating surplus was selected as the tax base for direct taxes paid by companies. This was mainly because of the better econometric fit.

The number of unemployed used in this paper is the official unemployment figure to which the number of elderly unemployed (which does not appear in this official figure) and the early retired were added.

Exclusion of public sector

Social security contributions, direct taxes paid by households and indirect taxes all contain parts, which are paid by either general government to itself or by general government employees. As it was decided to restrict the definition of the business cycle to private sector developments only, a zero elasticity should be attributed to these receipts. In some cases, most notably for direct taxes paid by public sector employees and indirect taxes paid by general government, exact data were not readily available and rough estimates had to be used.

At present, no corrections were made yet for direct taxes paid out of social benefits (e.g. pensions and unemployment-related outlays) or indirect taxes paid by government employees (or out of social benefits).

A9.1.2 Budgetary and macroeconomic elasticities: comparison with OECD

Fiscal variables w.r.t. macroeconomic reference variables

Even if the general caveat concerning the comparability with OECD results has to be kept in mind, the results with respect to budgetary elasticities are very similar to those found by the OECD (see Table A9.1.1).

The biggest deviation pertains to corporate taxes. In the current paper, the elasticity was estimated with respect to primary company income and a value of 0.72 was obtained. The OECD implicitly uses for all countries an “a priori” elasticity of 1 for corporate taxes with respect to company profits, which is a somewhat different aggregate. As this budget category is relatively small (less than 7 per cent of total revenue in 2000), however, the impact of this difference on the cyclically adjusted balances or the overall budgetary sensitivity is very limited.

Macroeconomic variables w.r.t. GDP

The elasticities of gross operating surplus and private consumption with respect to GDP estimated by us seem however to differ substantially from the respective OECD estimates. This is mainly owing to the divergences in the methodology of how the macroeconomic elasticities and the overall budgetary sensitivity have been derived in the OECD and our computations.

Table A9.1.1

Comparison of elasticities

Fiscal variables w.r.t. macroeconomic reference variables	Our approach ¹⁾	OECD ²⁾
Direct taxes on households w.r.t. average wages	1.36	1.40
Direct taxes on households w.r.t. employment	1.00	1.00
Direct taxes on companies w.r.t. gross operating surplus/ Gross primary company income	0.72	1.00
Indirect taxes w.r.t. private consumption	0.97	1.00
Social contributions w.r.t. average wages	1.00	0.90
Social contributions w.r.t. employment	1.00	1.00
Unemployment-related expenditure w.r.t. number of unemployed	0.92	1.00
Elasticities of macroeconomic variables w.r.t. output		
Average compensation of private sector workers	0.62	0.65
Private sector employment	0.73	0.73
Gross operating surplus/gross primary company income	1.35	0.90
Private consumption	1.29	0.89
Number of unemployed	-3.12	-3.14

¹⁾ The macroeconomic elasticities w.r.t. output have been derived in this paper from the shock scenario which has been described in detail in AnnexA4.

²⁾ The OECD elasticities have been taken from OECD (2000) and they have been adjusted to our methodology.

A9.1.3 Budget sensitivity: comparison with OECD

The overall sensitivity of the Belgian budget to a balanced growth shock in the private sector amounting to a 1 per cent change in GDP would be 0.56 (see Table A9.1.2). This value is between the traditional rule-of-thumb semi-elasticity of 0.5 and the most recent OECD estimate of 0.61.

Table A9.1.2

Comparison of the overall budget sensitivity to a balanced private sector shock amounting to a 1% change in GDP

	Our approach	OECD¹⁾
Overall budget sensitivity	0.56	0.61
Difference w.r.t. OECD sensitivity	-0.05	
on account of:		
Calibration of the macroeconomic scenario	+0.03	
Budget elasticities	-0.01	
Refinements of budgetary categories	-0.05	
Residual	-0.02	

1) Published on the OECD website: www.oecd.org.

The difference with respect to the OECD figure can generally be attributed to four elements: a different calibration of the macroeconomic shock, the use of different budget elasticities, the refinements of budget categories and a residual. It does not seem to be due to the different macroeconomic calibration of the shock as applying the OECD elasticities of macroeconomic bases with respect to GDP would reduce, rather than increase, the overall budgetary sensitivity by some 0.03 percentage point. The main reason for this is that in the shock scenario used in this paper the change in both private consumption and gross primary company income (or, in the OECD case, operating surplus) is bigger than the one implied by the OECD macroeconomic elasticities (see Table A9.1.1).

As the budget elasticities do not differ very much from the ones derived by the OECD they only explain a negligible part of the difference in the overall sensitivity.

The other refinements in the selection of budget categories - and, more specifically, the fact that in this paper, contrary to the OECD approach, a significant part of government revenue exhibits a zero elasticity with respect to GDP - decreases it by around 0.05 percentage point.

Finally, there is a small residual difference of -0.02 percentage point, which could be inter alia due to different weights for the budget items.

A9.1.4 Cyclical components of the balances: analysis of the results

After a slight worsening of the macroeconomic environment in 1999, when the cyclical component of the primary balance deteriorated by less than 0.1 per cent of GDP, the year 2000 saw a marked improvement. Indeed, the cyclical component is estimated to have risen from -0.4 per cent of GDP in 1999 to 0.0 per cent in 2000 (see Chart A9.1.1).

Chart A9.1.1
Cyclical components of the government budget, $\lambda = 30$ (in percentages of GDP)

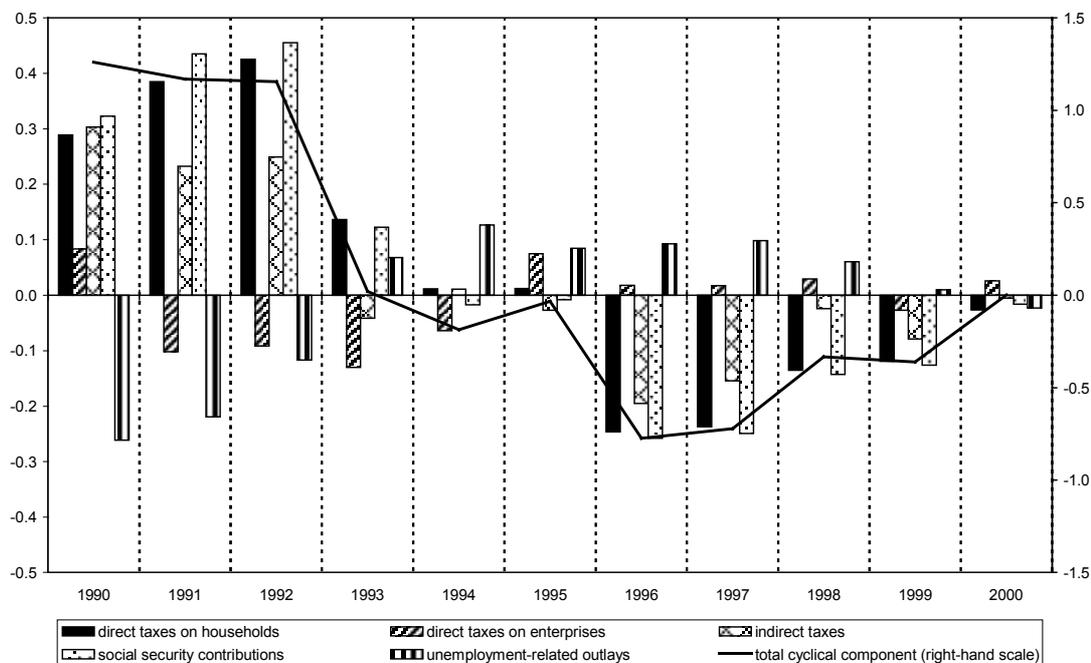
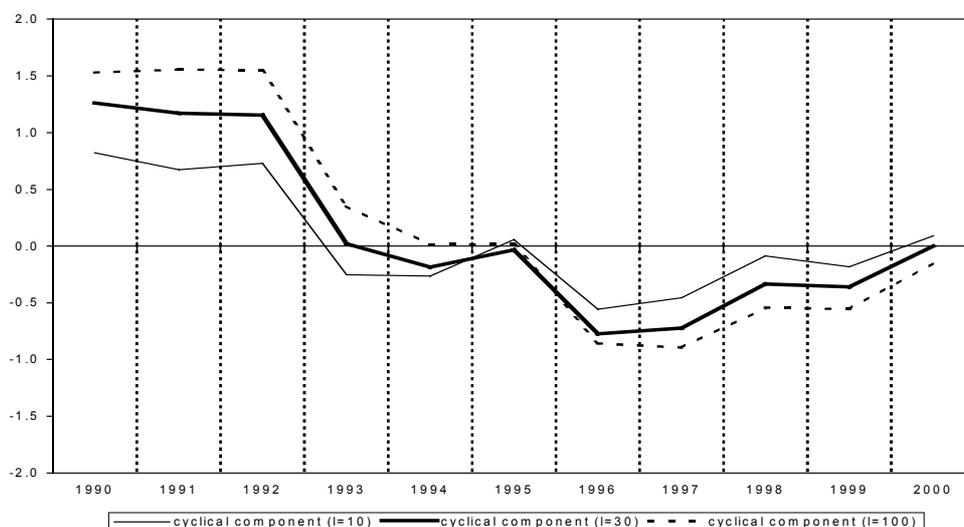


Chart A9.1.2 would suggest that in the case of Belgium the choice of the smoothing parameter for the Hodrick-Prescott filter does not have very large impact on the estimation of the cyclical component of the budget.

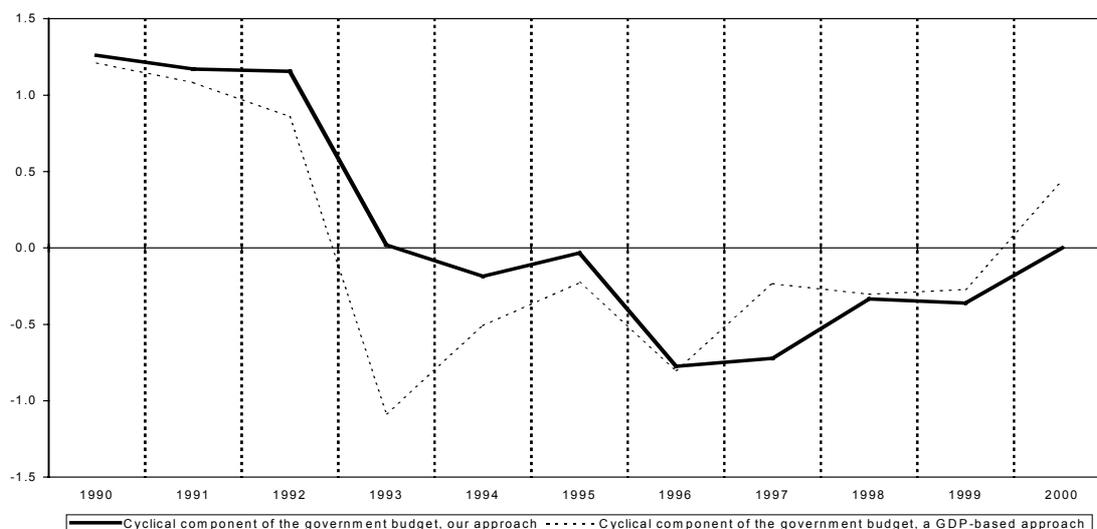
Chart A9.1.2
Sensitivity analysis on the cyclical component of the government budget balance: comparison to results obtained with $\lambda = 10$ and 100 (in percentages of GDP)



The cyclical component was also calculated using an approach that only focuses on GDP: gaps in real GDP (derived using a Hodrick-Prescott filter with a smoothing parameter of 30) were assumed to apply to all macroeconomic variables. As can be seen in Chart A9.1.3, the difference between the two approaches is not always negligible, which illustrates the importance of taking into account composition effects in the case of Belgium.

Chart A9.1.3

Comparison of cyclical components showing composition effects (in percentages of GDP)



In order to solve the end-point problem of the HP-filter (see Section 3.2 of the working paper), the five macroeconomic variables are extended to 2007 before applying the HP-filter, using the forecasts that were available last spring up to 2003. Beyond 2003, the development of macroeconomic variables is consistent with the assumption of balanced growth at a trend rate of 2.5%. Employment continues to increase, and unemployment continues to fall, but both at a reduced rate.

To assess the sensitivity of the estimates with regard to the extension used beyond 2000, a simple sensitivity analysis was conducted on the cyclical component of the budget balance computed using the aggregated approach (i.e. applying the budget sensitivity to the output gap) and by extending the real and nominal GDP series in two alternative ways for the period 2001-2007². The obtained results were then compared to the baseline scenario. The comparison showed that, even in 2000, the estimates are not very sensitive to the method used for extending the macroeconomic variables.

² In both alternative scenarios, the level of real GDP is extrapolated by growth rates such that the trend value of the growth rate is reached in 2007. The growth rates for the period 2001-2007 are linearly interpolated between the rate for 2000 and the targeted trend growth rate in 2007. The scenarios differ by the targeted trend growth rate in 2007. In scenario 1, the targeted trend growth rate in 2007 equals the average rate of growth between 1986 and 2000 (i.e. the last 15 years known). In scenario 2, the targeted trend growth rate in 2007 equals the average rate of growth between 1986 and 2000 plus 1 percentage point.

A9.2 Denmark

A9.2.1 Budgetary and macroeconomic elasticities: method description and variable definitions

Methodological remarks

The elasticities applied in this paper to compute the cyclical components of government budget reflect the estimations done by the authors of the working paper. The estimation results are made available upon request. These estimations can be seen as a way to start. At some point there may be a need to revise the estimates, which could alter the cyclical sensitivity of government budget to some extent.

The focus on the composition of the cyclical component in the budget is not just an alternative but also a complement to methods that focus on the derivation of potential output for measuring the structural fiscal position. Concerning the measurement of the fiscal stance the method applied in this paper is not a better approach than the direct estimates of the discretionary budget change calculated by the Danish Ministry of Finance.

Budget categories and macroeconomic bases

The applied category of direct taxes on households includes also other taxes than taxes based merely on labour income. Most importantly it contains taxes out of social benefits and taxes paid by employers in the household sector. The latter category does not follow the same pattern as labour income but it is also private income and also cyclically sensitive so its inclusion is not a big problem. The applied category of indirect taxes is in turn net of taxes paid by the general government to itself.

The cyclically sensitive expenditures include only unemployment benefits for the insured. The exclusion of other unemployment related expenditure pulls *ceteris paribus* in the direction of an underestimation of the budget sensitivity. On the other hand, the mentioned inclusion of taxes on social benefits pulls in the opposite direction.

The chosen budget categories, four on the revenue side and one on the expenditure side, represent a traditional choice of cyclically sensitive budget items. Considering that the method has average private sector wages as a macroeconomic base variable, there could be scope for including Danish public transfers and wages among the cyclically sensitive budget categories, since they follow the private sector wage developments with a lag. However, this has not been done.

Exclusion of public sector

Direct taxes and social security contributions are partly paid by government employees. It has been assumed that this part corresponds to the share of public employees in total wages, and this public paid part of the revenue is discarded from the calculation of cyclical impact. Also the employers' contribution paid by the public sector is excluded from social security contributions. Finally, as mentioned before indirect taxes are exclusive of taxes paid by the public sector to itself.

A9.2.2 Budgetary and macroeconomic elasticities: comparison with OECD

The choice of macroeconomic and fiscal variables and selection of elasticities is inspired by the OECD. Hence, it is natural to compare the working paper estimates with the OECD results. As

the approach presented in this paper relates the cyclical response of the budget to a handful of macroeconomic variables rather than to GDP, there may be several reasons behind different results for the cyclical component. The comparison concerns a controlled experiment of a 1 per cent shock to GDP with assumed implications for the macroeconomic variables determining the result of the current method.

Fiscal variables w.r.t. macroeconomic reference variables

The elasticities of the budget categories with respect to the macroeconomic base variables are not very different between the two methods (see Table A9.2.1). However, for the working paper there has been found a lagged progressive relation between corporate taxes and the broad concept of national account profits. The OECD takes into account that some of the labour market contributions are linked to the number of persons rather than to wages.

Macroeconomic variables w.r.t. GDP

The assumed elasticities of macroeconomic base variables with respect to GDP differ relatively more from the respective OECD estimates. This follows from the assumptions behind the shock, which explicitly only concerns the private sector and private demand in the working paper approach.

Table A9.2.1

Comparison of elasticities

Fiscal variables w.r.t. macroeconomic reference variables	Our approach¹⁾	OECD²⁾
Direct taxes on households w.r.t. average wages	1.22	1.30
Direct taxes on households w.r.t. employment	1.00	1.00
Direct taxes on enterprises w.r.t. gross operating surplus/ gross primary company income	1.43 (one year lag)	1.00
Indirect taxes w.r.t. private consumption	1.03	1.00
Social contributions w.r.t. average wages	1.00	0.90
Social contributions w.r.t. employment	1.00	1.00
Unemployment-related expenditure w.r.t. number of unemployed	1.03	1.00
Elasticities of macroeconomic variables w.r.t. output		
Average compensation of private sector workers	0.82	0.1
Private sector employment	0.60	0.6
Gross operating surplus/gross primary company income	1.42	1.6
Private consumption	1.37	1.6
Number of unemployed	-8.52	-5.60

1) The macroeconomic elasticities w.r.t. output have been derived in this paper from the shock scenario which has been described in detail in Annex A4.

2) The OECD elasticities have been respectively taken from van den Noord (2000) and they have been adjusted to our methodology.

A9.2.3 Budget sensitivity: comparison with OECD

The current approach results in a budget sensitivity of 0.67 per cent of GDP in the case of a balanced private sector growth shock, amounting to a 1 per cent change in real GDP (see Table A9.2.2). This is somewhat lower than the most recent OECD estimate of 0.75. The difference can be explained by the use of more narrow budgetary categories in the method of the working paper. Specifically, the unemployment related outlays have been confined to unemployment benefits. The negative contribution from narrower budget categories is only partly offset by somewhat higher macroeconomic and budgetary elasticities used to compute the budget sensitivity of 0.67.

Table A9.2.2

Comparison of the overall budget sensitivity to a balanced private sector shock amounting to a 1% change in GDP

	Our approach¹⁾	OECD²⁾
Overall budget sensitivity:	0.67	0.75
Difference w.r.t. OECD sensitivity	-0.08	
On account of:		
Definition of the macroeconomic elasticities/calibration of shock	+0.10	
Refinements of budgetary categories	-0.18	
Budget elasticities	+0.01	
Residual component	0.01	

1) Our sensitivity estimate refers to the impact in the second year.

2) Published on the OECD website: www.oecd.org.

A9.2.4 Cyclical components of the balances: analysis of the results

The fall in the total cyclical component in 2000 mainly concerns indirect taxes (see Chart A9.2.1). The combination of 3 per cent GDP growth with stagnating private consumption in 2000 provides a good example of the potential impact of the composition effect. This is brought out by comparing the change in the cyclically adjusted primary balance calculated in the working paper and by the OECD. The latter suggests a big discretionary relaxation of 1.5 per cent of GDP in 2000, which the working paper method moderates to 0.8 per cent (see Table A9.2.3). The latter result is closer to the discretionary budget impact calculated by the Danish Ministry of Finance, but there is still a clear difference to the Ministry, which indicates a fiscal tightening in 2000. It is difficult to argue that much against the Ministry's calculation, which is based on a detailed adding up of the budget effects of deviating from neutrality. More specifically, the difference in 2000 can be reconciled by adjusting ad hoc for a strong fall in the heavily taxed car sales and for temporary movements in corporate and pension tax revenues.

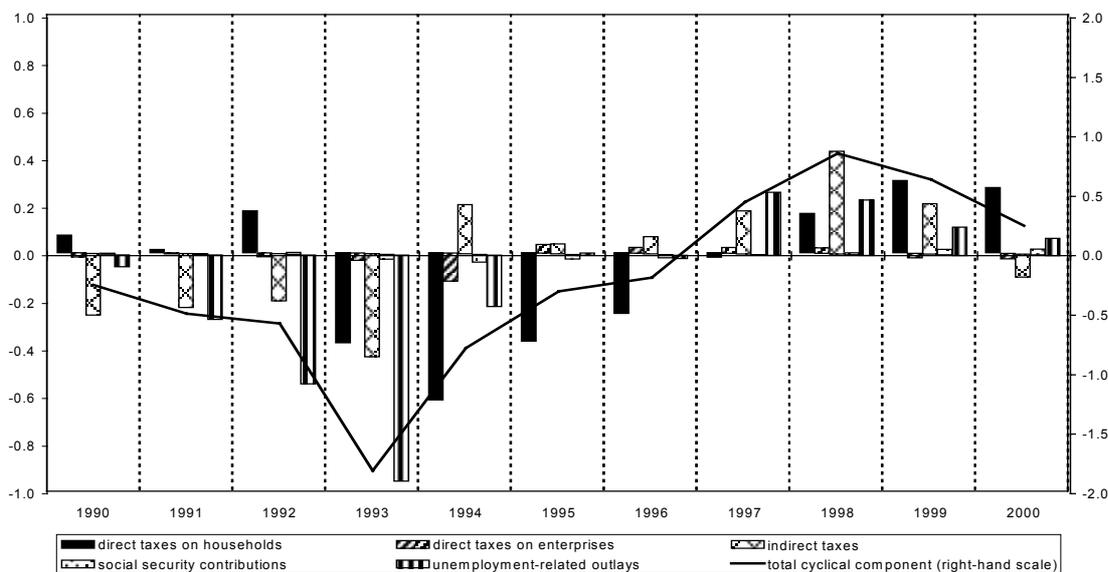
Table A9.2.3

Implied measure of fiscal stance compared to OECD and Danish Ministry of Finance measures 1999-2000

	(percentage points of GDP)	
	1999	2000
Our approach change in cyclically adjusted primary balance	1.5	-0.8
OECD change in cyclically adjusted primary balance	1.2	-1.5
Ministry of Finance direct measure	0.9	0.4

Chart A9.2.1

Cyclical components of the government budget, $\lambda = 30$ (in percentages of GDP)



A general observation is that the use of a decomposed method like the one described in the working paper introduces a lag in the calculated cyclical budget component relative to the GDP cycle. The lag is not least created by the normal sluggishness in the employment response and by the lag in corporate taxes accrued.

Regressing the working paper cyclical component on an HP-filtered GDP gap with a smoothing parameter of 30 (HP30) gives a first year budget elasticity of 0.42 and a second year elasticity of 0.23. The sum is close to the 0.67, which resulted from the balanced private demand shock calculation. It may be a rule-of-thumb that two thirds of the budget sensitivity materialises in the first year.

However, there is more to the composition effect than the simple lags in employment and corporate taxes. Not least the gap in the average real wage has a long lagged and unstable relation to the GDP gap. One reason could be that it is the wage change, which peaks, when the employment level peaks reflecting a kind of Phillips curve relation. On Danish data an HP-based gap in the average wage often correlates negatively with a similarly calculated output gap. This emphasises that the method also addresses long-lagged effects and that the average relation between gaps in GDP and budget determining variables may differ from the assumptions of the balanced shock.

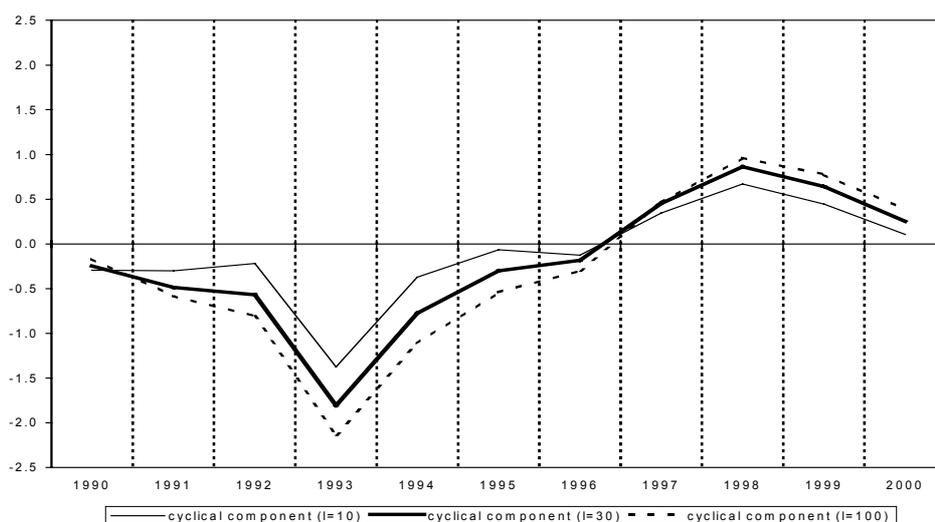
The choice of macroeconomic base variables is not simple. Ideally all cyclical movement in the budget categories relative to GDP should be captured by the base variables, but that is not possible in practice. One general problem concerns the treatment of prices, which are excluded from the budget determining variables.

Using the price as budget determining variable would not change the cyclical component drastically. Price gaps based on HP-filter are normally closer to zero than real gaps. However, the price effect is not zero. For instance, in 2000 European consumer prices were affected by strong rises in oil and other import prices. Tentative calculations suggest that the increase in the Danish price gap from 1999 to 2000 could potentially lift their cyclical component by 0.3 per cent of GDP. The potential price effect in 2000 may be larger in countries where energy is taxed ad valorem.

The method of the working paper uses the Hodrick-Prescott filter to calculate a kind of moving average for all macroeconomic base variables. This type of trend can be made more and less smooth by changing the so-called lambda parameter of the HP-filter. More smoothing increases the size of gaps and hence the cyclical component, less smoothing decreases the cyclical component. In a sample starting in 1990 the difference between the various levels of smoothing mainly concerns the trough in 1993 (see Chart A9.2.2).

Chart A9.2.2

Sensitivity analysis on the cyclical component of the government budget balance: comparison to results obtained with $\lambda = 10$ and 100 (in percentages of GDP)



It is possible to make a synthesis between the working paper and OECD approach, i.e. add a composition effect to the OECD cyclical measure or an output gap effect to the working paper measure.

The working paper approach emphasises composition, whereas the OECD emphasises the size of the output gap, which is based on a NAWRU estimate and a production function. The mentioned differences in budget categories and elasticities are not essential for the choice between the two approaches. Thus, we ignore differences in the R^j 's and ϵ 's and consider the cyclical component of the working paper:

$$\sum_j \frac{R_t^j}{Y_t} \epsilon_{R^j, V^j} V_{c,t}^j,$$

where the expenditure component is counted as a negative revenue. Now, re-write the base variable gap term, $V_{c,t}^j$, by adding and subtracting a real output gap based on the HP-filter with a smoothing parameter of 30 (HP30), $Y_{r,c,t}^{HP30}$, and the OECD output gap, $Y_{r,c,t}^{OECD}$, both multiplied

by the elasticities of base variables with respect to output, $\epsilon_{v^j, Y}$:

$$\sum_j \frac{R_t^j}{Y_t} \epsilon_{R^j, V^j} (V_{c,t}^j - \epsilon_{V^j, Y} Y_{r,c,t}^{HP30} + \epsilon_{V^j, Y} Y_{r,c,t}^{HP30} - \epsilon_{V^j, Y} Y_{r,c,t}^{OECD} + \epsilon_{V^j, Y} Y_{r,c,t}^{OECD}).$$

Collecting terms yields

$$\sum_j \frac{R_t^j}{Y_t} \epsilon_{R^j, V^j} (V_{c,t}^j - \epsilon_{V^j, Y} Y_{r,c,t}^{HP30}) + \sum_j \frac{R_t^j}{Y_t} \epsilon_{R^j, V^j} \epsilon_{V^j, Y} (Y_{r,c,t}^{HP30} - Y_{r,c,t}^{OECD}) + \sum_j \frac{R_t^j}{Y_t} \epsilon_{R^j, V^j} \epsilon_{V^j, Y} Y_{r,c,t}^{OECD}.$$

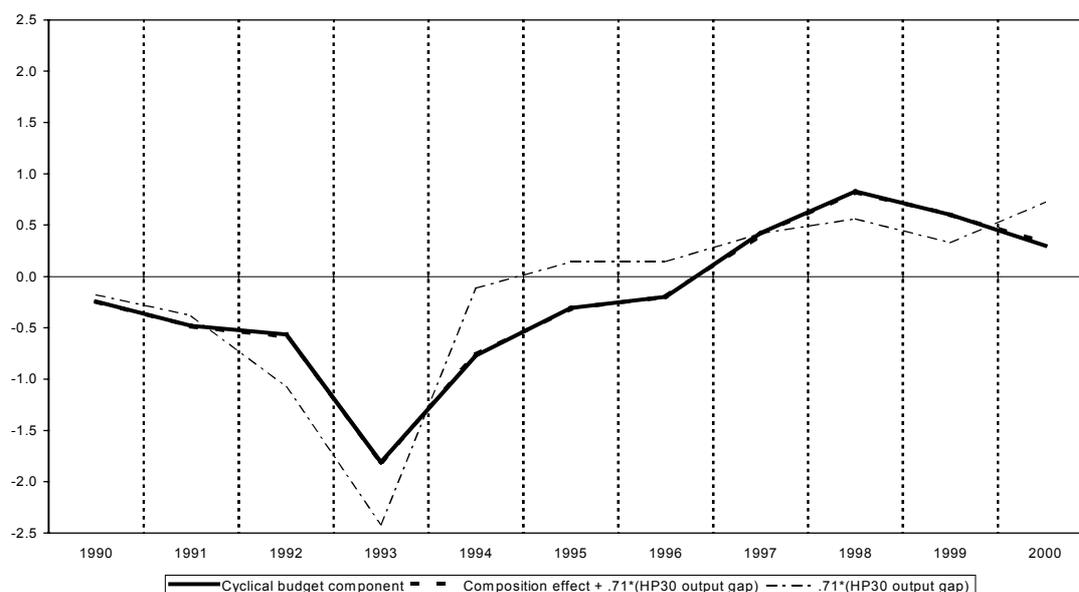
The first term is a composition effect indicating the budget impact of differences between the actual HP30 gaps of the base variables and "predicted" gaps based on elasticity times the HP30 output gap. The second term measures the budget impact of the difference between the OECD output gap and the HP30 output gap. The third and last term is recognised as an OECD style measure of the cyclical budget component. The official OECD cyclical component corresponds to 0.75 times the OECD output gap with an R^2 close to 1.

The output gaps in the second and third term have the same time-variable coefficient. It varies over time as the budget shares vary, and we also allow the output elasticity of unemployment to vary because the level of unemployment changed markedly over the nineties. For other elasticities we apply those from Table A9.2.1.

However, the variation of the coefficient is moderate. We can approximate the working paper cyclical component by a budget sensitivity of 0.71 times the HP30 GDP gap plus the first term, the composition effect, of the previous expression. The approximation has an R^2 close to 1 (see Chart A9.2.3). Contrary to the balanced shock estimate, the sensitivity of 0.71 concerns the whole period 1990-2000 and discards the denominator effect of GDP changes because the cyclical component expression from the working paper discards it.

Chart A9.2.3

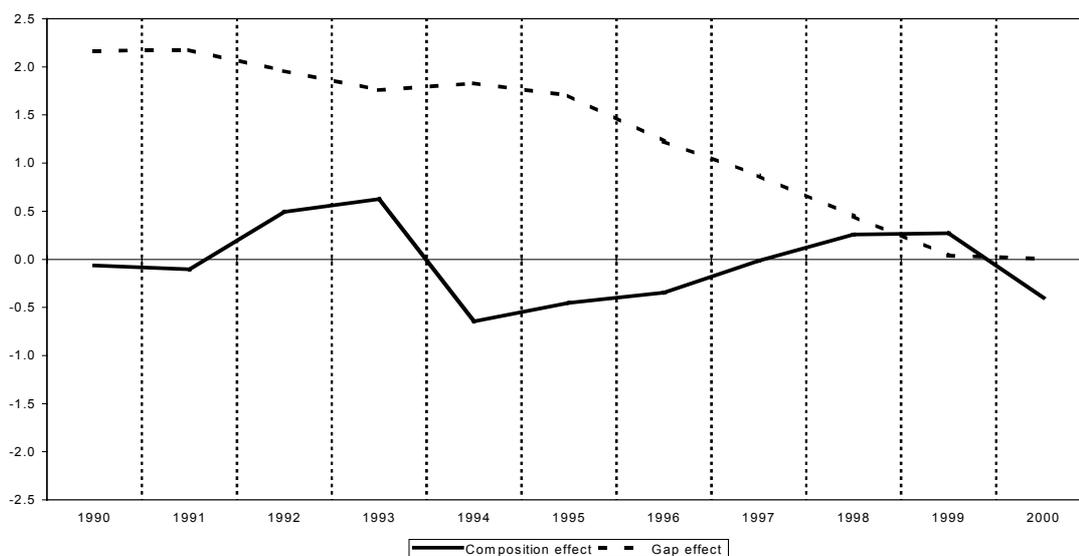
Comparison showing composition effect



Now, we can decompose the difference between the cyclical component of the working paper and a cyclical component of 0.71 times OECD's output gap into a composition effect and a gap effect. The latter is 0.71 times the difference between the OECD output gap and the HP30 output gap (see Chart A9.2.4).

Chart A9.2.4

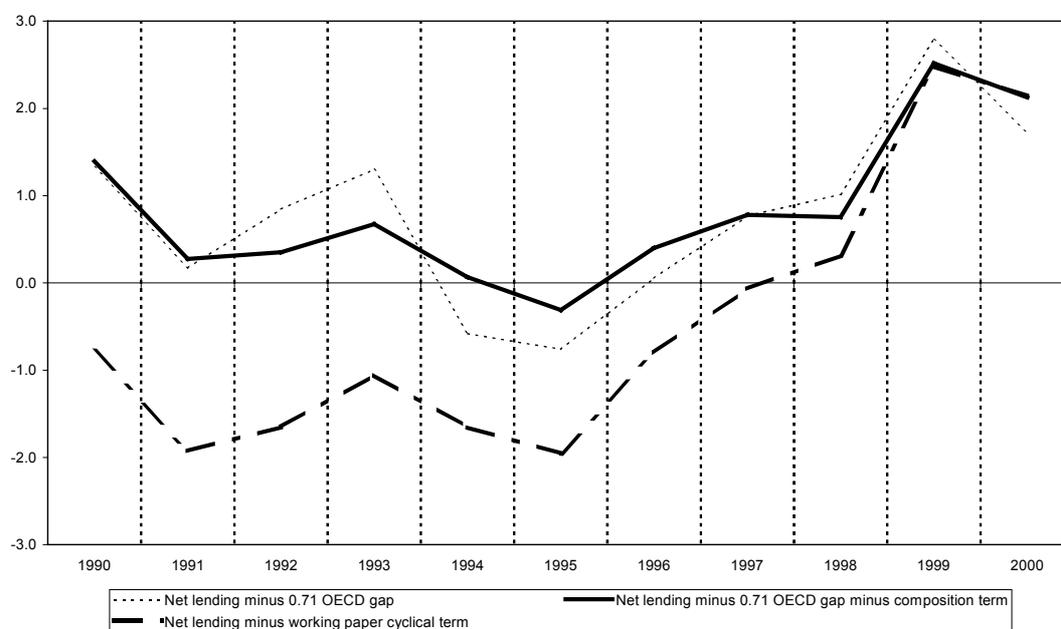
Difference to OECD measure: composition effect and gap effect



The gap effect reflects that the OECD gap differs primarily from an HP30 output gap by being more negative in the beginning of the nineties. The composition effect shifts sharply between positive in 1993 and negative in 1994. In those years, GDP moved more than the budget determining variables. In 1993, the gaps of the budget determining variables were generally less negative than the output gap. In 1994, unemployment remained high in spite of the strong pick up in the output gap. In 1998 and 1999, falling unemployment made the composition effect positive. In 2000, the effect turned negative as the strong GDP growth was driven by exports and by investments, while private consumption fell marginally and unemployment remained constant. The composition effect varies around zero over the whole time period. This follows from its construction as the HP30 gaps applied vary around zero.

One may consider both the structural OECD output gap and the composition of budget determining variables by adjusting net lending for not only 0.71 times the OECD gap but also for the composition effect from Chart A9.2.4. It amounts to adjusting for uneven cyclical positions of the budget determining variables before applying the average budget sensitivity to the output gap. The resulting cyclically adjusted balance is smoother and probably easier to interpret in 1993 and 1994, and also in 2000 where it deteriorates less than the pure OECD style measure. At the same time this synthetical cyclically adjusted budget balance measure remains above the cyclically adjusted balance of the working paper method, because the OECD gap suggests that the economy operated clearly below capacity in the first years of the nineties (see Chart A9.2.5).

Chart A9.2.5
Cyclically adjusted balance measures



Using a centred moving average implies an end-point problem and the HP-filter have been applied to the variables with a baseline extension to 2007. To address the end-point issue the baseline was supplemented with two alternative scenarios³. GDP growth was as high as 3 per cent in 2000 and both scenarios imply that the growth rate stay relatively close to that in the first years after 2000. Thus, both scenarios imply a higher growth in the first coming years than in the baseline and thereby also a higher growth trend. The stronger trend growth in the scenarios gives a lower GDP gap for the late nineties and 2000 than in the baseline calculation. The difference between the two scenarios is more modest.

³ In both alternative scenarios, the level of real GDP is extrapolated by growth rates such that the trend value of the growth rate is reached in 2007. The growth rates for the period 2001-2007 are linearly interpolated between the rate for 2000 and the targeted trend growth rate in 2007. The scenarios differ by the targeted trend growth rate in 2007. In scenario 1, the targeted trend growth rate in 2007 equals the average rate of growth between 1986 and 2000 (i.e. the last 15 years known). In scenario 2, the targeted trend growth rate in 2007 equals the average rate of growth between 1986 and 2000 plus 1 percentage point.

A9.3. Germany

A9.3.1 Budgetary and macroeconomic elasticities: method description and variable definitions

Methodological remarks

All revenue and expenditure elasticities, except the elasticity of excise taxes with respect to real private consumption, are determined by fiscal rules and, in some cases, additionally tested by regression analysis. Adjustments and methodological choices of the estimation procedure due to the country-specific institutional design proved necessary and they are briefly discussed in this section, together with the implications for macroeconomic elasticities of fiscal variables.

Budget categories and macroeconomic bases

Some of the revenue concepts defined in the national accounts have to be adjusted in order to yield more precise assignments of budgetary items to macroeconomic base variables. Fiscal items which are especially concerned in the case of Germany are indirect taxes and direct taxes on household income.

The definition of "indirect taxes" within the national accounts also covers trade tax. The fiscal base of trade tax, however, is profits rather than consumption. For this reason, indirect taxes are redefined as indirect taxes directly levied on the consumption of goods and services (special consumer taxes plus turnover tax). Trade tax is reassigned to direct taxes on operating surplus and mixed income.

Furthermore, the national accounts concept of direct taxes on household income includes assessed income tax. Revenue from assessed income tax mostly consists of taxes on profits in the non-corporate sector.⁴ Therefore, revenue accruing from assessed income tax is assigned to the tax base "operating surplus and mixed income". Consequently, "direct taxes on households" as defined here comprises only income tax deducted at source with regard to wage and salary income.

Institutional design

The particular institutional design in Germany requires major deviations from the OECD/ IMF/ EU Commission approach to the treatment of revenue and expenditure of public pension funds. It is common to adjust only the revenue of public pension funds - as part of the revenue from social security contributions - for cyclical effects but not the corresponding expenditure. However, in Germany both revenue and expenditure are subject to cyclical impacts. The budget of public pension funds is driven by pension expenditure, which is adjusted in line with the growth of modified gross wages in the previous year. At the beginning of the current year the contribution rate is adjusted on the basis of the estimated development of wages in the last and the current year in such a way that receipts and expenditure of the pension funds are expected to balance – after taking into account unplanned deficits or surpluses in the previous year and the maintenance of a statutory fluctuation reserve amounting to one month's expenditure at the end of the current year.⁵ These adjustments are made on a regular basis, so that cyclical fluctuations are automatically

⁴ Lacking availability of data makes it impossible to take account of the statistical overlapping of assessed income tax and income tax deducted at source with regard to wage and salary income.

⁵ Due to forecasting errors, a budget which is balanced ex ante may be unbalanced ex post. However, such estimation errors are regarded as special temporary effects rather than cyclical effects.

neutralised by revenue adjustments of an equal amount. Consequently, the overall cyclical balance of the public sector is not affected by cyclical fluctuations in the public pension system.⁶ For this reason, either the expenditure and revenue of the pension funds both have to be cyclically adjusted or, alternatively, the pension system as a whole should not be adjusted at all. Both approaches yield the same overall cyclical balance. The calculations in this paper are based on the latter procedure. Depending on the assumptions for the output elasticities of macroeconomic variables, this produces a sensitivity of the general government balance which is approximately 0.06 to 0.07 percentage point lower than under the standard approach which takes no account of the neutralising automatic adjustment mechanisms in the German public pension system.

A9.3.2 Budgetary and macroeconomic elasticities: comparison with OECD

Table A9.3.I compares the revenue elasticities with respect to the respective macroeconomic reference variables as used in the current approach with the respective elasticities estimated by the OECD. It additionally compares the output elasticities of macroeconomic variables of the shock scenario as defined in this paper with the macroeconomic elasticities of the OECD method.⁷

Table A9.3.I
Comparison of elasticities

Fiscal variables w.r.t. macroeconomic reference variables	Our approach ¹⁾	OECD ²⁾
Direct taxes on households w.r.t. average compensation of employees	1.8	1.5
Direct taxes on households w.r.t. employment	1.0	1.0
Direct taxes on enterprises w.r.t. gross operating surplus and mixed income	1.3 ³⁾	1.0
Indirect taxes w.r.t. private consumption	1.0; 0.8 ⁴⁾	0.8
Social contributions w.r.t. average compensation of employees	1.0	0.8
Social contributions w.r.t. employment	1.0	1.0
Unemployment-related expenditure w.r.t. number of unemployed	0.6	1.0
Elasticities of macroeconomic variables w.r.t. output		
Average compensation of private sector workers	0.7	0.5
Private sector employment	0.6	0.6
Gross operating surplus and mixed income	1.3	0.8
Private consumption	1.2	1.0
Number of unemployed	-4.6	-0.8

¹⁾ Macroeconomic elasticities w.r.t. output are taken from the shock scenario which is described in detail in Annex A4 of this paper.

²⁾ The OECD elasticities are respectively taken from van den Noord (2000). The output elasticities of macroeconomic variables are adjusted as described in Annex A6 of the paper.

³⁾ Tax base includes mixed income; revenue includes trade tax; aggregated over a lag of two years.

⁴⁾ Value added tax and excise taxes.

Fiscal variables w.r.t. macroeconomic reference variables

In most cases, the OECD elasticities of fiscal variables are smaller. A lag of two years in corporate tax revenue is assumed in the current paper. This differs from van den Noord (2000), where it is assumed that corporate tax revenue flows without lags. The elasticity shown in Table A9.3.I refers to the aggregated elasticity, whereby weights of 0.7, 0.15, and 0.15 have to be assigned to

⁶⁾ The grants to the public pension insurance funds paid by Federal Government are subject to cyclical impacts, too. Although these grants constitute intragovernmental transfers, their cyclical components contribute to the overall cyclical balance because the pension funds take these grants into account when setting the contribution rate. Thus, a change in the Federal grant does not pass through to an automatic change in the funds' balance but rather to a change in the contribution rate. As a consequence of this, a higher Federal grant leads to a worsening not only of the Federal but also the general government fiscal balance. These effects are accounted for in the calculation of the cyclically adjusted balances, although their impact is small.

⁷⁾ Note that the current disaggregated approach to cyclically adjusted budgetary balances does not rely upon stable relationships between macroeconomic variables and output.

the tax revenue in t , $t-1$ and $t-2$, respectively. The weights are roughly estimated using statistics on corporate tax revenue.⁸ Although the exact lag structure is not known and may vary strongly over time, it seems plausible to assume at least a lag of two years in the revenue from profit taxes. The aggregated elasticity should be significantly larger than 1, reflecting the fact that operating surplus and mixed income earned in the non-corporate sector are subject to progressive assessed income tax and that taxes on corporate profits are imputed in the assessed income tax of individual shareholders.

Indirect taxes are split into excise taxes and value added tax. The elasticity of excise taxes with respect to real private consumption is econometrically estimated as 0.8. The elasticity of value added tax with respect to private consumption (1.0) is the same as in the OECD approach.

Social security contributions are charged as a fixed percentage of compensation of employees up to a certain contribution ceiling. The OECD estimates an elasticity of social security contributions with respect to wages of 0.8, since the existence of statutory contribution ceilings has the effect that, "...as income rises, a larger share of income falls above the contribution ceilings and the average effective tax rate tends to drop" (van den Noord 2000:19). Consequently, the elasticity is smaller than 1. However, in the case of Germany the regressive impact of the ceilings is offset by the fact that they are wage-indexed. Hence, the aggregated elasticity is approximately 1.

Elasticities of direct taxes on households are computed as the ratio of marginal to average rates for an average household based on the tax rules of the respective year.⁹ This is comparable to the method used by the OECD, with the difference that the OECD estimation is based on the tax schemes of 1996.

The elasticity of expenditure related to unemployment with respect to the number of unemployed (0.6) is much smaller than the corresponding OECD figure (1.0). One reason is that unemployment benefits contain social security contributions which are revenue for public pension funds and the public health insurance system. Thus, social security contributions are subtracted before unemployment benefits were cyclically adjusted in our method. This is however not done in the OECD approach, which accounts for about 0.2 of the total difference of 0.4. In general, unemployed people are no longer eligible to unemployment benefits after one year of unemployment but they rather receive unemployment aid after that period. Consequently, payments for unemployment aid reflect structural rather than cyclical imbalances in the labour market and are therefore not cyclically adjusted in the current approach. This accounts for the rest of difference, since the OECD adjusts also unemployment aid.

Macroeconomic variables w.r.t. GDP

The elasticities of average compensation of private sector employees, gross operating surplus, private consumption and the number of unemployed persons with respect to GDP as estimated here seem however to differ quite markedly from the respective OECD estimates. This is mainly owing to the divergences in the methodology of how the macroeconomic elasticities and the overall budgetary sensitivity are derived in the OECD and our computations.

⁸ *The poor quality of data on operating surplus and mixed income, on the one hand, and profit taxes, on the other, as well as variable lag structures in the tax revenue made it impossible to estimate the lag structure econometrically. Both the OECD approach and the method used in this paper are based on the assumption of constant elasticities and constant lag structures. It should be noted, however, that these assumptions can only be legitimised by "pragmatic" reasons. The highly stylised estimates given here may give rise to inaccurate assessments in individual years and must, where applicable, be modified by means of a qualitative evaluation.*

⁹ *The elasticity of wage tax with respect to average compensation of employees given in the table is an average over the period 1990 to 2000.*

A9.3.3 Budget sensitivity: comparison with OECD

The approach proposed here implies a value of 0.45 for the sensitivity of the budgetary balance with respect to GDP (see Table 9.3.2). The difference of 0.06 percentage point to the value of 0.51 as estimated by the OECD can be explained by differences in the specification of output elasticities of macroeconomic base variables, on the one hand, and by differences in fiscal elasticities, on the other.

Table A9.3.2

Comparison of overall budget sensitivity to a balanced private sector shock amounting to a 1% change in GDP

	Our approach ¹⁾	OECD ²⁾
Overall budgetary sensitivity	0.45	0.51
Difference w.r.t. OECD sensitivity	-0.06	
on account of:		
Macroeconomic elasticities	+0.10	
Cyclical components in social security contributions to public pension funds and expenditure of public pension funds	-0.07	
Budgetary elasticities	+0.03	
Refinements in definition of relevant budgetary categories, of which	-0.11	
Social security contributions	-0.04	
Direct taxes	-0.02	
Indirect taxes	-0.02	
Expenditure related to unemployment	-0.03	
Unexplained effects (rounding)	-0.01	

1) Our sensitivity estimate refers to the impact in the second year.

2) Published on the OECD website: www.oecd.org.

The part of the difference which is due to the specification of the macroeconomic base can be sized up within a combined approach in which fiscal elasticities from the current method (including cyclical components in expenditure on pensions) are combined with output elasticities of macroeconomic variables as estimated in van den Noord (2000) - the latter adjusted for the private sector as described in Annex A6 of the working paper. The combined approach yields a sensitivity of 0.35. Hence, a difference of 0.16 percentage point is due to the specification of fiscal elasticities and definitions of fiscal variables in our approach. It is partly attributable to the inclusion of cyclically affected expenditure on pension payments offsetting revenue from contributions to the public pension funds. If pension payments were treated as in van den Noord (2000) (i.e.: being not cyclically affected), the sensitivity in the combined approach would increase by 0.07 percentage point from 0.35 to 0.42.

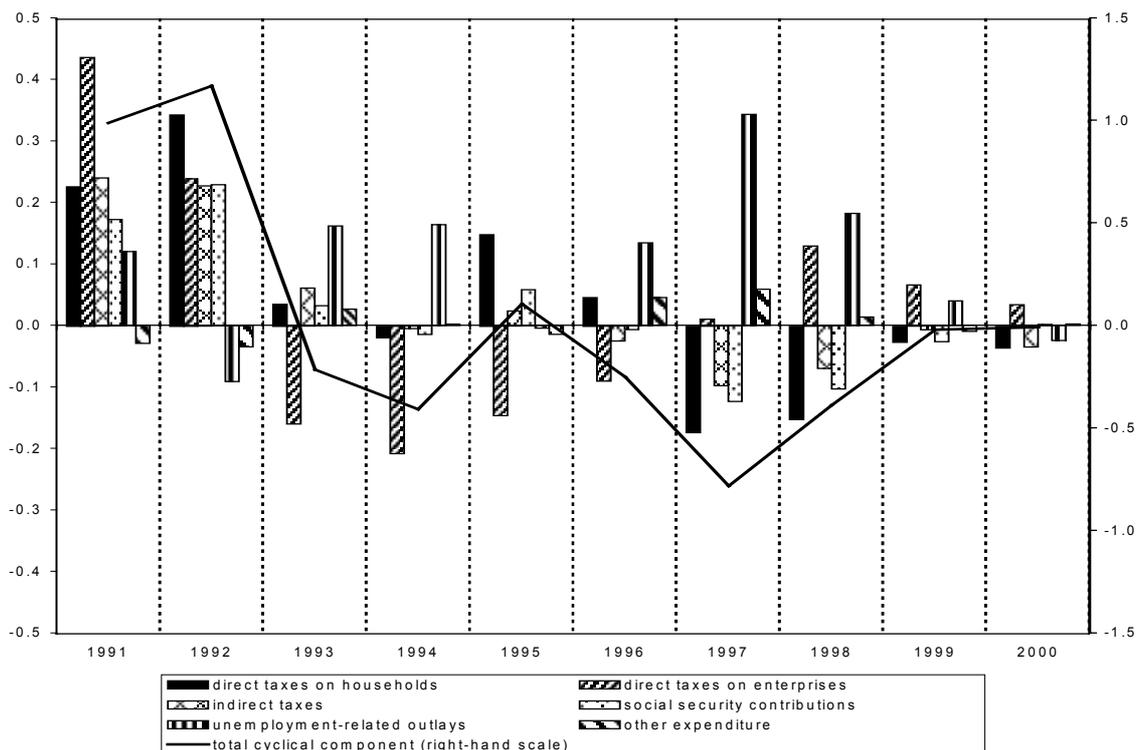
The remaining difference of 0.09 percentage point compared with the OECD original estimate of 0.51 can be split into two effects: Elasticities of fiscal variables with respect to their macroeconomic bases are higher in the current (and thus also in the combined) approach than in van den Noord (2000), increasing the budgetary sensitivity by 0.03 percentage point. Thus, the sensitivity in the combined approach would decrease from 0.42 to 0.39 if the values of the fiscal elasticities were replaced with those in van den Noord (2000). The second effect however, which is attributable to different *definitions of fiscal variables* - especially the exclusion of certain components - more than compensates this decrease (see Table A9.3.2).

A9.3.4 Cyclical components of the balances: analysis of the results

Chart A9.3.1 shows the development of the cyclical balance and the components of the cyclical balance.

Chart A9.3.1

Cyclical components of the government budget, $\lambda = 30$ (in percentages of GDP)



In general, cyclical impacts on single components do not point in the same direction. For example, in 1995 the impact on wage tax was positive but negative on taxes on operating surplus and mixed income. Furthermore, although the cyclical balance is largely driven by cyclical revenue from wage tax and social security contributions, the effect of other budgetary items cannot be neglected. Hence, the additional information which can be gained by relating fiscal items to trend deviations of macroeconomic base variables rather than to the output gap are not redundant. This impression is confirmed by a comparison of the cyclical balance of the disaggregated to that of the aggregated approach (the product of the trend deviation of real GDP and the overall budgetary sensitivity of 0.45) in Chart A9.3.2.

Chart A9.3.2

Comparison of cyclical components showing composition effects (in percentages of GDP)

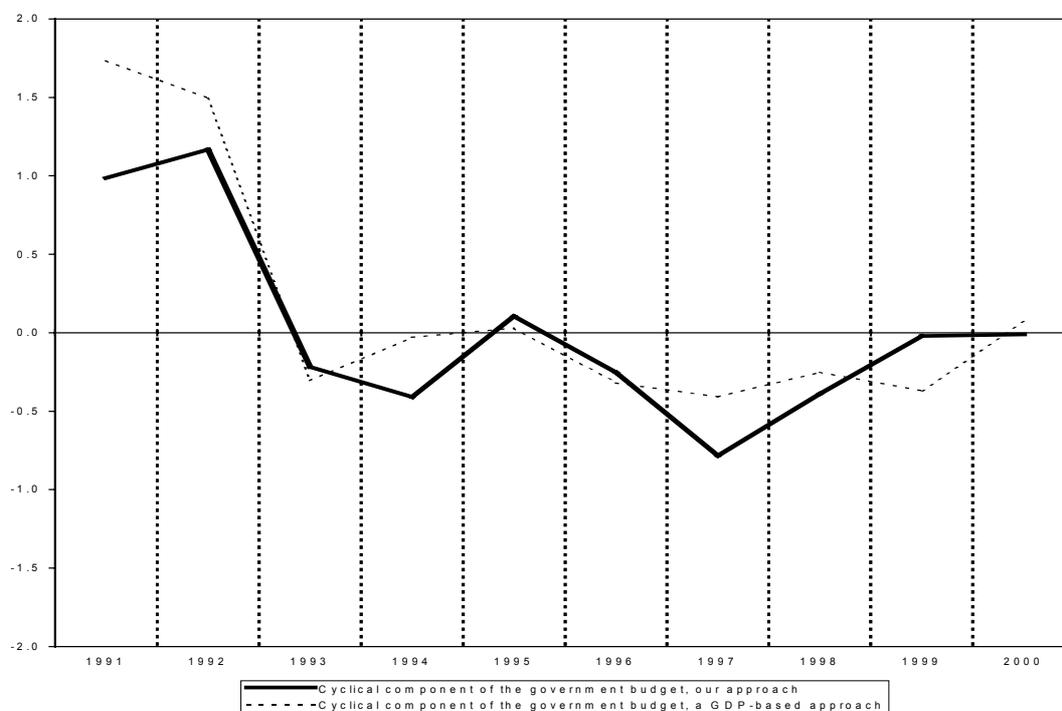
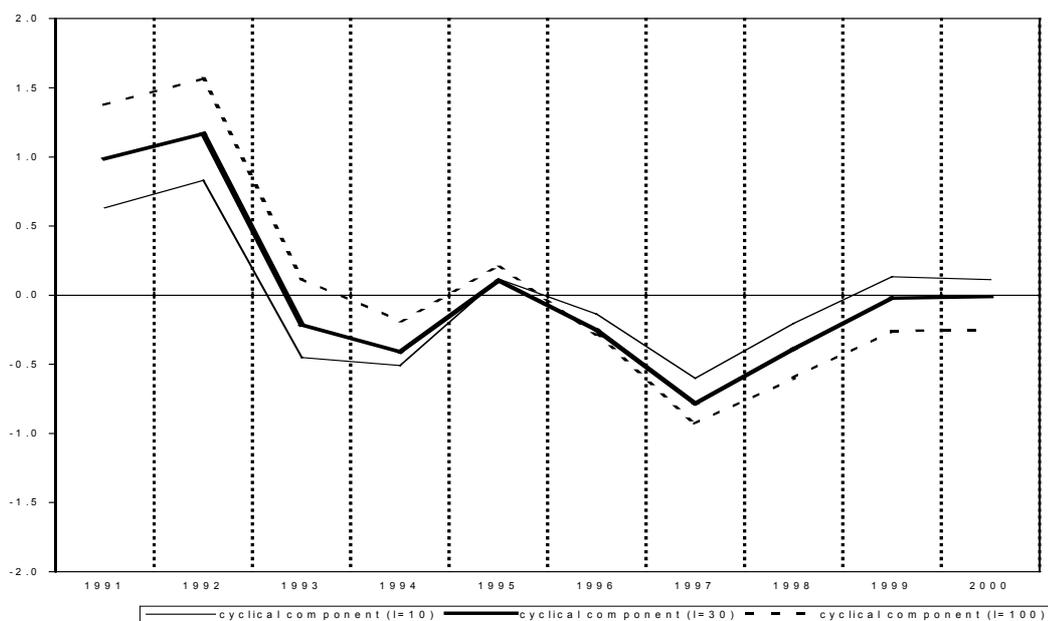


Chart A9.3.2 shows that the two approaches can result in substantial differences, although changes in both series of cyclical balances usually point in the same direction. Marked differences appear in the year 1994, when the cyclical balance obtained using the disaggregated approach does not follow the closing of output gap mirrored by an improving cyclical balance in the aggregated shock scenario, and in the year 1999, when the cyclical balance improves significantly in the disaggregated approach, whereas the shock scenario indicates a worsening cyclical impact on the overall balance. In both cases, the differences can be traced back to developments of some of the budgetary components. The key factor in 1994 was a relatively moderate development of wages and salaries, so that the closing of output gap did not materialise correspondingly in the revenue from wage tax and social security contributions. In 1999, unemployment declined and employment increased despite weaker economic growth.

The cyclical component depends on the choice of the value for the HP-filter smoothing parameter λ . Reasons for the value 30 used here are given in Section 3.3 of the working paper. The extent to which the results depend on the choice of λ can be inferred from Chart A9.3.3 in which three series of cyclical balances obtained from the disaggregated approach based on the values 10, 30, and 100 for λ are compared.

Chart A9.3.3

Sensitivity analysis on the cyclical component of the government budget balance: comparison to results obtained with $\lambda = 10$ and 100 (in percentages of GDP)



As expected, the series of cyclical balances for $\lambda = 30$ runs between those obtained for $\lambda = 10$ and $\lambda = 100$. The difference between the series for the extreme values 10 and 100 is especially marked in the period 1991 to 1993, when the macroeconomic repercussions of German unification were immediately effective. In the less exceptional years thereafter the difference amounts to no more than 0.4 per cent of GDP.

In order to solve the end-point problem of the HP-filter (see Section 3.2 of the working paper), the five macroeconomic time series are extended between 2004 and 2007 by constant growth rates before the HP-filter is applied.¹⁰ A growth rate of 2.25% is used for GDP, private consumption, compensation of employees, and operating surplus. Employment is extended with a growth rate of 0.25%. The number of unemployed is held constant between 2003 and 2007.

The impact of the extension used beyond 2000 can be examined by a simple sensitivity analysis, with the cyclical balance derived from the aggregated approach¹¹. The obtained results based on two alternative scenarios are then compared to the baseline. The comparison shows that the cyclical balance differs by no more than 0.2 per cent of GDP between the baseline approach and the comparatively optimistic extension scenario 2, which is based on a long-run growth rate of 3.1%.

¹⁰ For the period 2001 to 2003, the projections that were available last spring were used.

¹¹ In both alternative scenarios, the level of real GDP is extrapolated by growth rates in such a way that the trend value of the growth rate is reached in 2007. The growth rates for the period 2001-2007 are linearly interpolated between the rate for 2000 and the targeted trend growth rate in 2007. The scenarios differ by the targeted trend growth rate in 2007. In scenario 1, the targeted trend growth rate in 2007 equals the average rate of growth of 2.1% between 1986 and 2000 (i.e. the last 15 years known). In scenario 2, the targeted trend growth rate in 2007 equals the average rate of growth between 1986 and 2000 plus 1 percentage point.

A9.4 Greece

A9.4.1 Budgetary and macroeconomic elasticities: method description and variable definitions

Methodological remarks

The revenue and expenditure elasticity estimates have been derived almost exclusively from econometric regressions, as specified in Section 2.1.1 of the working paper. Error correction models have been used when deemed necessary.

Budget categories and macroeconomic bases

In the Greek case, the budget categories and macroeconomic bases follow relatively closely the benchmark list and definition of variables described earlier in Section 2.2 of the paper.

A9.4.2 Budgetary and macroeconomic elasticities: comparison with OECD

Fiscal variables w.r.t. macroeconomic reference variables

The elasticities of fiscal variables with respect to the macroeconomic reference variables are mostly in line with the OECD estimates (see Table A9.4.1). One exception is the elasticity of direct taxes on households with respect to the average wage, which is meant to reflect the progressivity of the income tax system. This elasticity is calculated by the OECD on the basis of the tax code and a very high value (3.1) is reported, indeed the highest among OECD countries. We, on the other hand, have estimated the same elasticity using econometric techniques and have obtained a value of 1.5. Taking into account the fact that due to the presence of tax evasion, the statutory tax rules are not always applied effectively, the use of econometric estimations for the calculation of elasticities can indeed be considered preferable in the Greek case.

Regarding the elasticity of unemployment-related expenditure with respect to the number of unemployed, the OECD assumed a value of 1, which can be considered very high, especially if one takes into account the fact that the 'new unemployed' are not entitled to unemployment benefits and the same holds true for the long-term unemployed. Therefore, we consider our econometric estimate of 0.2 more reliable.

Finally, it should be noted that the elasticity of social security contributions with respect to the average wage can be expected to become 1 in the current and future years, since a ceiling in contributions no longer applies.

Macroeconomic variables w.r.t. output

Regarding macroeconomic elasticities, a large difference is observed in the case of the output elasticity of employment. The OECD fixes the output elasticity of employment to 0.6 (i.e. the average for the smaller OECD countries), which in our view is rather arbitrary and very high. Research at the Bank of Greece, based on the estimation of an employment function taking into account changes in the GDP and real wage, reports an output elasticity of employment of around 0.2, which is much closer to the value presented in this paper.

Table A9.4.1**Comparison of elasticities**

Fiscal variables w.r.t. macroeconomic reference variables	Our approach¹⁾	OECD²⁾
Direct taxes on households w.r.t. average wages	1.50	3.10
Direct taxes on households w.r.t. employment	1.00	1.00
Direct taxes on enterprises w.r.t. gross operating surplus/ gross primary company income	1.00	1.00
Indirect taxes w.r.t. private consumption	1.00	1.00
Social contributions w.r.t. average wages	0.95	0.90
Social contributions w.r.t. employment	1.00	1.00
Unemployment-related expenditure w.r.t. number of unemployed	0.20	1.00
Elasticities of macroeconomic variables w.r.t. output		
Average compensation of private sector workers	0.68	0.48
Private sector employment	0.10	0.60
Gross operating surplus/gross primary company income	0.68	0.90
Private consumption	1.23	0.80
Number of unemployed	-0.73	0.60

1) The macroeconomic elasticities w.r.t. output have been derived in this paper from the shock scenario which has been described in detail in Annex A4.

2) The OECD elasticities have been respectively taken from van den Noord (2000) and they have been adjusted to our methodology.

A9.4.3 Budget sensitivity: comparison with OECD

The sensitivity of the Greek budget balance to a balanced growth shock in the private sector amounting to a 1 per cent change in GDP is 0.38 (see Table A9.4.2). This value is between the most recent OECD estimate of 0.44 and the European Commission estimate of 0.35.

Table A9.4.2**Comparison of the overall budget sensitivity to a private sector shock amounting to a 1 % change in GDP**

	Our approach¹⁾	OECD²⁾
Overall budget sensitivity:	0.38	0.44
Difference w.r.t. OECD sensitivity	-0.06	
On account of:		
Definition of the macroeconomic elasticities	0.00	
Refinements of budgetary categories	-0.01	
Budget elasticities	-0.04	
Residual component	-0.01	

1) Our sensitivity estimate refers to the impact in the second year.

2) Published on the OECD website: www.oecd.org.

The difference with respect to the OECD overall budgetary sensitivity estimate is almost exclusively accounted for by the use of different budget elasticities. Replacing the OECD macroeconomic elasticities with the ones used by us to compute the same overall sensitivity suggests that differences in these elasticities have broadly cancelling out effects. On the other hand, the sometimes non-negligible differences of the OECD and our estimates of budget elasticities (see Table A9.4.1) have a negative effect. The other sources of difference between the OECD and our methodology seem to have only a minor impact on the results.

A9.4.4 Cyclical components of the balances: analysis of the results

Chart A9.4.1 presents the overall effect of the business cycle on fiscal balances in the 1990s, as well as the impact of individual budget items. The chart confirms the often claimed ascertainment that the fiscal deficit in Greece is primarily of a structural nature. The business cycle seems to have had a slight negative impact on fiscal balances almost throughout the 1990s, which is expected to level off around 0 from 1998 onwards. However, this impact is of an almost negligible magnitude.

Chart A9.4.1

Cyclical components of the government budget, $\lambda = 30$ (in percentages of GDP)

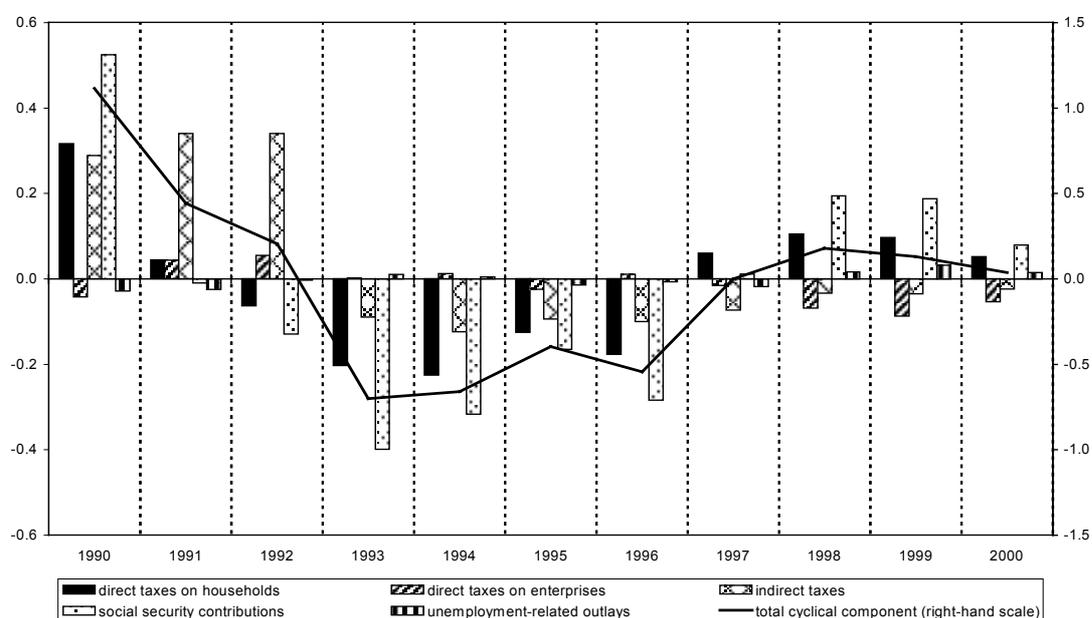
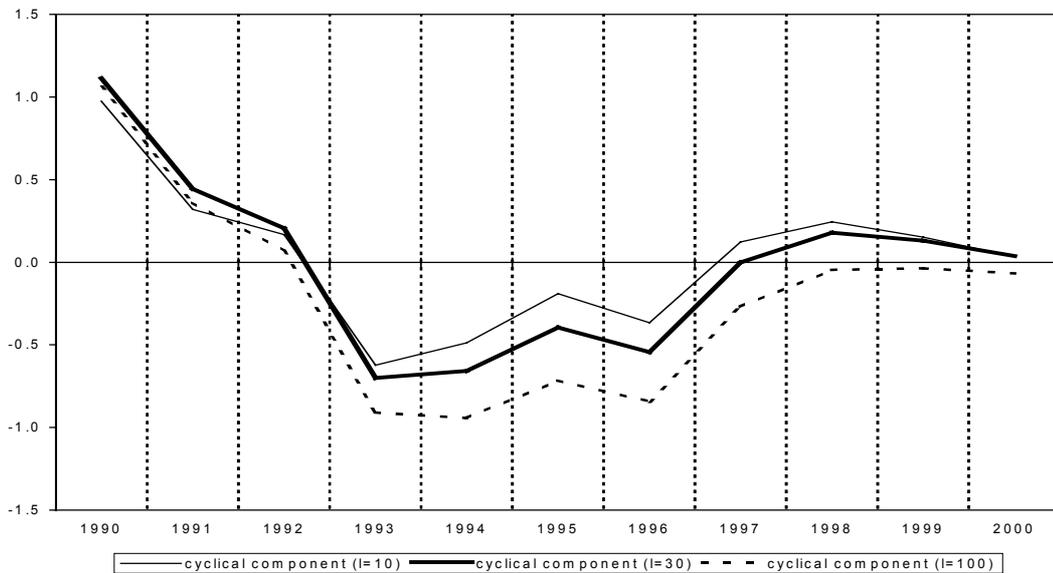


Chart A9.4.2 would suggest that in the case of Greece the choice of the smoothing parameter for the Hodrick-Prescott filter does not have any major impact on the estimation of the cyclical component of the budget.

Chart A9.4.2

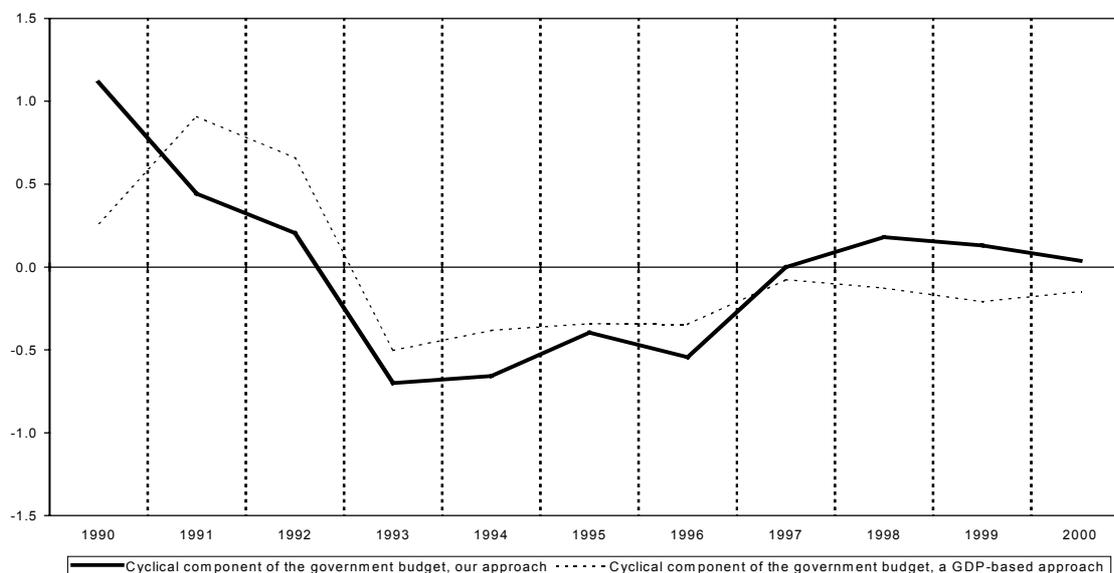
Sensitivity analysis on the cyclical component of the government budget balance: comparison to results obtained with $\lambda = 10$ and 100 (in percentages of GDP)



The cyclical component of the budget balance was also calculated on the basis of an aggregated approach in order to capture the possible impact of composition effects revealed by our methodology. More precisely, in the aggregated approach the gaps in real GDP were assumed to apply in the same magnitude to all macroeconomic variables. As is apparent in Chart A9.4.3, the difference between the two approaches is rather negligible, suggesting that composition effects are not really important in the Greek case.

Chart A9.4.3

Comparison of cyclical components showing composition effects (in percentages of GDP)



In order to solve the end-point problem of the HP-filter, the five macroeconomic variables are extended to 2007 before applying the HP-filter, using the forecasts that were available last spring up to 2003. To assess the sensitivity of the estimates with regard to the extension used beyond 2000, a simple sensitivity analysis was conducted on the cyclical component of the budget balance computed using the aggregated approach (i.e. applying the budget sensitivity to the output gap) and by extending the real and nominal GDP series in two alternative ways for the period 2001-2007¹². The obtained results were then compared to the baseline scenario.

The comparison showed that the estimated values of the cyclical component are rather sensitive to the method used to extend the macroeconomic variables. This is attributable to the nature of the sensitivity test, which might not be extremely relevant for the Greek case, as the assumed rate of GDP growth of around 4-5% in the baseline scenario would gradually fall substantially to lower than 2% (scenario 1) or 3% (scenario 2) in the years to come. This might not be a very likely scenario. Would it materialise, however, the cyclical component would have been on the positive side in recent years.

¹² In both alternative scenarios, the level of real GDP is extrapolated by growth rates in such a way that the trend value of the growth rate is reached in 2007. The growth rates for the period 2001-2007 are linearly interpolated between the rate for 2000 and the targeted trend growth rate in 2007. The scenarios differ by the targeted trend growth rate in 2007. In scenario 1, the targeted trend growth rate in 2007 equals the average rate of growth between 1986 and 2000 (i.e. the last 15 years known). In scenario 2, the targeted trend growth rate in 2007 equals the average rate of growth between 1986 and 2000 plus 1 percentage point.

A9.5. Spain

One important remark has to be made before presenting the results for Spain. Estimates of the elasticities are based on ESA 79 data, since macroeconomic and fiscal series in terms of ESA 95 are only available from 1995. Estimates of the cyclical budget components are based on the past data and forecasts that were available last spring, and they are thus in terms of ESA 95. Finally, in order to apply the Hodrick-Precott filter, long series for those macroeconomic variables used in this paper have been created, based on the available ESA 95 figures and the old ESA 79 figures. Once longer ESA 95 series are available, the elasticities and the budget cyclical components will be re-estimated.

A9.5.1 Budgetary and macroeconomic elasticities: method description and variable definitions

Methodological remarks

The budgetary elasticities are derived both from tax rules and revenue data or estimated on the basis of an econometric regression. The elasticity of direct taxes on households with respect to average wages is computed on the basis of detailed data on the distribution of income and tax revenue¹³. The value of the elasticities of corporate tax with respect to gross operating surplus, of indirect taxes with respect to private consumption and of social security contributions with respect to compensation of employees are based both on econometric regression and also derived from tax rules. The latter is especially relevant, since it has been demonstrated to be extraordinarily difficult to find satisfactory and stable relationships between fiscal and macroeconomic variables. This might be explained by the far-reaching changes undergone in the Spanish public sector since the late seventies as a consequence of moving towards European welfare state and tax models^{14,15}. Finally, the elasticity of unemployment-related expenditures with respect to the number of unemployed is assumed to be one.

Budget categories and macroeconomic bases

In the Spanish case, the benchmark list of budget categories and macroeconomic bases described in Section 2.2 of the working paper were deemed appropriate. In addition, most elasticities for the final budget categories were obviously also influenced by the exclusion of the public sector.

A9.5.2 Budgetary and macroeconomic elasticities: comparison with OECD

Fiscal variables w.r.t. macroeconomic reference variables

While the general caveat on comparability with the OECD must be kept in mind, in the case of Spain the estimates do not appear significantly different from those of the OECD (see Table A9.5.1).

The value of the elasticity of direct taxes on households with respect to average wages (1.5) is

¹³ The latest year for which this detailed data is available is 1994. As significant regulatory changes have affected income tax since then, the elasticity has also been estimated using an econometric approach and results do not significantly differ.

¹⁴ This difficulty to find satisfactory and stable relationships might also be explained by the fact that the macroeconomic variables considered here are only proxies of the real tax bases. This is especially the case for the gross operating surplus as a proxy for profits.

¹⁵ Moreover, the apparent elasticity of indirect taxes to GDP and private consumption has been particularly high during the last few years, pointing out that other factors, such as the surfacing of the shadow economy might have played a role during the recent economic expansion, which are not captured by the estimated elasticity.

lower than the recent OECD estimate (1.8)¹⁶. The value of the elasticities of corporate tax with respect to gross operating surplus (1.2), of indirect taxes with respect to private consumption (1) and of social security contributions with respect to compensation of employees (0.9) are respectively equal to 1, 0.8 and 1 in the OECD estimates. Finally, the elasticity of unemployment-related expenditure with respect to the number of unemployed is set to 1 as in the OECD estimates.

Macroeconomic variables w.r.t GDP

The OECD and our elasticities of various macroeconomic variables with respect to GDP would also seem to be very close to each other. The only major difference concerns the reaction of unemployment to a change in output. Indeed, we have found it to be considerably larger than the OECD. This is however mainly owing to the divergences in the classification applied by the OECD and by us, the coverage being smaller in our case.

Table A9.5.1

Comparison of elasticities

Fiscal variables w.r.t. macroeconomic reference variables	Our approach¹⁾	OECD²⁾
Direct taxes on households w.r.t. average wages	1.5	1.8
Direct taxes on households w.r.t. employment	1.0	1.0
Direct taxes on enterprises w.r.t. gross operating surplus/ Gross primary company income	1.2	1.0
Indirect taxes w.r.t. private consumption	1.0	1.0
Social contributions w.r.t. average wages	0.8	0.8
Social contributions w.r.t. employment	1.0	1.0
Unemployment-related expenditure w.r.t. number of unemployed	1.0	1.0
Elasticities of macroeconomic variables w.r.t. output		
Average compensation of private sector workers	0.3	0.4
Private sector employment	0.7	0.7
Gross operating surplus/gross primary company income	1.0	1.1
Private consumption	1.3	1.2
Number of unemployed	-3.15	-2.1

1) *The macroeconomic elasticities w.r.t. output have been derived in this paper from the shock scenario which has been described in detail in Annex A4.*

2) *The OECD elasticities have been respectively taken from van den Noord (2000) and they have been adjusted to our methodology.*

A9.5.3 Budget sensitivity: comparison with OECD

The Spanish budget sensitivity is, according to the methodology set forth in this paper, equal to 0.4. This value falls within the range spanned by available estimates. It is in line with the previous estimates (0.4) of the Banco de España and the most recent estimate (0.4) of the OECD (OECD, 2000).

¹⁶ *In any case, the estimated elasticities do not take into account the 1999 reform of the income tax due to the lack of information on detailed data. According to some preliminary estimates, this reform might have caused important effects on tax progressivity.*

Table A9.5.2

Comparison of the overall budget sensitivity to a balanced private sector shock amounting to a 1% change in GDP

	Our approach ¹⁾	OECD ²⁾
Overall budget sensitivity:	0.40	0.4
Difference w.r.t. OECD sensitivity	0.00	
on account of:		
Definition of the macroeconomic elasticities	0.02	
Refinements of budgetary categories	-0.01	
Budget elasticities	0.00	
Residual component	0.00	

1) Our sensitivity estimate refers to the impact in the second year.

2) Published on the OECD website: www.oecd.org.

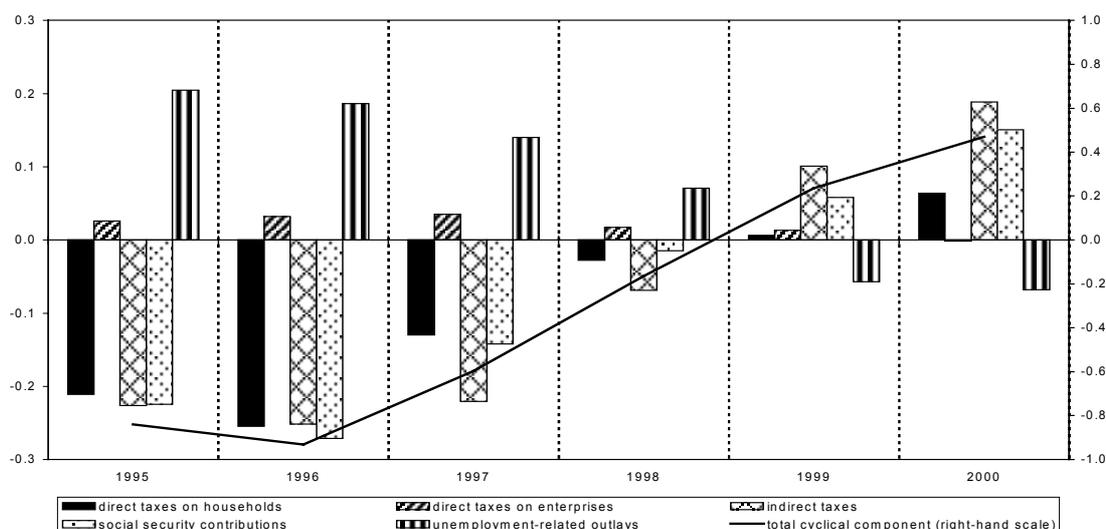
The difference with respect to the OECD figure can be broken down into four elements: a) a different calibration of the macroeconomic shock; b) the refinements of budget categories; c) the use of different budget elasticities; and d) a residual component which highlights that the two approaches are not exactly comparable (see Table A9.5.2 above). However, none of these elements have a significant impact on the elasticity when compared to the respective OECD estimate.

A9.5.4 Cyclical components of the balances: analysis of the results

Since 1995¹⁷ the cycle has exerted an unfavourable effect on the Spanish general government accounts. The cyclical component of the budget balance reached a negative peak in 1996 (-0.9 % of GDP), while in the following years the adverse impact lessened, becoming positive in 1999 (see Chart A9.5.1).

Chart A9.5.1

Cyclical components of the government budget, $\lambda = 30$ (in percentages of GDP)



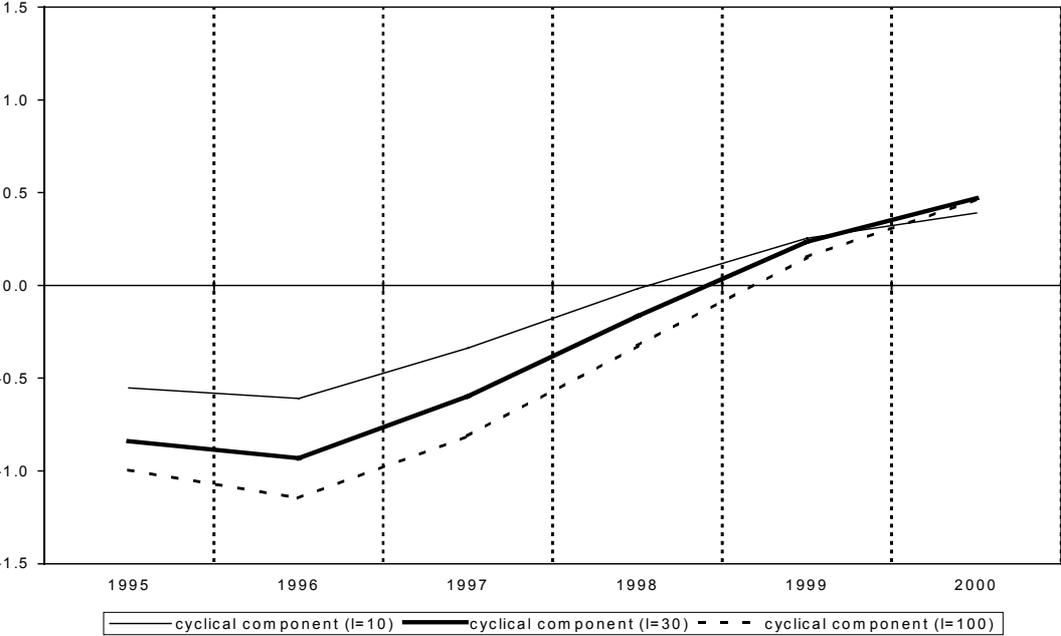
The sign of the overall impact and its developments were largely determined by the cyclical

¹⁷ The method has been applied from 1995 since this is the first year for which data on general government accounts in terms of ESA 95 is available.

component of the budget items (direct taxes on households, social security contributions and unemployment-related expenditures) linked to employment/unemployment and unit wages. These macroeconomic variables were below their trend levels until 1997 (1998 in the case of unemployment), becoming positive afterwards. Broadly similar developments have characterised private consumption. This pattern was only partially offset by the developments in gross operating surplus, which was above trend in the period 1995-99 and became at trend in 2000.

For different values of lambda (30, 10 and 100), the evolution of the cyclical component of the government budget balances is shown in Chart A9.5.2. Differences between the level of cyclical components based on different lambda values are certainly not negligible, as is clearly illustrated for the period 1995-98 in the chart.

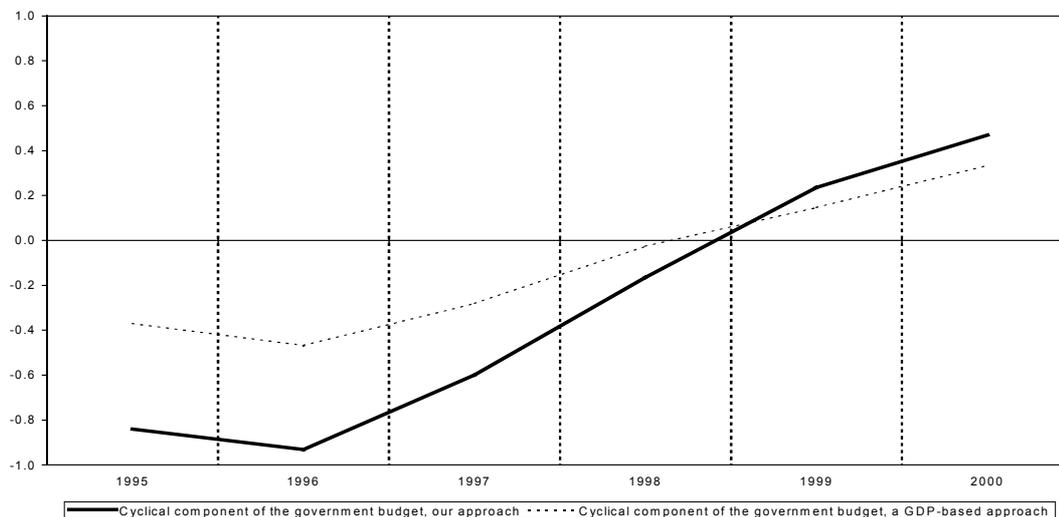
Chart A9.5.2
Sensitivity analysis on the cyclical component of the government budget balance: comparison to results obtained with $\lambda = 10$ and 100 (in percentages of GDP)



To assess the relevance of composition effects, the cyclical component of the budget has also been calculated using the output gap (derived by applying to real GDP a Hodrick-Prescott filter with a smoothing parameter of 30) and the overall budgetary sensitivity computed in this paper (0.4). Chart A9.5.3 reveals that in terms of levels, the differences between the two estimates are relatively large only in 1995 (0.4% of GDP), and in 1996 (0.4%).

Chart A9.5.3

Comparison of cyclical components showing composition effects (in percentages of GDP)



In order to solve the end-point problem of the HP-filter (see Section 3.2 of the working paper), the five macroeconomic variables are extended to 2007 before applying the HP-filter, using the forecasts that were available last spring up to 2003. Beyond 2003, the same rate growth as in 2003 is maintained.

To assess the sensitivity of the estimates with regard to the extension used beyond 2001, a simple sensitivity analysis was conducted on the cyclical component of the budget balance computed using the aggregated approach (i.e. applying the budget sensitivity to the output gap) and by extending the real and nominal GDP series in two alternative ways for the period 2001-2007¹⁸. The obtained results were then compared to the baseline scenario. The comparison revealed that, even in 2000, the estimates are not very sensitive to the method used for extending the macroeconomic variables.

¹⁸ In both alternative scenarios, the level of real GDP is extrapolated by growth rates in such a way that the trend value of the growth rate is reached in 2007. The growth rates for the period 2001-2007 are linearly interpolated between the rate for 2000 and the targeted trend growth rate in 2007. The scenarios differ by the targeted trend growth rate in 2007. In scenario 1, the targeted trend growth rate in 2007 equals the average rate of growth between 1986 and 2000 (i.e. the last 15 years known). In scenario 2, the targeted trend growth rate in 2007 equals the average rate of growth between 1986 and 2000 plus 1 percentage point.

A9.6 France

A9.6.1 Budgetary and macroeconomic elasticities: method description and variable definitions

Methodological remarks

The revenue and expenditure elasticity estimates were derived from econometric regressions mainly, using error correction models as often as possible (see Section 2.1.1 of the working paper). The estimations take into account the frequent reforms, which have influenced French tax system and unemployment-related expenditure, especially during the most recent years. Many equation specifications and estimation results on household and corporate sector direct taxes, indirect taxes, social contributions and unemployment related outlays have been tested with respect to the relevant macroeconomic variables. They have been used to confirm the value of the elasticity deduced from the fiscal information. The estimation results are made available upon request.

Budget categories and macroeconomic bases

In the French case, the common methodology has been quite easy to implement and the budget categories and macroeconomic bases follow relatively closely the benchmark list and definition of variables (see Section 2.2). Moreover, the econometrically estimated budgetary elasticities are nearly in all cases consistent with what can be expected according to the fiscal rules. One exception is the social security contributions, for which the elasticity has been arbitrarily set to 1. Another one pertains to the elasticity of unemployment-related expenditure with respect to the number of unemployed. The econometric estimate implies too high an elasticity, which is not consistent with the current functioning of the social security system. Therefore, it has also been set to 1 in the calculations.

Exclusion of public sector

The exclusion of the public sector has been made as often as possible, according to the common methodology. A zero elasticity has been attributed to the components of social security contributions, direct taxes paid by households and indirect taxes, which are paid either by the general government or by public sector employees.

A9.6.2 Budgetary and macroeconomic elasticities: comparison with OECD

Fiscal variables w.r.t. macroeconomic reference variables

The elasticities of fiscal variables with respect to the macroeconomic reference variables differ in some cases markedly from the respective OECD estimates (see Table A9.6.1). Indeed, we find the elasticity of direct taxes on enterprises to be considerably higher and the elasticity of direct taxes on households to be substantially lower than the OECD.

Macroeconomic variables w.r.t. GDP

The OECD and our elasticities of various macroeconomic variables with respect to GDP would also seem to differ quite a lot from each other. We obtain markedly higher elasticities for average compensation of private sector employees and private consumption than the OECD, while those

of gross operating surplus and the number of unemployed persons are significantly lower. The former is largely attributable to the differences in the methodology of how the macroeconomic elasticities and the overall budgetary sensitivity are derived in our computations.

Table A9.6.1

Comparison of elasticities

Fiscal variables w.r.t. macroeconomic reference variables	Our approach ¹⁾	OECD ²⁾
Direct taxes on households w.r.t. average wages	1.2	1.7
Direct taxes on households w.r.t. employment	1.0	1.0
Direct taxes on enterprises w.r.t. gross operating surplus/ Gross primary company income	1.5	1.0
Indirect taxes w.r.t. private consumption	1.0	1.0
Social contributions w.r.t. average wages	1.0	1.0
Social contributions w.r.t. employment	1.0	1.0
Unemployment-related expenditure w.r.t. number of unemployed	1.0	1.0
Elasticities of macroeconomic variables w.r.t. output		
Average compensation of private sector workers	0.82	0.05
Private sector employment	0.6	0.5
Gross operating surplus/gross primary company income	1.42	1.8
Private consumption	1.36	0.68
Number of unemployed	-3.91	-4.5

1) The macroeconomic elasticities w.r.t. output have been derived in this paper from the shock scenario which has been described in detail in Annex 4.

2) The OECD elasticities have respectively been taken from OECD (2000) and they have been adjusted to our methodology.

A9.6.3 Budget sensitivity: comparison with OECD

The overall sensitivity of the French budget to a balanced growth shock in the private sector amounting to a 1 per cent change in GDP is estimated to be 0.53. This value is clearly higher than the traditional rule-of-thumb (tax pressure times a close-to-one elasticity) semi-elasticity estimate (approximately 0.45 in 2000). It also exceeds the most recent OECD budget sensitivity estimate by a clear margin. This is mainly owing to the differences in how the shocks have been derived in the OECD and our calculations. Indeed, as the French public sector has a substantial weight in the economy, a 1 per cent of GDP shock in the private sector induces a stronger impact on the budget than in the case of most other countries.

Table A9.6.2

Comparison of the overall budget sensitivity to a balanced private sector shock amounting to a 1% change in GDP

	Our approach	OECD ¹⁾
Overall budget sensitivity:	0.53	0.42
Difference w.r.t. OECD sensitivity	0.11	
on account of:		
Macroeconomic elasticities/methodology	+0.02	
Calibration of the shock	+0.10	
Others (budget elasticities, exclusion of the public sector, refinements of budgetary categories)	-0.01	
Residual component	0.00	

1) Published on the OECD website: www.oecd.org.

The fact that the French public wages are sensitive to the business cycle has not been taken into account in the calculations. This is simply because there is no clear institutional linkage between the private and public sector wages. Moreover, econometric analysis does not provide any evidence of a link at least in the short-run. Therefore, public wages are assumed to be non-

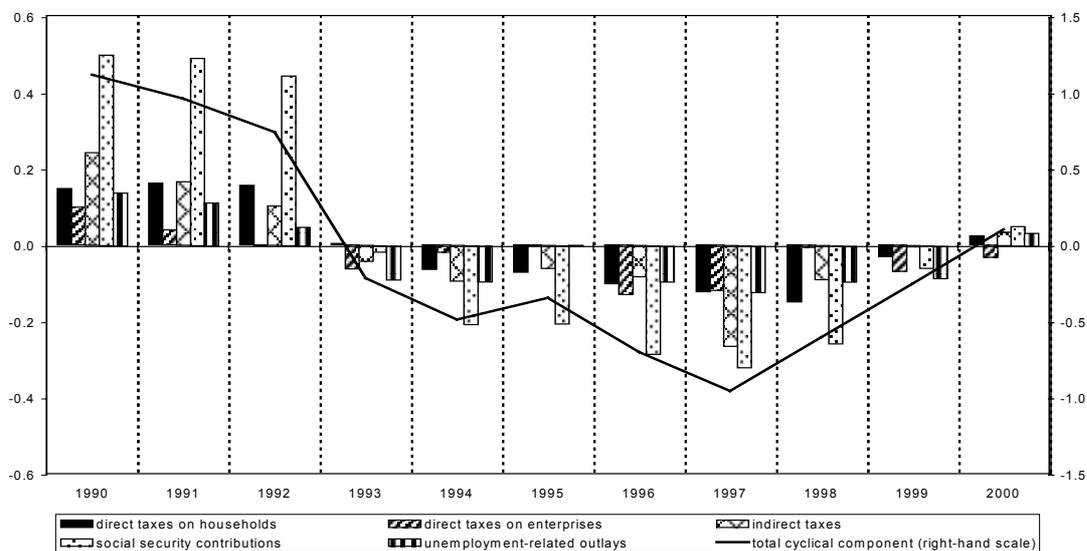
cyclical.

A9.6.4 Cyclical components of the balances: analysis of the results

The contribution of direct taxes on households to the changes of the cyclical part of the budget balance has been rather weak in the past (see Chart A9.6.1). It can be seen that social security contributions have been mainly responsible for the turning points of the cyclically adjusted budget balance last years.

Chart A9.6.1

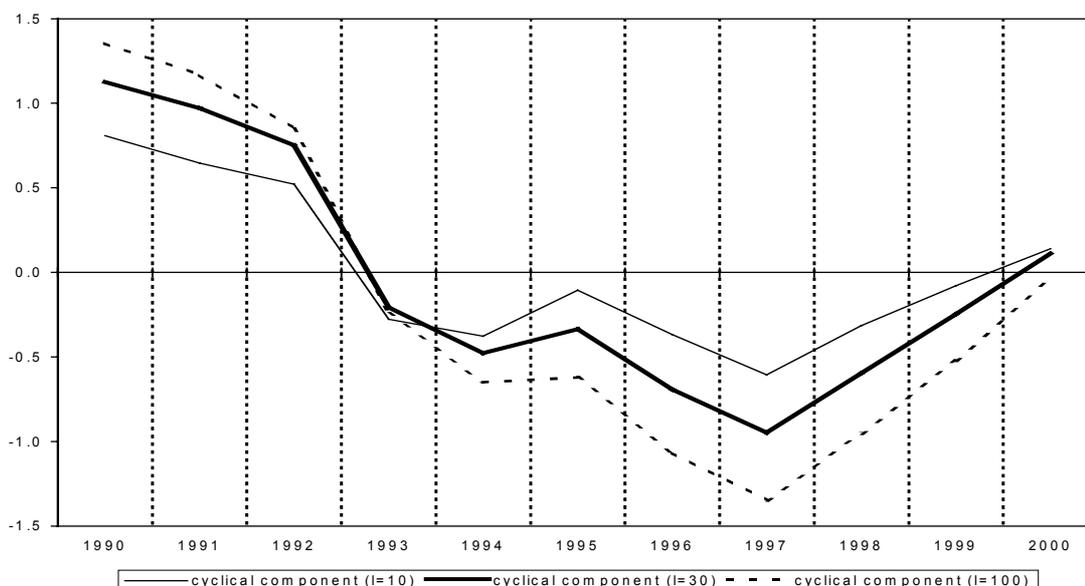
Cyclical components of the government budget, $\lambda = 30$ (in percentages of GDP)



Like in many other European countries, the cyclical component has negatively contributed to the general government accounts since 1993. The peak has been reached in 1997 (-0.95% of GDP). In the following years, the negative impact has been weaker, becoming null in 2000. These results would be very similar, whatever the value of the smoothing parameter lambda used (10, 30 or 100) in applying the Hodrick-Prescott filter (see Chart A9.6.2).

Chart A9.6.2

Sensitivity analysis on the cyclical component of the government budget balance: comparison to results obtained with $\lambda = 10$ and 100 (in percentages of GDP)

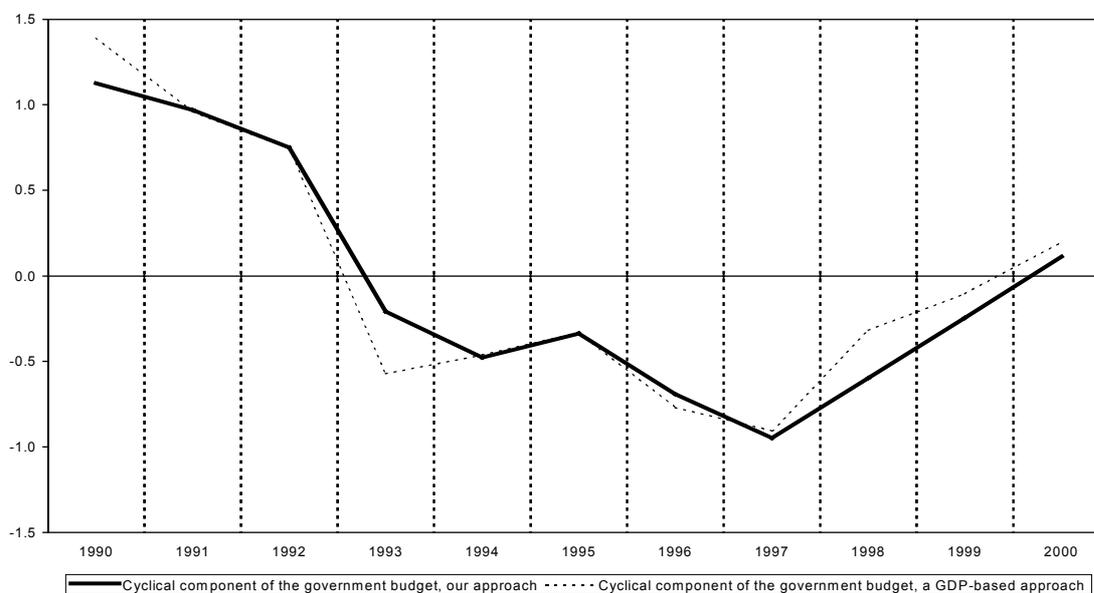


In order to assess the relevance of composition effects, the cyclical component of the budget has also been calculated by applying the aggregated approach that employs only the output gap (i.e. HP-filtering the real GDP with a smoothing parameter value of 30) and uses the overall budgetary sensitivity of 0.53. This is however only a rough approximation, since we know that the sensitivity varies over the business cycle due to the changing weights of different GDP components. For instance, in case of a growth acceleration being driven by domestic demand, the relative weight of taxes based on private consumption with respect to GDP is higher than the one calculated during a recession. In France, the overall elasticity can change by more than 0.1 percentage point depending on which stage of the business cycle the economy is.

The difference between the aggregated and disaggregated approaches has not always been negligible (see Chart A9.6.3). The composition effects matter when changes in GDP are not due to private demand and income components included in the fiscal bases. For instance, in France, the contribution of changes in inventories to GDP variations used to be quite important, especially during the upswing or downswing periods. As the inventories are not influencing any fiscal base, a change in GDP induced by a change in the inventories has no direct effect on the government budget. The growth has nevertheless been mainly driven by private components in the recent past. Household income and company profits have been dynamic. Consequently, the aggregated and disaggregated approaches have provided relatively similar results.

Chart A9.6.3

Comparison of cyclical components showing composition effects (in percentage of GDP)



In order to solve the end-point problem of the Hodrick-Prescott filter, the macroeconomic variables have been extended to 2007, first using the forecasts that were available last spring up to 2003, then using some relevant long-term assumptions (reference scenario). Beyond 2001, two alternative scenarios have been tested, the first one consistent with a 2.4% balanced growth rate and the second one with 4.8% growth rate. To assess the sensitivity of the estimates to the extension used beyond 2000, a sensitivity test was conducted employing the aggregated approach (i.e. applying the overall budget sensitivity to the output gap calculated with an HP-filter and a lambda value equal to 30). The obtained results were then compared to the reference scenario. The comparison showed that, even in 2000, the estimates are not very sensitive to the way macroeconomic variables are extended. Indeed, the most important variations concerned the end of the extension period.

A9.7 Ireland

A9.7.1 Budgetary and macroeconomic elasticities: method description and variable definitions

Methodological remarks

All revenue and expenditure elasticities were based on econometric estimation. The elasticities were estimated for a sample period 1980 to 1999. Cointegration analysis pointed to the viability of error correction mechanisms (ECMs). Growth rate model-based estimates were also undertaken. In a number of cases, the development of Irish public finances over the past 20 years pointed to the inclusion of a dummy variable assigned a value of 1 for the years 1980 to 1987, and 0 thereafter. This dummy variable's inclusion was warranted in many cases by significant t-values. The estimation results are made available upon request.

Budget categories and macroeconomic bases

The chosen macroeconomic variables adhered to the preferred variables suggested in the working paper. Therefore, direct taxes on households (excluding that paid by government employees) were regressed on compensation of employees (excluding government employees), indirect taxes on private consumption, direct taxes on enterprises on gross operating surplus, social contributions (excluding that paid by government employees) on compensation of employees (excluding government employees), and unemployment outlays (comprising unemployment benefits and assistance) on the number of unemployed persons.

Exclusion of public sector

The cyclical adjustment of public sector wages was not considered appropriate in the case of Ireland, as no clearcut institutional link exists between the economic cycle and public sector wages.¹⁹

A9.7.2 Budgetary and macroeconomic elasticities: comparison with OECD

Fiscal variables w.r.t. macroeconomic reference variables

Elasticity measures were selected on the basis of the diagnostic performance of ECM and growth rate models and a priori theory. Each specification was tested and, if necessary, corrected for heteroscedasticity and autocorrelation. All elasticities were found to be statistically significant at a 5 per cent significance level.

The elasticity of direct taxes on households (excluding government employees) with respect to compensation of private sector employees was estimated, using a growth rate model, to be 1.26 (see Table A9.7.1), reflecting the progressive nature of the income tax system.

The elasticity of indirect taxation with respect to private consumption was estimated at just over unity (1.04). The increment over one may be explained by cyclically sensitive consumption patterns of luxury goods, which generally tend to be taxed more heavily.

¹⁹ Given the term structure of public sector wage agreements in Ireland there is likely to be a significant lag between the economic cycle and public sector wage adjustment. Additionally, these national agreements and any deviations from them are agreed to by government and should thus be deemed to be a discretionary policy action. Cyclical adjustment of public wages was thus considered inappropriate.

Gross operating surplus (a residual between GDP and total compensation of employees) was the macroeconomic variable applied in estimating the elasticity of direct taxes on companies. A value of 0.76 was obtained using a simple growth rate model. The relatively inelastic value may reflect the growing importance of multinationals in the Irish economy, which pay relatively low rates of tax. This estimate must, however, be interpreted with caution due to the inherent complexities of the corporate tax system.

The elasticity of social security contributions (excluding government employees) with respect to compensation of private sector employees was estimated to be approximately 0.89. Although social contributions are generally a flat rate tax a value of less than unity can be attributed to caps on contributions above a certain level of income.

The elasticity of unemployment-related expenditure (benefit plus assistance) with respect to the number of unemployed was calculated to be 0.91 using an error correction model. This suggests that an increase in the number of unemployed results in a less than proportionate increase in unemployment expenditure. An intuitive explanation for this maybe that there is a less than full take up of unemployment benefit and assistance.

Macroeconomic variables w.r.t. GDP

Additionally, the elasticities of the macroeconomic variables with respect to GDP were calculated using growth rate and, where appropriate, ECM models. All elasticity coefficients of the regressions were found to be statistically significant.

The elasticity of compensation of private sector employees with respect to GDP was estimated at 0.94, indicating a less than proportionate shift in compensation for a given change in GDP.

The elasticity of private consumption with respect to GDP was estimated at 0.82 (using an ECM model), consistent with a marginal propensity to consume less than unity.

The elasticity of gross operating surplus with respect to GDP was calculated, using an ECM model, to be 1.34. This compares with an OECD estimate of 1.2.

The elasticity of unemployment with respect to output was estimated to be -0.51. That is, for a 1 per cent increase in output (GDP) the number of unemployed decreases by approximately 0.5 per cent. The estimation of such an Okun coefficient for a small open economy such as Ireland, however, needs to be interpreted with caution.

Table A9.7.1**Comparison of elasticities**

Fiscal variables w.r.t. macroeconomic reference variables	Our approach¹⁾	OECD²⁾
Direct taxes on households w.r.t. average wages	1.46	1.50
Direct taxes on households w.r.t. employment	1.00	1.00
Direct taxes on enterprises w.r.t. gross operating surplus/ gross primary company income	0.76	1.00
Indirect taxes w.r.t. private consumption	1.04	1.00
Social contributions w.r.t. average wages	1.00	1.00
Social contributions w.r.t. employment	0.70	1.00
Unemployment-related expenditure w.r.t. number of unemployed	0.91	1.00
Elasticities of macroeconomic variables w.r.t. output		
Average compensation of private sector workers	0.13	0.34
Private sector employment	0.81	0.79
Gross operating surplus/gross primary company income	1.34	1.2
Private consumption	0.82	0.47
Number of unemployed	-5.92	-2.70

1) The macroeconomic elasticities w.r.t. output have been derived in this paper from the shock scenario which has been described in detail in Annex A4.

2) The OECD elasticities have been respectively taken from van den Noord (2000) and they have been adjusted to our methodology.

A9.7.3 Budget sensitivity: comparison with OECD

The overall sensitivity of the Irish budget balance to a balanced growth shock in the private sector amounting to a 1 per cent change in GDP is 0.42 (see Table A9.7.2). The sensitivity computed by the OECD, although not directly comparable, based on the shock scenario - which uses the relationship between the different macroeconomic variables and GDP - gives a significantly lower result of 0.31. The difference with respect to the OECD estimate can be attributed to the differing calibration of macroeconomic shock, since applying the adjusted OECD elasticities of macroeconomic bases with respect to GDP reduces the overall budget sensitivity by 0.16. The main reason for this is that in the shock scenario used in this paper the changes in the macroeconomic bases are larger than those implied by the OECD macroeconomic elasticities (see Table A9.7.1). The budget elasticities account for approximately 0.02 of the difference. Finally, there is a small residual difference, which could be due to the different weights for the budget items or different conceptual definition of fiscal variables.

Table A9.7.2**Comparison of the overall budget sensitivity to a balanced private sector shock amounting to a 1% change in GDP**

	Our approach¹⁾	OECD²⁾
Overall budget sensitivity:	0.42	0.31
Difference w.r.t. OECD sensitivity	-0.11	
on account of:		
Definition of the macroeconomic elasticities	+0.16	
Budget elasticities	-0.02	
Residual component	-0.03	

1) Our sensitivity estimate refers to the impact in the second year.

2) Published on the OECD website: www.oecd.org.

A9.7.4 Cyclical components of the balances: analysis of the results

Alongside the improvement in the actual budget balance, the methodology described in this paper suggests that the cyclically adjusted budget balance improved considerably over the 1990s. Two issues arise when considering Irish fiscal performance in recent years.

Firstly, it may be better to focus on the primary budget balance. This is because debt servicing outlays are determined by the existing level of government debt and prevailing interest rates. The pronounced decline in the debt-to-GDP ratio (largely attributable to the high rate of GDP growth) and the structural downward shift in interest rates on entry into EMU has meant that debt servicing costs in Ireland have declined from 5.5 per cent of GDP in 1995 to 2.0 per cent in 2000. The cyclically adjusted budget balance improved by 5.2 percentage points between 1995 and 2000 - yet 3.5 percentage points of this improvement can be attributed to lower debt servicing costs. Choosing to focus on the cyclically adjusted fiscal balance in the case of Ireland, therefore, would not underline the key point that the structural improvement in the budget balance is largely generated by falling interest outlays and not by declining primary expenditure or increasing tax revenue.

Secondly, in 1999 the Irish government used privatisation receipts to pay a one-off pensions liability. This had the impact of reducing the general government balance by 1.9 percentage points. It would be improper to exclude such expenditure when examining the level of the cyclically adjusted budget balance for assessing the budgetary performance in the context of the Stability and Growth Pact, since the Pact does not make special allowance for such payments. However, when using either the change in the cyclically adjusted budget balance or in the cyclically adjusted primary balance as a measure of the fiscal stance, it may be appropriate to exclude this payment, as it is in effect a financial transaction with no direct impact on aggregate demand.

Since 1998 the cycle has exerted a favourable impact on the Irish general government surplus (see Chart A9.7.1). The cyclical component of the budget balance reached a negative peak of about 1.0 per cent of GDP in 1995 and it recored a surplus of more than 0.7 per cent of GDP in 2000.

Chart A9.7.1

Cyclical components of the government budget, $\lambda = 30$ (in percentages of GDP)

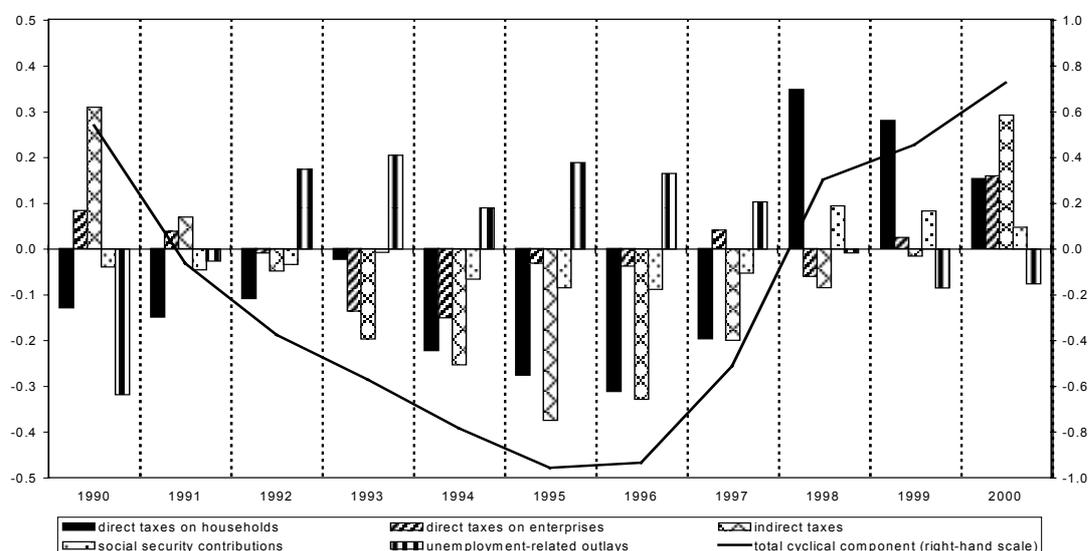


Chart A9.7.2 illustrates the cyclical component of the Irish budget balance for lambda values of 10, 30 and 100. Irish GDP growth has averaged about 8.5 per cent per annum over the last seven years. There are two alternative views with regard to the Irish business cycle and the choice of lambda. Firstly, the Irish economy has moved to a new, higher, sustainable steady state growth rate, with a resulting higher trend growth rate. A low lambda value would thus be more appropriate in this case. Secondly, and possibly more plausibly, the Irish economy is in a temporary phase of above average growth with an associated longer business cycle supporting the use of a higher lambda value.

Chart A9.7.2

Sensitivity analysis on the cyclical component of the government budget balance: comparison to results obtained with $\lambda = 10$ and 100 (in percentages of GDP)

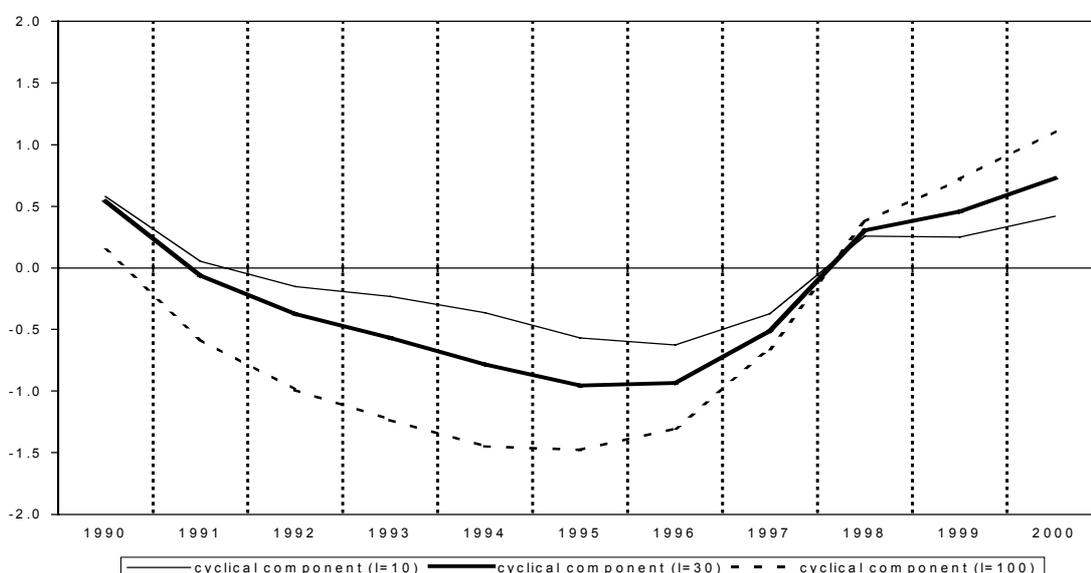


Chart A9.7.3 points to an average business cycle length of approximately 23 years for the Irish economy in recent years. This suggests that Ireland may currently be in a longer business cycle than the 12 year critical cycle pattern usually associated with choosing a HP-filter lambda value of 30 and points to the viability of using a higher lambda value. The large leakage effects (and overestimation of the cyclical component) usually connected with high lambda values depends on the critical length of the business cycle. Chart A9.7.3 suggests that given a longer business cycle a higher lambda value would give a more symmetric trade off between compression and leakage effects. Using a lambda value of 30 in the case of Ireland results in larger compression effects (some larger cyclical fluctuations are attributed to the trend component), a larger trend output estimate, a smaller output gap and an overestimation of the cyclically adjusted budget balance. Applying lambda 30 to the Irish economy seems to give implausibly high trend or potential growth rates, peaking at 8.5 per cent trend growth in 1998 (see Chart A9.7.4).

Chart A9.7.3

The output gap and the business cycle in Ireland

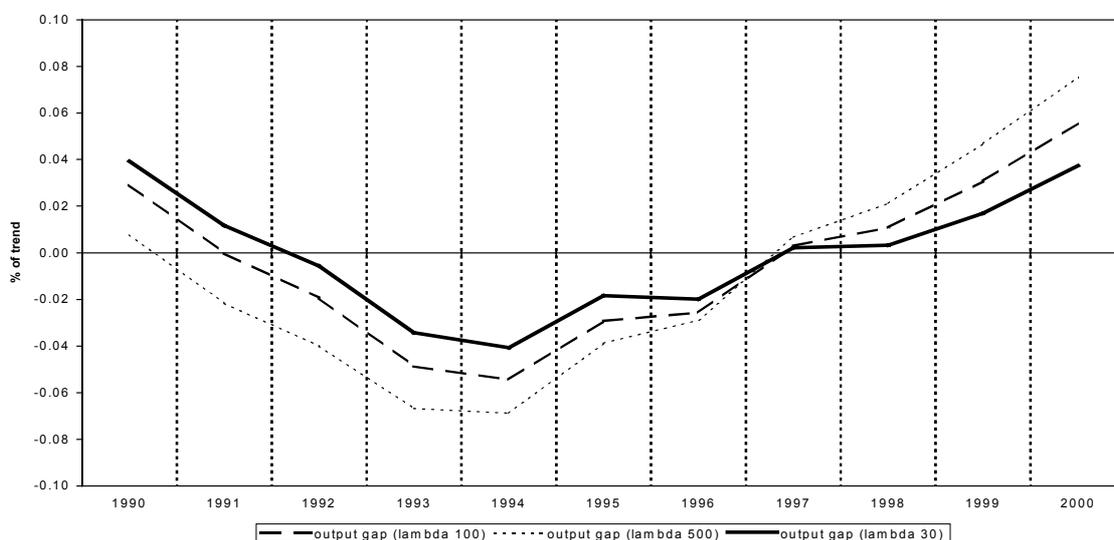


Chart A9.7.4

Trend GDP growth (lambda 30) and realised growth

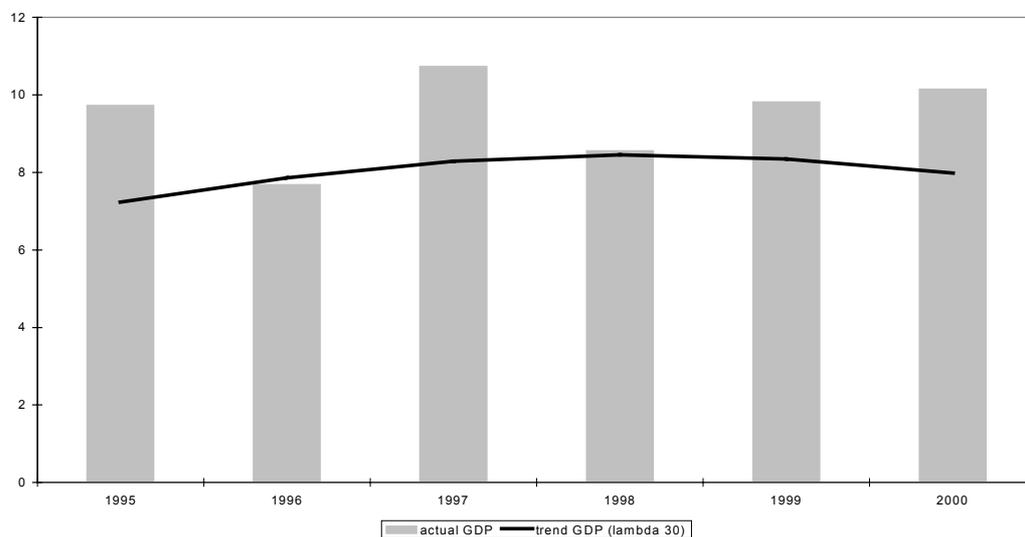
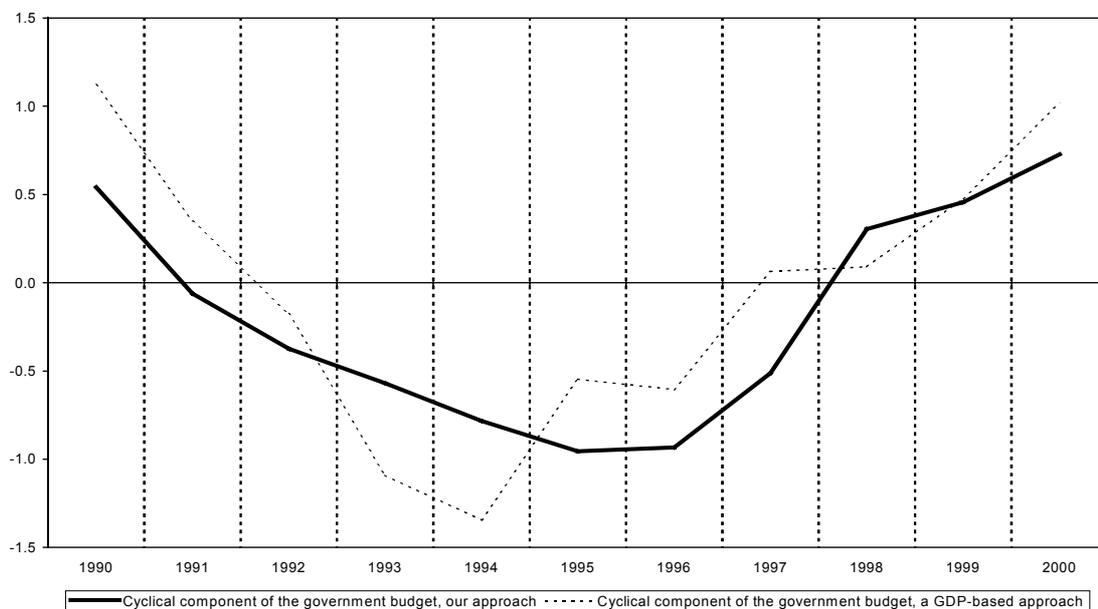


Chart A9.7.5 reveals a relatively high degree of correlation between the movements of the aggregated and disaggregated approaches. Overall, the GDP-based approach lags slightly behind the disaggregated approach, possibly due to different wage and employment dynamics, as captured by the approach described in this paper.

Chart A9.7.5

Comparison of cyclical components showing composition effects (in percentages of GDP)



In order to solve the end-point problem of the HP-filter, the five macroeconomic variables are extended to 2007, before applying the filter, using the forecasts that were available last spring up to 2003. Beyond 2003, the development of macroeconomic variables is consistent with a gradual slowing down of the Irish economy.

To assess the sensitivity of the estimates with regard to the extension used beyond 2000, a simple sensitivity analysis was conducted on the cyclical component of the budget balance. This was done by using the aggregated approach (i.e. applying the budget sensitivity to output gap) and by extending the real and nominal GDP in two alternative ways for the period 2001-2007²⁰. The obtained results were then compared to the baseline scenario. The comparison revealed that the cyclical component is smaller in scenarios 1 and 2 than in the baseline. This is due to the weight attached to the relatively high growth rates imposed (and thus higher trend estimate) for the most recent years.

²⁰ In both alternative scenarios, the level of real GDP is extrapolated by growth rates in such a way that the trend value of the growth rate is reached in 2007. The growth rates for the period 2001-2007 are linearly interpolated between the rate for 2000 and the targeted trend growth rate in 2007. The scenarios differ by the targeted trend growth rate in 2007. In scenario 1, the targeted trend growth rate in 2007 equals the average rate of growth between 1986 and 2000 (i.e. the last 15 years known – approximately 6.2 percent). In scenario 2, the targeted trend growth rate in 2007 equals the average rate of growth between 1986 and 2000 plus 1 percentage point.

A9.8. Italy

A9.8.1 Budgetary and macroeconomic elasticities: method description and variable definitions

Methodological remarks

Elasticities of individual budget categories with respect to their macroeconomic bases were derived for Italy from tax and expenditure rules and detailed revenue data. Econometric estimation was considered less reliable, taking into account the limited number of observations and the frequent reforms which have influenced Italian taxation and unemployment-related expenditure.

Budget categories and macroeconomic bases

In the Italian case, some minor deviations from the benchmark list of budget categories and macroeconomic bases described in Section 2.2 were deemed appropriate and feasible. In addition, most elasticities for the final budget categories were obviously also influenced by the exclusion of the public sector.

Direct taxes on households were restricted to those that weigh on employees. In particular, the withholding tax on interest income, which is part of this category but does not directly depend on labour income, was singled out and attributed a zero elasticity. The same was done for other current taxes on households.

As for indirect taxes, the regional tax on productive activities (Irap), which is part of this category but is levied mainly on labour income with a one year lag, was singled out and attributed a zero elasticity.

Direct taxes paid by companies include taxes paid by independent workers on their income.

The revenue from Irap was added to social security contributions, taking into account the one year lag in collection.

The unemployment-related expenditures include unemployment benefits and disbursements for the income-maintenance schemes.

Both econometric analysis and the examination of the rules and institutions, which govern public sector wage setting tend to exclude the existence of a short-term linkage, even in a weak form, between private and public sector wages. Therefore, public wages are assumed to be non-cyclical.

Exclusion of public sector

Social security contributions, direct taxes paid by households and indirect taxes all contain parts, which are paid by either general government to itself or by general government employees. As it was decided to restrict the definition of the business cycle to private sector developments only, a zero elasticity was attributed to these receipts. In some cases, most notably for social security contributions and direct taxes paid by public sector employees, exact data were not readily available and estimates had to be used.

At present, no corrections have yet been made for direct taxes paid out of social benefits (e.g.

pensions and unemployment-related outlays) or indirect taxes paid by government employees.

A9.8.2 Budgetary and macroeconomic elasticities: comparison with OECD

Fiscal variables w.r.t. macroeconomic reference variables

Even if the general caveat concerning the comparability with OECD results has to be kept in mind, the results with respect to budgetary elasticities are almost identical to those published by the OECD, which are also derived from tax rules (see Table A9.8.1). The only significant difference refers to the elasticity of corporate taxes with respect to gross operating surplus: in this paper the estimate (1.0) refers to the impact on the corporate tax of year $t+1$, taking into account the lag in tax payments, while the OECD estimate (1.0) has no lag. It should be pointed out that estimates of the corporate tax elasticity are subject to large uncertainty (with its last revision, the OECD estimate was reduced from 2.5 to 1). However, since this budget category is quite small, relatively large differences in the estimates of the elasticity have a very limited impact on the cyclically adjusted budget balance or the overall budgetary sensitivity estimates.

Macroeconomic variables w.r.t. GDP

The elasticities of different macroeconomic variables with respect to GDP would not seem to differ markedly from each other either. The only large difference concerns the elasticity for average compensation of private sector employees, considerably higher than the OECD.

Table A9.8.1

Comparison of elasticities

Fiscal variables w.r.t. macroeconomic reference variables	Our approach¹⁾	OECD²⁾
Direct taxes on households w.r.t. average wages	1.60	1.50
Direct taxes on households w.r.t. employment	1.00	1.00
Direct taxes on enterprises w.r.t. gross operating surplus/ gross primary company income	1.0 (one year lag)	1.00
Indirect taxes w.r.t. private consumption	1.00	1.00
Social contributions w.r.t. average wages	1.00	0.90
Social contributions w.r.t. employment	1.00	1.00
Unemployment-related expenditure w.r.t. number of unemployed	1.00	1.00
Elasticities of macroeconomic variables w.r.t. output		
Average compensation of private sector workers	0.93	0.41
Private sector employment	0.35	0.35
Gross operating surplus/gross primary company income	1.28	1.4
Private consumption	1.25	1.36
Number of unemployed	-2.35	-2.2

1) The macroeconomic elasticities w.r.t. output have been derived in this paper from the shock scenario which has been described in detail in Annex A4.

2) The OECD elasticities have been respectively taken from van den Noord (2000). The output elasticities of macroeconomic variables have been adjusted to be comparable with our methodology.

A9.8.3 Budget sensitivity: comparison with OECD

The overall sensitivity of the Italian budget (defined as the change in absolute value of the balance) to a balanced growth shock in the private sector amounting to a 1 per cent change in GDP is estimated to be 0.42 per cent of GDP in the first year and 0.48 in the second year. The latter value is identical to the most recent OECD estimate. However, this result is the effect of significant differences, owing to various factors, which overall cancel each other out (see Table A9.8.2): a) a different calibration of the macroeconomic shock; b) the refinements of budget categories; c) the use of different budget elasticities; and d) a residual component.

Table A9.8.2

Comparison of the overall budget sensitivity to a balanced private sector shock amounting to a 1% change in GDP

	Our approach¹⁾	OECD²⁾
Overall budget sensitivity:	0.48 (0.42 in the first year)	0.48
Difference w.r.t. OECD sensitivity	0.00	
on account of:		
Calibration of the macroeconomic scenario	+0.10	
Refinements of budgetary categories	-0.09	
Budget elasticities	-0.01	
Residual component	0.00	

1) *Our sensitivity estimate refers to the impact in the second year.*

2) *Published on the OECD website: www.oecd.org.*

A significant impact can be attributed to the different macroeconomic calibration of the shock. As explained in Chapter 4 of the working paper, the change in the macroeconomic bases is consistent with the assumption of a balanced shock on the private components of GDP amounting to a 1 per cent change in the latter. The OECD has instead estimated the elasticities of various macroeconomic variables with respect to GDP on the basis of past co-movements. With regard to applying the OECD elasticities, the choice made in the current approach increases the overall budgetary sensitivity by some 0.1 percentage point. This is mainly due to the relatively high value of the change in the average compensation of private sector employees assumed in our shock scenario (see Table A9.8.1).

The refinements in the selection of budget categories – and, more specifically, the fact that in our method, contrary to the OECD approach, a significant part of government revenue exhibits zero elasticity with respect to GDP – lower the overall budgetary sensitivity by some 0.09 percentage point. The impact attributed to differences in the budget elasticities is negligible when abstracting from the time lag in revenue collection; it reaches 0.07 percentage point when the sensitivity estimate for the first year presented in this paper is considered.

A9.8.4 Cyclical components of the balances: analysis of the results

Since 1993 the cycle has exerted an unfavourable effect on the Italian general government accounts. The cyclical component of the budget balance reached a negative peak in 1995, which amounted to -0.8 per cent of GDP (see Chart A9.8.1). The adverse impact lessened in the following years, becoming approximately null since 1998 and turning positive in 2000. This general picture appears to be robust against “reasonable” changes in the value of the smoothing parameter for the Hodrick-Prescott filter. However, the quantitative results would change significantly using relatively extreme values of this parameter: in particular, for values of 10 and 100, the negative peak in 1995 would be equal, respectively, to -0.6 and to -1.0 per cent of GDP (see Chart A9.8.2 below and Section 3.3 of the main text of this paper).

Chart A9.8.1

Cyclical components of the government budget, $\lambda = 30$ (in percentages of GDP)

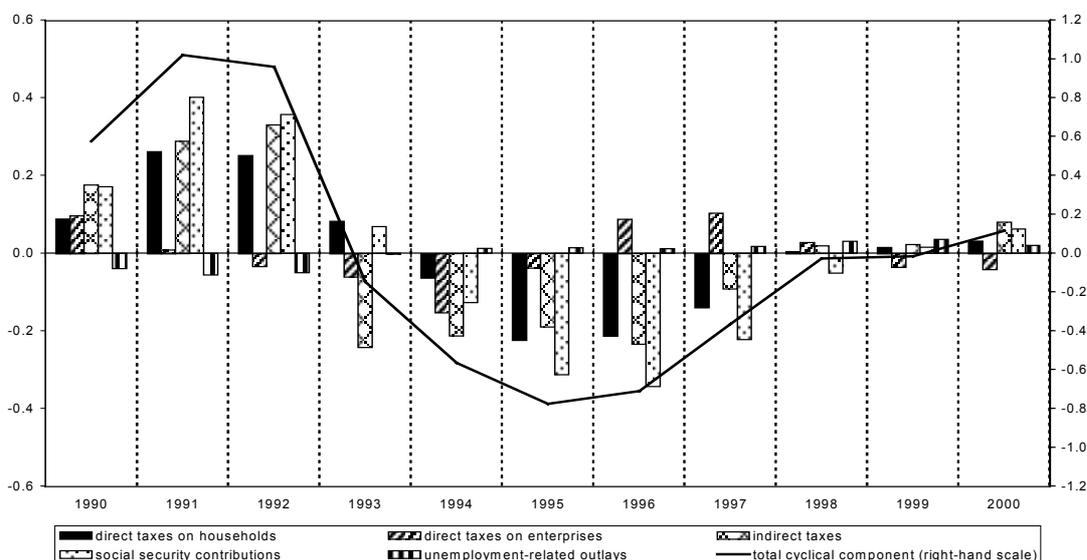
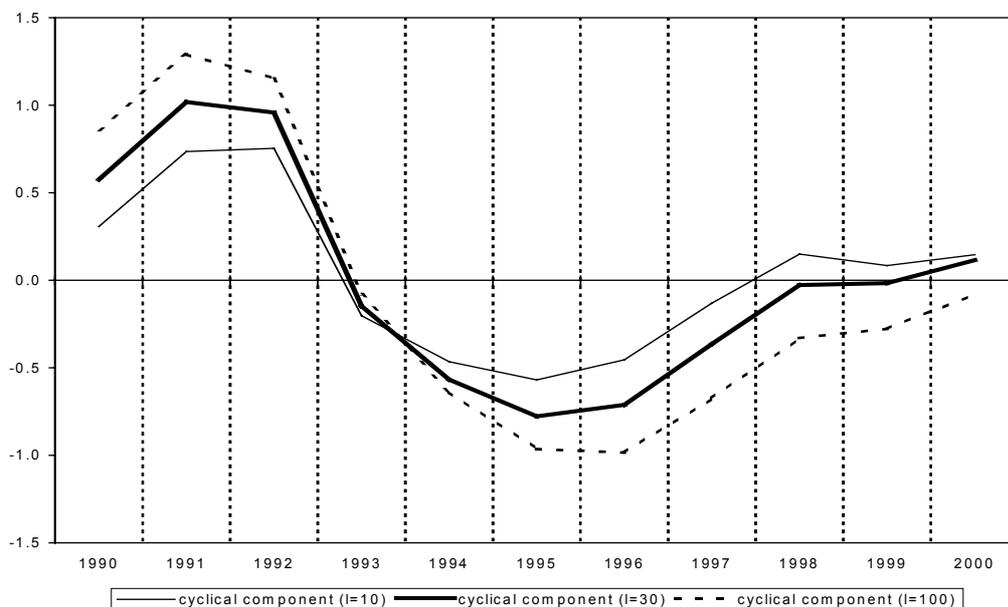


Chart A9.8.2

Sensitivity analysis on the cyclical component of the government budget balance: comparison to results obtained with $\lambda = 10$ and 100 (in percentages of GDP)



The sign of the overall impact and its developments were largely determined by the cyclical component of the budget items (direct taxes on households, social security contributions and unemployment-related expenditures) linked to employment/unemployment and unit wages. These macroeconomic variables were above their trend levels at the beginning of the 1990s, but they became significantly below such levels in the middle of the decade. However, they have registered a steady improvement since 1997 and have approximately reached trend levels in the years 1998-

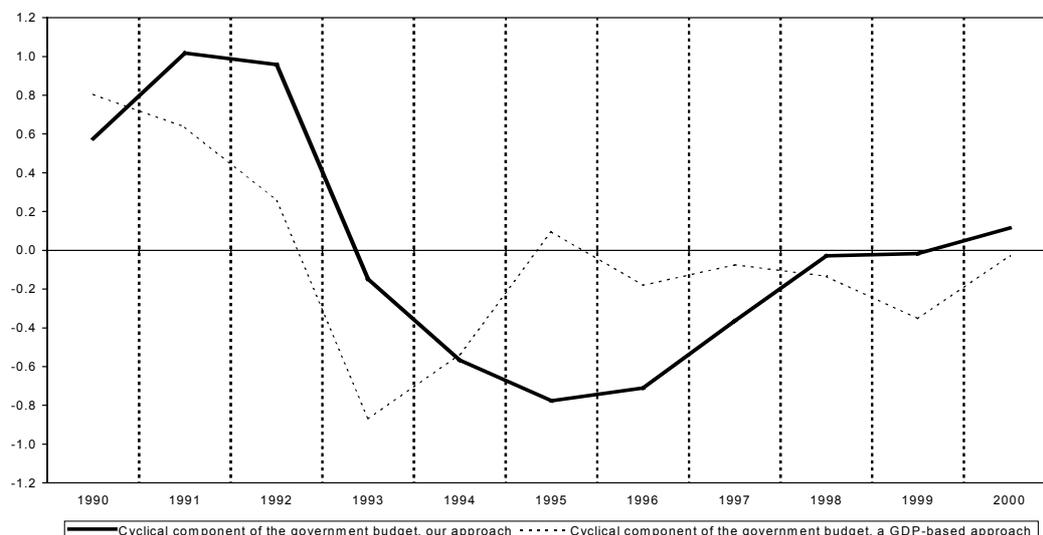
2000.

Broadly similar developments have characterised private consumption. This pattern was only partially offset by the developments in corporate profits, which affect direct taxes on enterprises with a one year lag. Corporate profits were above trend in the period 1995-1997 and have been close to trend since then.

To assess the relevance of composition effects, the cyclical component of the budget has also been calculated using the output gap (derived by applying to real GDP a Hodrick-Prescott filter with a smoothing parameter of 30) and the overall budgetary sensitivity computed in this paper (0.48). As can be seen in Chart A9.8.3, the values and changes in the cyclical component computed in this way diverge significantly from the results of the disaggregated method adopted by us, highlighting the importance of taking into account shifts in composition of aggregate demand and national income in the case of Italy. In terms of levels, the differences between the two estimates are relatively large in several years. As for the most recent period, the differences were significant in 1995 (0.9 % of GDP), in 1996 (0.5%) and, with a different sign, in 1999 (0.3%). In terms of changes, particularly significant are the differences for the sub-periods 1994-1995 and 1997-1999. The cyclical component computed on the basis of the output gap improves in the first sub-period and worsens in the second, while an opposite pattern is shown by the cyclical component computed with the disaggregated approach. The explanation of these results lies mainly in the asynchrony between the dynamics of GDP and those of wages and employment. In particular, while GDP growth at first accelerated and has been low since 1995, the level of employment reached a low in 1995 and steadily increased afterwards. Indeed, the number of private sector employees in 1999 was almost 6 % above the 1995 level.

Chart A9.8.3

Comparison of cyclical components showing composition effects (in percentages of GDP)



In order to solve the end-point problem of the HP-filter (see Section 3.2 of the working paper), the five macroeconomic variables have been extended to 2007 before applying the HP-filter, using the country specific forecasts that were available last spring up to 2003. Beyond 2003, the development of the macroeconomic variables is consistent with the assumption of balanced growth at a trend rate of 2.4%.

To assess the sensitivity of the estimates with regard to the extension used beyond 2000, a simple sensitivity analysis was conducted on the cyclical component of the budget balance computed using the aggregated approach (i.e. applying the budget sensitivity to the output gap) and by extending the real and nominal GDP series in two alternative ways for the period 2001-2007.¹ The obtained results were then compared to the original baseline scenario. The estimates were not found to be very sensitive to the method used for prolonging the macroeconomic variables beyond the considered time period.

¹ In both alternative scenarios, the level of real GDP is extrapolated by growth rates such that the trend value of the growth rate is reached in 2007. The growth rates for the period 2001-2007 are linearly interpolated between the rate for 2000 and the targeted trend growth rate in 2007. The scenarios differ by the targeted trend growth rate in 2007. In scenario 1, the targeted trend growth rate in 2007 equals the average rate of growth between 1986 and 2000 (i.e. the last 15 years known). In scenario 2, the targeted trend growth rate in 2007 equals the average rate of growth between 1986 and 2000 plus 2 percentage points.

A9.9 Luxembourg

A9.9.1 Budgetary and macroeconomic elasticities: method description and variable definitions

Methodological remarks

Until now, no estimates of the budgetary elasticities or sensitivities have been presented by any national or international institution. Although the European Commission presents figures of the cyclically adjusted budget balance in its recent publications, the OECD hitherto does not publish estimates of the sensitivity of major revenue and expenditure categories of the general government budget for Luxembourg. This information gap originates in the lack of comparable data, which could only be overcome with the recent transition to ESA 95 and the ensuing legal requirements to produce timely data according to a common methodology. Nevertheless, the general caveat on the presented sensitivity estimates still relates to the underlying data. Indeed, the series for the underlying tax bases were lengthened on the basis of the growth rates of the corresponding old series found in the EUROSTAT NewCronos database. These series are based on information provided by the National Statistical Institute STATEC. The latter provides tax and social security data in ESA 95 format back to 1970. Hence, the required revenue series were compiled on the basis of known ESA 95 sub-categories.

The budgetary elasticities presented below are derived from econometric estimations based on error-correction models (ECM). The sample of annual data spans the period from 1970 to 2000. The estimation results are made available upon request.

Budget categories and macroeconomic bases

In the case of Luxembourg, no major deviations from the benchmark list of budget categories and macroeconomic bases described in Section 2.2 of the working paper were deemed appropriate.

A9.9.2 Budgetary and macroeconomic elasticities: comparison with OECD

The OECD does not publish estimates of the Luxembourg budget or macroeconomic elasticities at the moment. Therefore, comparability with OECD results is currently not possible (Table A9.9.1).

Table A9.9.1**Comparison of elasticities**

Fiscal variables w.r.t. macroeconomic reference variables	Our approach ¹⁾	OECD ²⁾
Direct taxes on households w.r.t. average wages	1.67	n.a.
Direct taxes on households w.r.t. employment	1.00	n.a.
Direct taxes on enterprises w.r.t. gross operating surplus/ gross primary company income	0.73 (one year lag)	n.a.
Indirect taxes w.r.t. private consumption	0.69	n.a.
Social contributions w.r.t. average wages	1.00	n.a.
Social contributions w.r.t. employment	1.00	n.a.
Unemployment-related expenditure w.r.t. number of unemployed	1.00	n.a.
Average compensation of private sector workers	0.40	n.a.
Private sector employment	0.70	n.a.
Gross operating surplus/gross primary company income	1.10	n.a.
Private consumption	1.27	n.a.
Number of unemployed	-23.04	n.a.

1) The macroeconomic elasticities w.r.t. output have been derived in this paper from the shock scenario which has been described in detail in Annex A4.

2) The OECD elasticities have been respectively taken from van den Noord (2000). The output elasticities of macroeconomic variables have been adjusted to our methodology.

A9.9.3 Budget sensitivity: comparison with OECD

The sensitivity of the Luxembourg budget to a balanced growth shock in the private sector amounting to a 1 per cent change in GDP is 0.33 (Table A9.9.2).

Table A9.9.2**Comparison of the overall budget sensitivity to a balanced private sector shock amounting to a 1 % change in GDP**

	Our approach ¹⁾	OECD ²⁾
Overall budget sensitivity:	0.33	n.a.
Difference w.r.t. OECD sensitivity	n.a.	
on account of:		
Definition of the macroeconomic elasticities	n.a.	
Refinements of budgetary categories	n.a.	
Budget elasticities	n.a.	
Residual component	n.a.	

1) Our sensitivity estimate refers to the impact in the second year.

2) Published on the OECD website: www.oecd.org.

A9.9.4 Cyclical components of the balances: analysis of the results

Since 1995 the cycle has exerted an unfavourable effect on the Luxembourg general government accounts. The cyclical component of the budget balance reached a negative peak in 1997, which amounted to -1.0 per cent of GDP (see Chart A9.9.1). The adverse impact lessened in the following years, becoming approximately null in 2000. The results would be quite similar if a smoothing parameter for the Hodrick-Prescott filter of 10 or 100, as reviewed in Section 3.3 of the working paper were used (see Chart A9.9.2).

Chart A9.9.1

Cyclical components of the government budget, $\lambda = 30$ (in percentages of GDP)

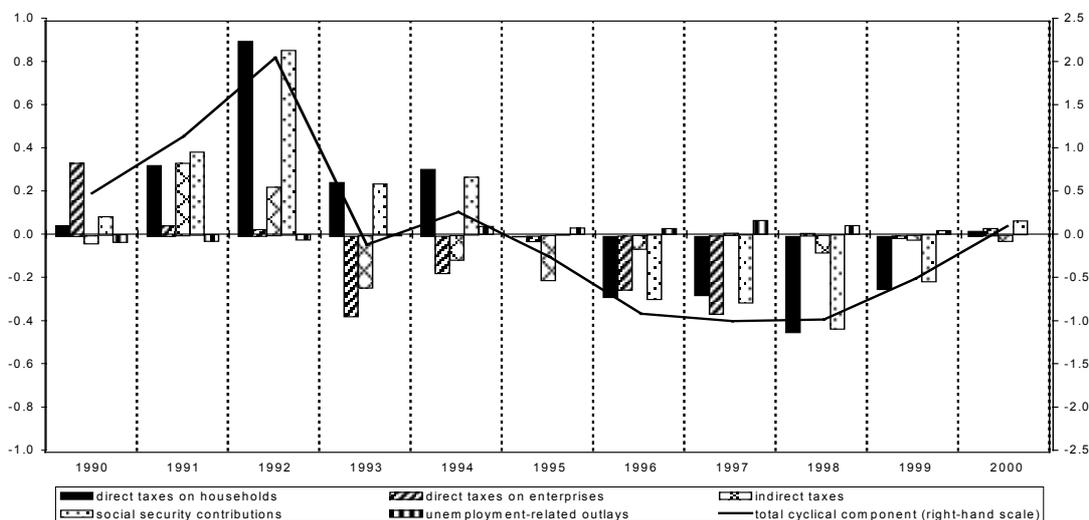
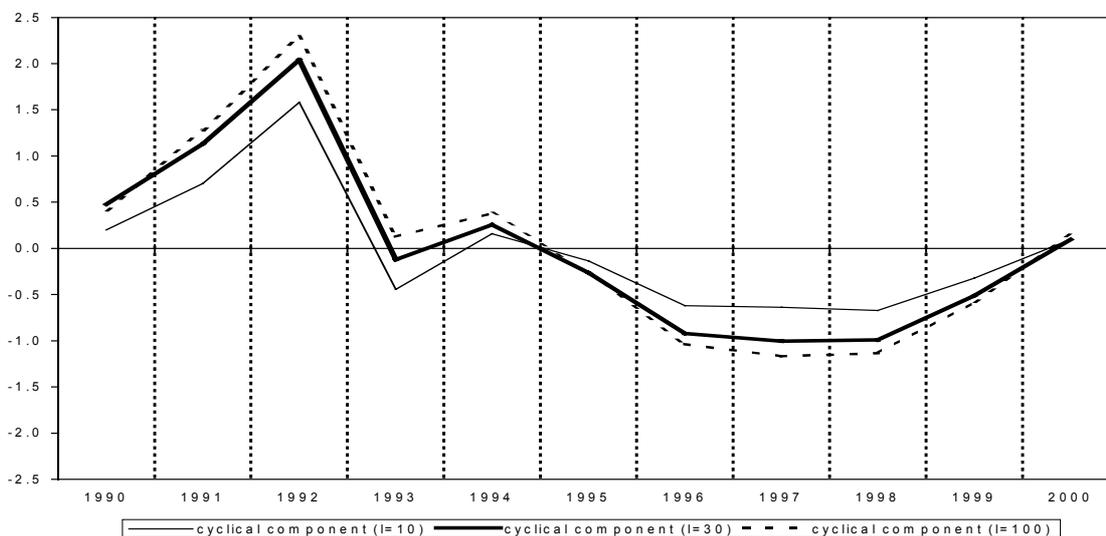


Chart A9.9.2

Sensitivity analysis on the cyclical component of the government budget balance: comparison to results obtained with $\lambda = 10$ and 100 (in percentages of GDP)



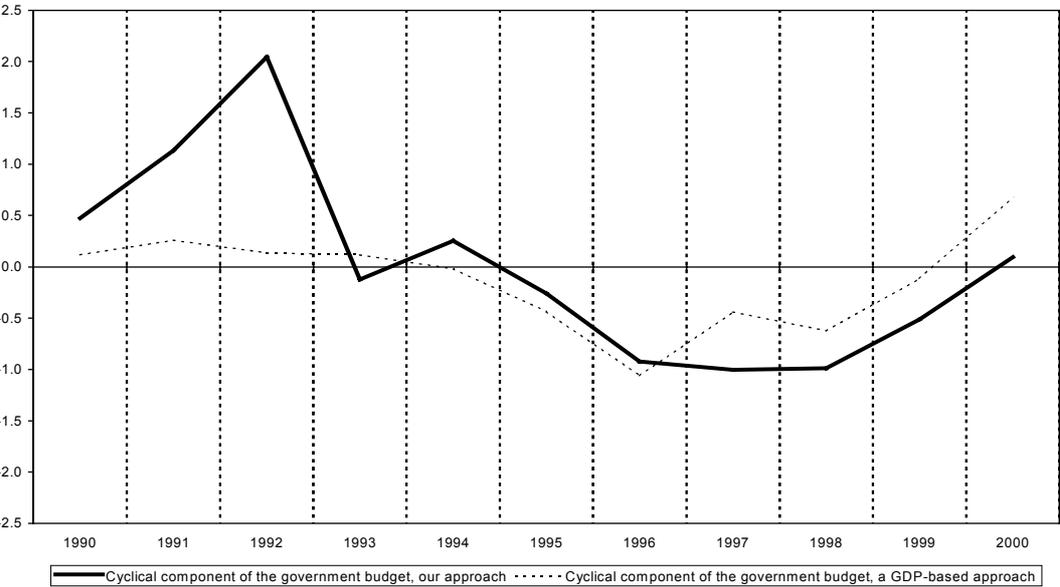
The sign of the overall impact and its developments were largely determined by the cyclical component of the budget items (direct taxes on households and social security contributions) linked to employment and wages. These macroeconomic variables were above their trend levels at the beginning of the 1990s, but they moved significantly below such levels in 1995-1998. They have registered a steady improvement since 1999 and have approximately reached trend levels in the year 2000.

Private consumption was above trend during the period 1991-1992 and below or at trend for the

period from 1993 onwards. This pattern was only partially offset by the developments in corporate profits, which affect direct taxes on enterprises with a one year lag. Corporate profits were below trend in the period 1992-1997 and have been slightly above trend since 1999.

To assess the relevance of composition effects, the cyclical component of the budget has also been calculated using the output gap (derived by applying to real GDP a Hodrick-Prescott filter with a smoothing parameter of 30) and the overall budgetary sensitivity computed in this paper (0.33). As can be seen in Chart A9.9.3, the values and changes in the cyclical component computed in this way diverge significantly from the results of the disaggregated method adopted by us, highlighting the importance of taking into account shifts in the composition of aggregate demand and national income in the case of Luxembourg. In terms of levels, the differences between the two estimates are relatively large in 1991 (0.9 % of GDP) and in 1992 (1.9%) and, with a different sign, in 1997 and 2000 (0.6%). In terms of changes, particularly significant are the differences for the period 1992-1996. The cyclical component computed on the basis of the output gap improves in the first sub-period and worsens in the second. The cyclical component computed with the disaggregated approach shows a similar, but more pronounced movement over the periods 1990-1992 and 1997-1999. Starting 2000 this component is yet smaller than the one based on the output gap. The explanation of these results lies mainly in the asynchrony between the dynamics of GDP and those of wages. In particular, while GDP growth was nearly constant during 1991-1996 and increased since 1997, wage growth increased sharply in 1991-1992 and remained more steady afterwards.

Chart A9.9.3
Comparison of cyclical components showing composition effects (in percentages of GDP)



In order to solve the end-point problem of the HP-filter (see Section 3.2), the five macroeconomic variables are extended to 2007 before applying the HP-filter, using the forecasts that were available last spring up to 2003. Beyond 2003, the development of macroeconomic variables is consistent with the assumption of balanced growth at a trend rate of 4.7%.

To assess the sensitivity of the estimates with regard to the extension used beyond 2003, a simple sensitivity analysis was conducted on the cyclical component of the budget balance computed using the aggregated approach (i.e. applying the budget sensitivity to the output gap) and by extending the real and nominal GDP series in two alternative ways for the period 2001-2007². The obtained results were then compared to the baseline scenario. The comparison showed that, even in 2000, the estimates are not very sensitive to the method used for prolonging the macroeconomic variables beyond the considered time period.

² *In both alternative scenarios, the level of real GDP is extrapolated by growth rates such that the trend value of the growth rate is reached in 2007. The growth rates for the period 2001-2007 are linearly interpolated between the rate for 2000 and the targeted trend growth rate in 2007. The scenarios differ by the targeted trend growth rate in 2007. In scenario 1, the targeted trend growth rate in 2007 equals the average rate of growth between 1986 and 2000 (i.e. the last 15 years known). In scenario 2, the targeted trend growth rate in 2007 equals the average rate of growth between 1986 and 2000 plus 1 percentage point.*

A9.10. Netherlands

A9.10.1 Budgetary and macroeconomic elasticities: method description and variable definitions

Methodological remarks

Over the period under review (1970-2000), elasticities of budgetary variables with respect to their respective macroeconomic bases have been subject to frequent changes in the tax system and the scheme for unemployment benefits. In view of the resulting difficulties to estimate the deviation of fiscal variables from their trends with an HP-filter, this was considered a serious obstacle to a reliable econometric analysis. Therefore, rather than relying on unstable regression results, most elasticities were based on a more rough, graphical approach or on plausible assumptions. For instance, elasticities of total wage tax and social security contributions with respect to employment (in FTE's) were set equal to one. In the case of corporate taxes, a cyclical relationship with profits did not seem to exist at all, but an elasticity of one was assumed on the basis of tax regulations. While such an approach evidently may have led to errors in elasticities, one should not overestimate the impact of these errors on the cyclically adjusted budget balance and on the overall sensitivity of the budget to the business cycle. If, for instance, total current government receipts represent 30 per cent of GDP and their elasticity with respect to GDP is underestimated by 0.1 percentage point, the error in the overall budgetary sensitivity is only 0.03 percentage point. As was stated in the main text of this working paper, reliable estimates of gaps in the macroeconomic variables are much more important. In the following section the estimation of elasticities for individual budget categories is described in some more detail.

Budget categories and macroeconomic bases

Direct taxes on households have been restricted to payroll taxes (*Loonbelasting*). Interest income, for instance, has been excluded from the tax base. The elasticity of wage tax with respect to average real wages (2.6) has been adopted from the OECD; it was calculated by van den Noord as the weighted average of the ratios of marginal to average taxes for different wage categories and based on the (estimated) distribution of production worker wages in 1996. Part of taxes on wages can be attributed to workers in the public sector and the same holds for the cyclical component, as in the Netherlands the gaps in private and public sector real wages show some correlation (contrary to gaps in employment in both sectors). However, as there is no automatic, institutional relationship, payroll taxes paid by employees in the public sector have been excluded from the cyclical adjustment of *revenues*, just as compensation of government employees has not been cyclically adjusted on the *expenditure* side of the budget. The total cyclical component in wage taxes was reduced by about 1/6, the average of the government share in total compensation of employees and in dependent employment.

No relationship was found between gaps in social security contributions (SSC) and labour income. This is due to, among other things, the irregular adjustment of contribution rates and ceilings per worker carried out by social security funds. They are supposed to strive for balanced accounts, which may have counter-cyclical effects. Nevertheless, a more or less proportionate relationship has been assumed to exist and therefore the elasticity of SSC with respect to labour income has been fixed at unity (although in practice it might be somewhat lower because of contribution ceilings). Just like for wage taxes, the cyclical component has been restricted to the private sector by multiplying it by 5/6.

Indirect taxes include components with elasticities far above and far below unity. Over the last couple of decades, however, HP-filtered gaps of indirect taxes and private consumption turned out to be roughly equal. Therefore, an elasticity of one has been assumed with respect to private consumption. Consumption was chosen as a proxy for the actual tax base, which also includes, for instance, residential investment.

Gaps calculated for company income (profits, approximated by gross operating surplus plus mixed income) and gaps of corporate taxes (*Vpb*), one of the most volatile budget categories, showed no cyclical relationship. After adjustment for carry back and carry forward of losses by companies, and after excluding the natural gas sector, on the basis of data provided by the Netherlands Bureau for Economic Policy Analysis (CPB), some correlation emerged from the data, which also provided evidence for lags in the collection of corporate taxes. However, the lags varied over time. In view of the poor regression results the elasticity was set equal to 1 and lags have been neglected (introducing a lag of three quarters, for instance, would have affected the cyclically adjusted budget by no more than 0.1 percentage point in only 4 years of the period 1970-2000).

The gap of unemployment outlays has been assumed to equal the gap in the number of (registered) unemployed.³ Contrary to the OECD-approach, the number of unemployed, being the difference between labour supply and employment, has not been adjusted for cyclical fluctuations in the supply of labour, as these fluctuations do not necessarily reflect changes in the number of people entitled to unemployment benefits. For the sake of simplicity, the average level of benefit has not been cyclically adjusted either, i.e. the irregular indexation of benefits to cyclically sensitive wages has not been taken into account. Outlays include the main unemployment scheme (WVW and, in the past, WVW and RWW) and, as from 1996, roughly two thirds of social assistance outlays (ABW).

A9.10.2 Budgetary and macroeconomic elasticities: comparison with OECD

The budgetary and macroeconomic elasticities used in the calculation of the cyclically adjusted budget balance are presented in Table A9.10.1, which also contains the elasticities estimated or assumed by the OECD.

Fiscal variables w.r.t. macroeconomic reference variables

The elasticities of various government revenue and expenditure items with respect to relevant macroeconomic bases are identical to those published by the OECD, which has also derived them from tax rules.

Macroeconomic variables w.r.t. GDP

The elasticities of different macroeconomic variables with respect to GDP would however seem to differ quite substantially from the respective OECD estimates. Indeed, we have obtained markedly higher elasticities for private consumption and the number of unemployed persons. This is mainly due to divergences in the way macroeconomic elasticities and the overall budgetary sensitivity are derived in the OECD and our methodology.

³ For the Netherlands, adopting this element of the harmonised approach may have led to some (additional) bias in the calculations, because in practice the number of unemployed people (in persons) does not necessarily match the number of recipients of unemployment benefits (in FTE's). Average benefits calculated for the unemployed appeared implausibly low or far too high. Percentage changes in the volume of outlays, however, showed a strong and plausible correlation with changes in the number of unemployed.

Table A9.10.1**Comparison of elasticities in 1999**

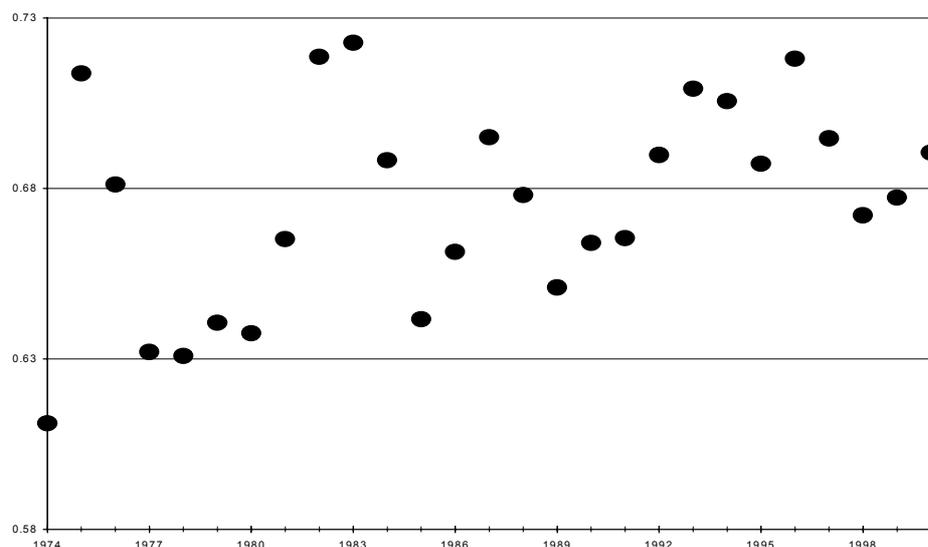
Fiscal variables w.r.t. macroeconomic reference variables	Our approach ¹⁾	OECD ²⁾
Direct taxes on households w.r.t. average wages	2.6	2.6
Direct taxes on households w.r.t. employment	1.0	1.0
Direct taxes on enterprises w.r.t. gross operating surplus/ gross primary company income	1.0	1.0
Indirect taxes w.r.t. private consumption	1.0	1.0
Social contributions w.r.t. average wages	1.0	0.96
Social contributions w.r.t. employment	1.0	1.0
Unemployment-related expenditure w.r.t. number of unemployed	1.0	1.0
Macroeconomic variables w.r.t. output		
Average compensation of private sector workers	0.42	0.38
Private sector employment	0.74	0.77
Gross operating surplus/gross primary company income	1.15	1.10
Private consumption	1.45	0.74
Number of unemployed	-15.4	-7.7

1) The macroeconomic elasticities w.r.t. output have been derived in this paper from the shock scenario which has been described in detail in Annex A4.

2) The OECD elasticities have been taken from van den Noord (2000). The output elasticities of macroeconomic variables have been adjusted to our methodology.

A9.10.3 Budget sensitivity: comparison with OECD

An interesting by-product of the analysis of elasticities is the sensitivity of the budget balance to a shock in GDP, an indicator that can be defined in several ways. In the OECD approach, a shock of 1 per cent reflects underlying shocks in macroeconomic variables according to *estimated patterns in the past*, allowing some variables to respond stronger than others. An alternative approach, chosen here, is to impose an equal response of wages and profits on the income side of GDP and, on the expenditure side of GDP, to attribute the 1 per cent shock in GDP fully to private demand components. This so-called shock scenario approach results in an average sensitivity of about 0.67 in the case of the Netherlands over the period 1974-2000 (see Chart A9.10.1).

Chart A9.10.1**Sensitivity of the budget balance to a balanced 1% shock in GDP (as a percentage of GDP)**

Over the last 25 years the sensitivity showed large fluctuations owing to structural and cyclical changes in the composition of both GDP and the government budget. It should be noted that, because of this kind of changes, the sensitivity of 0.64 calculated for 1999 by the OECD is also a snapshot (see Table A9.10.2). Therefore, not too much weight should be attached to the following breakdown of the difference between the sensitivities into different explanatory contributions. Not only does it apply to a specific year, overlap effects also limit the accuracy of the breakdown.

Table A9.10.2
Comparison of the overall budget sensitivity in 1999 to a balanced private sector shock amounting to 1% of GDP

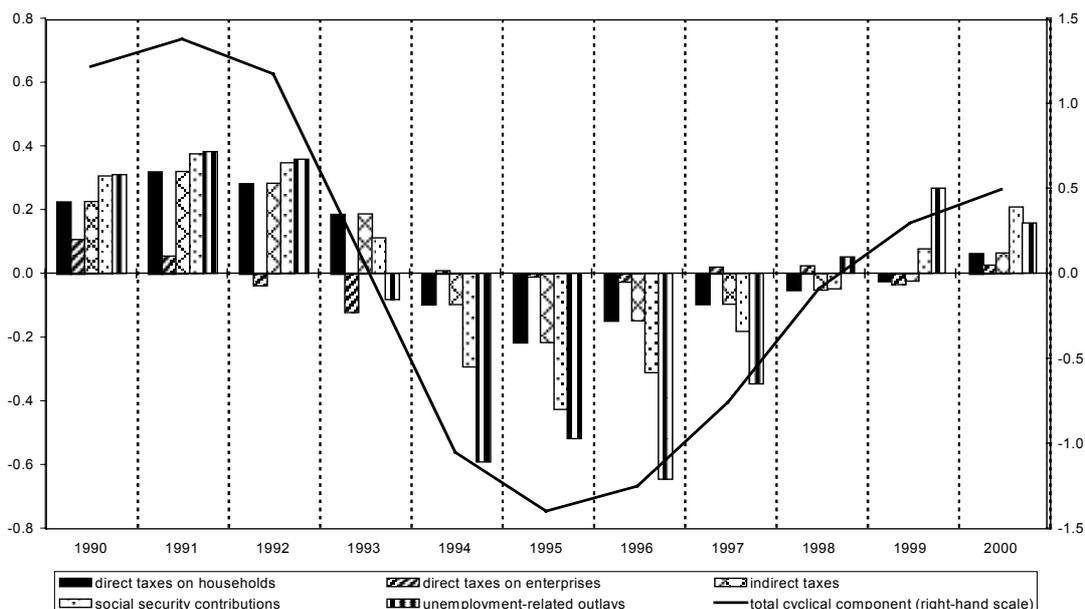
	Our approach	OECD ¹
Overall budget sensitivity	0.69	0.64
Difference w.r.t. OECD sensitivity	+0.05	
on account of:		
Redefinition of the macroeconomic elasticities	+0.06	
Refinements of budgetary categories	-0.05	
Budget elasticities	-0.04	
Assumption of inelastic labour supply	+0.04	
Other factors	+0.04	

1) Published on the OECD website: www.oecd.org.

A9.10.4 Cyclical components of the balances: analysis of the results

In the nineties, the cyclical component in the Dutch budget balance was largely determined by fluctuations in unemployment outlays and social security contributions (Chart A9.10.2).

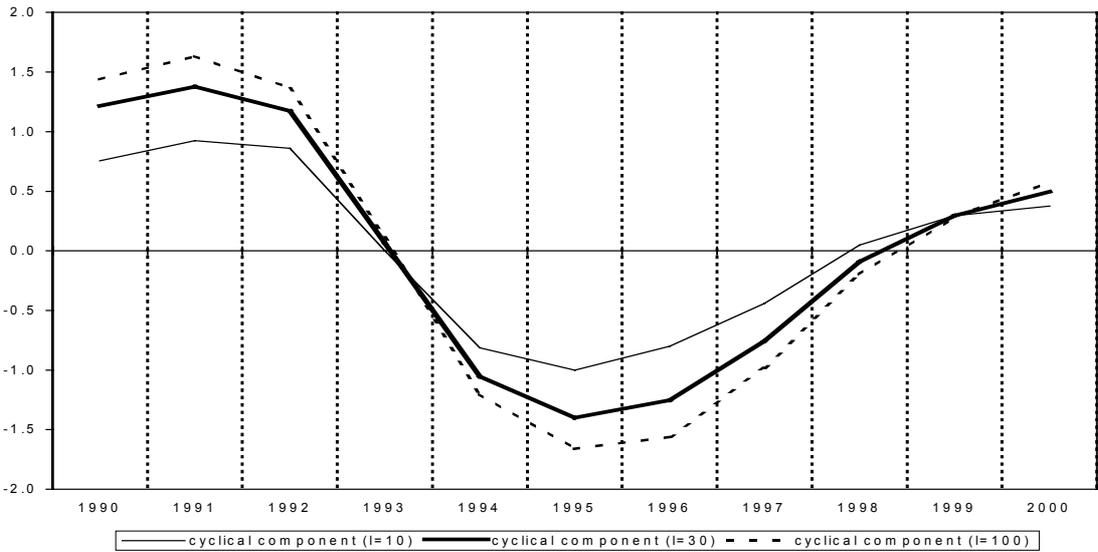
Chart A9.10.2
Cyclical components of the government budget, $\lambda = 30$ (in percentages of GDP)



For different values of lambda, the evolution of the cyclically adjusted balance over the period 1974-2000 is shown in Chart A9.10.3. Evidently, the development of the cyclically adjusted budget

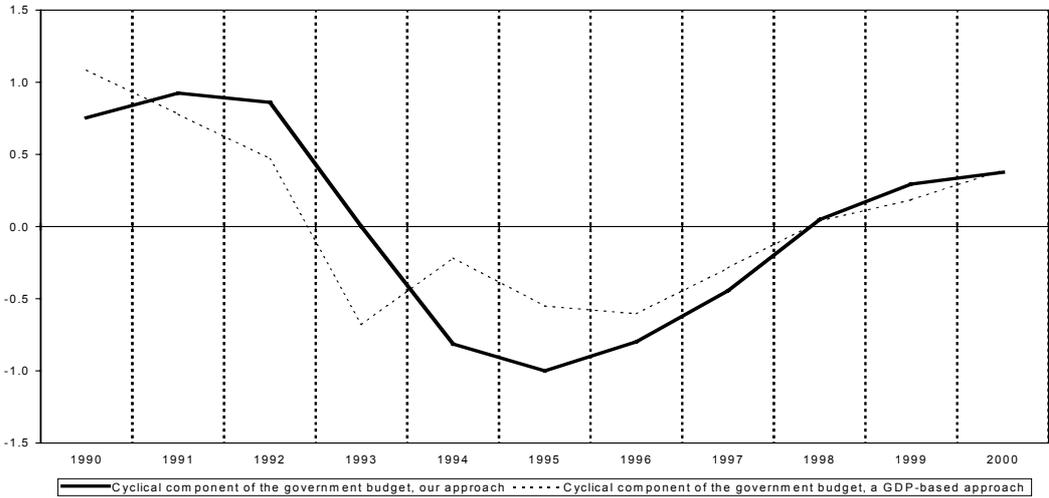
balance in the long-run does not depend on the choice of lambda. In the short-run, however, differences between the *level* of cyclically adjusted balances based on different values of lambda are certainly not negligible, as is clearly illustrated for the mid-eighties in the chart below.

Chart A9.10.3
Sensitivity analysis on the cyclical component of the government budget balance: comparison to results obtained with $\lambda = 10$ and 100 (in percentages of GDP)



In the short-run, composition effects may also play an important role in the evolution of the cyclically adjusted budget (Chart A9.10.4). In 1994, for instance, the cyclical component according to our approach and to the GDP-based approach diverged significantly. The difference between the changes, plus 0.5 per cent and minus 0.9 per cent of GDP, show that in particular the *change* in the cyclically adjusted balance may be very sensitive to composition effects, which highlights the importance of taking these effects into account in the case of the Netherlands.

Chart A9.10.4
Comparison of cyclical components showing composition effects (in percentages of GDP)



Finally, to check how sensitive the above results are to the way time series for macroeconomic variables are extended till 2007 (to deal with the end-point problem inherent to the HP-filter), two alternative ways of extrapolating each of the macroeconomic variables beyond 2001, the first year for which the forecasts were available last spring, have been investigated: 1) a linearly interpolated return to trend growth (the average growth rate in the nineties); 2) unchanged growth rates after 2000. These results were then compared to the baseline scenario.

The first alternative resulted into a slight improvement of the cyclically adjusted budget balance by around 0.1 per cent of GDP in 2000, while the second assumption led to small deterioration by some 0.1-0.2 percentage point per annum both in 1999 and 2000. These alternatives show that the way of extending series does matter, but, under the present circumstances, the estimated cyclical components for 1999 and 2000 do not seem to be very sensitive to changes in growth rates during the forecasting period.

A9.11. Austria

A9.11.1 Budgetary and macroeconomic elasticities: method description and variable description

Methodological remarks

Elasticities of individual budget categories with respect to their macroeconomic bases were derived from econometric estimation, namely from dynamic error correction equations. As the tax code was changed several times over the estimation period (1954-1998), dummy variables have been included in the equation specifications. Step as well as level shift dummies were used to emulate the discretionary measures. This means that the dummies have only one non-zero entry (step) or they change their value from zero to one starting with a specific year (level shift), depending on whether temporary or permanent effects resulted from the reform.

Budget categories and macroeconomic bases

In the Austrian case, the list of budget categories and macroeconomic bases described in Section 2.2 of the working paper has been extended to some extent. Indeed, pension payments from the social security system are included as a cyclically dependent fiscal variable. This is simply because the law regulating social security affairs (the General Social Security Act – ASVG) contains a legal formula for the annual pension adjustment, which relates the pension dynamics to the growth of average wages of covered employees.

Cyclical variations in direct taxes on households depend on two macroeconomic indicators, namely on average wages per employee and the number of employed persons. Growth in average wages creates fiscal drag and pushes households into higher tax brackets. Due to the progressive tax scheme, the elasticity with respect to average wages should be above one.

Direct taxes on companies consist of two major components. Corporate income tax with a proportional statutory tax rate of 34 per cent and income tax of self-employed and unincorporated companies with a tax scheme similar to that of wage income. Therefore, the macroeconomic base variable for direct taxes on companies is the operating surplus plus mixed income according to ESA 95.

Holding a share of about 70 per cent, value-added tax is the most important item of indirect tax revenues. Nevertheless, a substantial part of indirect taxes is related to quantities rather than value added. Therefore, an elasticity smaller than one should be expected.

The most important item of the revenue side of the Austrian budget is social security contributions. For the estimation of the elasticities, the social security contributions of civil servants were not taken into account.

Since many unemployment-related expenditures are discretionary, only monetary transfers to the unemployed, which are directly derived from the unemployment insurance law are taken as the cyclical component of unemployment-related outlays.

As mentioned above, the General Social Security Act links pension dynamics to the development of average wages of covered employees. The elasticity of monetary pension transfers has been calculated with respect to average wages.

A9.11.2 Budgetary and macroeconomic elasticities: comparison with OECD

Table A9.11.1 compares the elasticities of the budget categories with the respective macroeconomic reference variables as used in the paper with the respective elasticities calculated by the OECD. Moreover, it also illustrates the differences between the OECD and our elasticity estimates on various macroeconomic variables with respect to output.

Table A9.11.1

Comparison of elasticities

Fiscal variables w.r.t. macroeconomic reference variables	Our approach ¹⁾	OECD ²⁾
Direct taxes on households w.r.t. average wages	1.34	2.2
Direct taxes on households w.r.t. employment	1.0	1.0
Direct taxes on enterprises w.r.t. gross operating surplus/ gross primary company income	1.11	1.0
Indirect taxes w.r.t. private consumption	0.93	1.0
Social contributions w.r.t. average wages	0.9	0.8
Social contributions w.r.t. employment	1.0	1.0
Unemployment-related expenditure w.r.t. number of unemployed	0.91	1.0
Pension transfers w.r.t. average wages	1.0	
Elasticities of macroeconomic variables w.r.t. output		
Average compensation of private sector workers	1.51	0.2
Private sector employment	0.4	0.58
Gross operating surplus/gross primary company income	1.51	1.85
Private consumption	1.31	0.53
Number of unemployed	-4.64	-1.18

1) The macroeconomic elasticities w.r.t. output have been derived in this paper from the shock scenario which has been described in detail in Annex A4.

2) The OECD elasticities have been taken from van den Noord (2000). The output elasticities of macroeconomic variables have been adjusted to our methodology.

Fiscal variables w.r.t. macroeconomic reference variables

In van den Noord (2000), lags in corporate tax revenues are not accounted for, whereas in our paper a lag of up to two years was derived. The coefficients for the first and second lags of the operating surplus were highly significant, whereas the contemporaneous operating surplus had no explanatory power. The weights of 0.58 for t-1 and 0.53 for t-2, respectively, seem very plausible, as in Austria, tax statements can be submitted to the fiscal authorities with a delay of up to 15 months. The elasticity shown in Table A9.11.1 is the sum of the two lagged coefficients. For the computation of the cyclical component of direct taxes on companies, the first and second lags of the gap in the operating surplus are used.

The average wage per employee net of social security contributions is used as the relevant macroeconomic indicator to estimate the elasticity of direct taxes on households with respect to income. The coefficient is rather low in comparison with the OECD estimate – only half of the value published by van den Noord (2000). This may be due to the fact that the regression in this paper refers explicitly to the progressivity of the tax scheme and the width of tax brackets is such that most of the individuals are within the 31 or 41 percent brackets.

The elasticity of social security contributions with respect to average wages is slightly higher compared to OECD estimates. Since only about eight per cent of employees receive income above the maximum contribution limit, a value further away from one seems to be less plausible.

The value of the elasticity for indirect taxes indicates less than proportional cyclical variation. The

composition of indirect taxes as a mixture of 70 per cent VAT revenues and 30 per cent revenues from quantity-based indirect taxes makes the shortfall below one very reasonable.

Article 108 of the General Social Security Act (ASVG) prescribes an annual adjustment rule for pension payments. Annual pension payments grow by the same rate as the average wage of covered employees net of social security contributions. Thus, an elasticity of one is used for the computation of cyclical budget components.

The value of unemployment-related expenditure with respect to the number of unemployed below one seems plausible, given the specifics of the Austrian labour market and the unemployment insurance system. Since, according to the ASVG, long-term unemployed receive lower unemployment benefits, their rising share should reduce expenditure dynamics.

Macroeconomic variables w.r.t GDP

Elasticities of macroeconomic base variables with respect to output are also the result of estimates. With the exception of the elasticities of employment and operating surplus, all elasticities are higher than their OECD counterparts. Differences between the OECD and our figures are due to the manipulations of elasticities with the respective shares of private sector activity and taxes in output.

A9.11.3 Budget sensitivity: comparison with OECD

The sensitivity of the Austrian budget to a balanced growth shock in the private sector amounting to a 1 per cent change in GDP is 0.47. This value is higher than the respective OECD estimate of 0.31, mainly because of the nature of the shock. As the Austrian public sector has a substantial weight in the economy, a 1 per cent of GDP shock in the private sector has a relatively strong impact on the government budget.

The part of the difference which is due to the specification of the macroeconomic basis can be sized up within a combined approach in which fiscal elasticities from our method (including cyclical components in expenditure for pensions) are combined with output elasticities of macroeconomic variables as estimated in van den Noord (2000) – the latter being adjusted for the private sector as described in Annex A6 of the working paper. The combined approach yields a sensitivity estimate of 0.31. Hence, a difference of 0.16 percentage point is due to the specification of fiscal elasticities and definitions of fiscal variables in our approach.

Table A9.11.2

Comparison of the overall budget sensitivity to a balanced private sector shock amounting to a 1% change in GDP

	Our approach ¹⁾	OECD ²⁾
Overall budget sensitivity	0.47	0.31
Difference w.r.t. OECD sensitivity	+0.16	
on account of:		
Definition of the macroeconomic elasticities/calibration of shock	n.a.	
Refinements of budgetary categories	n.a.	
Budget elasticities	n.a.	
Residual component	n.a.	

1) Our sensitivity estimate refers to the impact in the second year.

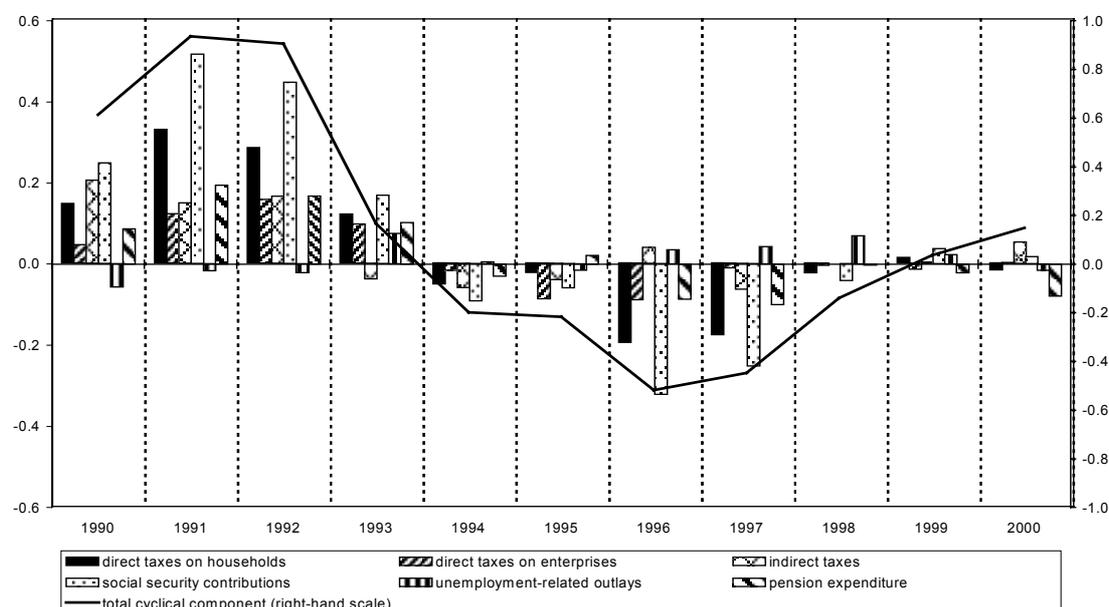
2) Published on the OECD website: www.oecd.org.

A9.11.3 Cyclical components of the balances: analysis of the results

The following chart exhibits the development of the cyclical balance and of its components.

Chart A9.11.1

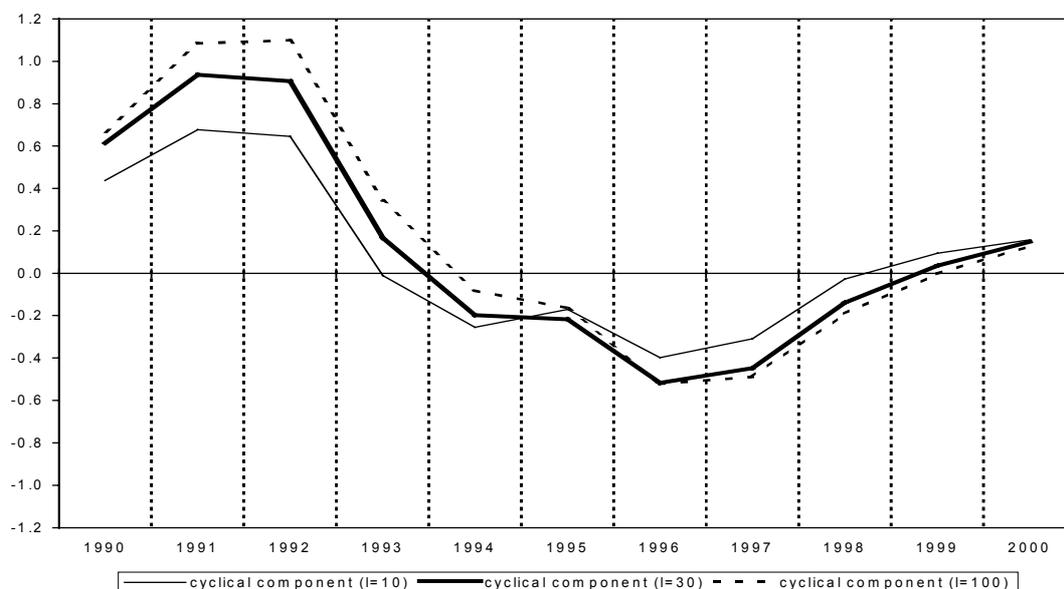
Cyclical components of the government budget, $\lambda=30$ (in percentages of GDP)



In the early 1990s, the cycle exerted a favourable effect on the Austrian general government balances, but since 1994 Austria's cyclical position has become negative (Chart A9.11.1). The cyclical component of the budget balance reached a negative peak of -0.5 per cent of GDP in 1996. The adverse impact lessened in the following years, becoming approximately null in 1999 and slightly positive thereafter, amounting to 0.15 per cent of GDP in 2000. The results would be quite similar if an alternative smoothing parameter for the Hodrick-Prescott filter of 10 or 100 instead of 30 were used (Chart A9.11.2).

Chart A9.11.2

**Sensitivity analysis on the cyclical component of the government budget balance:
Comparison to results obtained with $\lambda=10$ and $\lambda=100$**

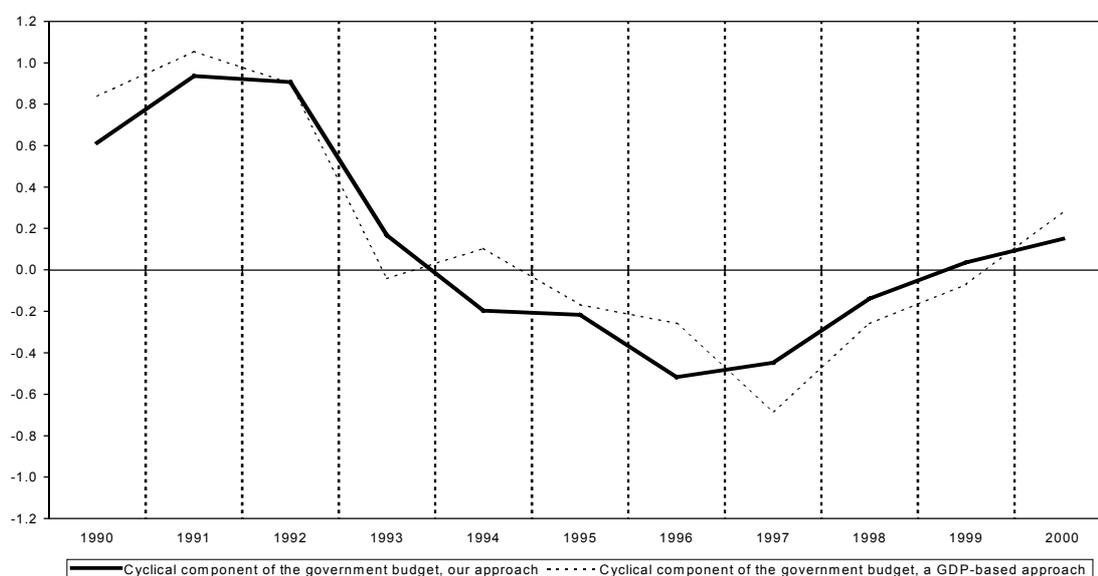


In Austria, the overall impact and its development were largely determined by the cyclical component of budget items – direct taxes on households, social security contributions and pension transfers - linked to employment and unit wages. These macroeconomic variables were well above their respective trend levels in the early 1990s but they became clearly below their trend levels in the mid-1990s. Average wages approximately reached their trend levels in 1999 again, but then fell again below it. Starting from 1999, the employment level has been above its trend.

Private consumption as well as gross operating surplus showed deviations from their trend levels only at the beginning of the decade, when they were above trend. After that, they have been broadly in line with the trend (calculated by using a smoothing parameter for the HP-filter of 30).

As the number of unemployed was above its trend level in 1993 and between 1996 and 1999, unemployment-related expenditure was higher than usual in these years.

To assess the relevance of the composition effects, the cyclical component of the budget was calculated using the output gap – derived by applying an HP-filter with a smoothing parameter of 30 to real GDP and the overall budgetary sensitivity of 0.47 computed in this paper. The following chart compares the results based on the current approach with those obtained with the GDP-based method.

Chart A9.11.3**Comparison of cyclical components showing composition effects (in percentages of GDP)**

As can be seen in Chart A9.11.3, values and changes generally move into the same direction. However, in some years our approach yields different results and allows for a more detailed assessment, highlighting the importance of taking into account shifts in composition of aggregate demand and national income in the case of Austria.

In 1994, our approach did not follow the closing of output gap mirrored by an improving cyclical balance in the aggregated approach. The cyclical component computed on the basis of the output gap improved, whereas our method showed a further deterioration of the cyclical component. The opposite is true for the sub-period 1996-1997, when our methodology indicated an improvement of the cyclical component, while the cyclical component of the government budget using a GDP-based approach was still deteriorating. These differences can mainly be traced back to the asynchrony between the dynamics of GDP and that of wages and employment. In particular in 1994, real GDP was right at its trend level, whilst wages and employment were slightly below trend. Hence, the closing of output gap did not materialise correspondingly in the revenues from wage tax and social security contributions.

To take account of the end-point problem of the HP-filter, the five macroeconomic variables were extended to 2007 before applying the HP-filter. Up to 2003, the forecasts that were available last spring were used, while the medium-term forecast values up to 2007 mirror the trend growth of these variables. To assess the sensitivity of the estimates with regard to the extension used beyond 2000, a simple sensitivity analysis was conducted. The comparison of the two alternative scenarios with the originally employed scenario did show hardly any differences⁴. The results would thus not seem to be too sensitive to the method used in extending the macroeconomic variables beyond the considered time period.

⁴ In both alternative scenarios, the level of real GDP is extrapolated by growth rates in such a way that the trend value of the growth rate is reached in 2007. The growth rates for the period 2001-2007 are linearly interpolated between the rate for 2000 and the targeted trend growth rate in 2007. The scenarios differ by the targeted trend growth rate in 2007. In scenario 1, the targeted trend growth rate in 2007 equals the average rate of growth between 1986 and 2000 (i.e. the last 15 years known). In scenario 2, the targeted trend growth rate in 2007 equals the average rate of growth between 1986 and 2000 plus 1 percentage point.

A9.12. Portugal

A9.12.1 Budgetary and macroeconomic elasticities: method description and variable definitions

Methodological remarks

Elasticities of individual budget categories with respect to their macroeconomic bases were mostly derived from tax and expenditure rules. Econometric estimation of the tax elasticities was considered unreliable, taking into account the limited number of observations and the frequent changes in tax rules and rates.

In the Portuguese case, there are some minor deviations from the benchmark approach described in the working paper. Namely, the operating surplus gap was obtained through the use of national account identities. Also, since Portugal has exhibited a stable natural unemployment rate, the unemployment gap was estimated as the difference of the actual unemployment relative to the natural level of unemployment, instead of applying the HP-filter to the unemployment series.

Budget categories and macroeconomic bases

The direct taxes on households that were taken into account were those that correspond to the taxation of private sector wages. Indeed, it was assumed that tax revenue from civil servants labour income and the withholding tax on capital income (interest payments and dividends) do not depend on cyclical fluctuations and as such have a zero elasticity. The tax elasticity with respect to wages was calculated using grouped data provided by the tax administration. The tax elasticity with respect to employment was considered equal to 1, since it was assumed that the income distribution of the new employees is similar to that of those already employed.

The elasticity of indirect taxes with respect to private consumption was computed using expenditure elasticities obtained through the econometric estimation of a demand system, using data from the Portuguese Expenditure Survey combined with effective rates at the same level of desegregation. The effective tax rates considered both VAT rates and the specific tax rates in the cases of oil products, automobiles, tobacco, beer and other alcoholic beverages.

The elasticity of direct tax on companies with respect to operating surplus was set to 1, since the corporate tax is proportional to profits. But, in Portugal, corporations are required to make prepayments of the corporate income tax equal to 75 or 85 per cent of the tax liability of the previous year. However, a corporation can ask for a suspension of these prepayments when estimates that the current year tax liability is equal to, or less than, the prepayments already made. This scheme, results in an asymmetric lag in the reaction of the corporate taxes since the corporation reduces their contemporaneous payments when profit decreases, but tax payments only reflect profits increases with a year lag.

The elasticity of social security contributions paid by the private sector with respect to labour income was assumed equal to 1, since these contributions are almost proportional to the compensation of employees.

It was assumed that the elasticity of unemployment benefits with respect to the number of unemployed is 1.

Exclusion of public sector

Part of direct taxes on households and social security contributions are paid out of civil servants wages. In addition, general government pays to itself indirect taxes and social security contributions. As it was decided to restrict the influence of the business cycle on fiscal variables to private sector developments, a zero elasticity was attributed to these receipts. In some cases, most notably for social security contributions and direct taxes paid by public sector employees, exact data were not readily available and rough estimates had to be used. In the Portuguese case, the indirect taxes paid by the general government were not excluded from total indirect taxes due to the lack of detailed information.

A9.12.2 Budgetary and macroeconomic elasticities: comparison with OECD

Fiscal variables w.r.t. macroeconomic reference variables

Our budgetary elasticity estimates are almost identical to those published by the OECD, which are also derived from tax rules (see Table A9.12.1). In fact, there are only two major differences between the elasticities considered now and the ones presented by the OECD. The first one is the direct taxes on households with respect to average wage. The second difference is that, according to the tax rules, it was considered an asymmetric lag on corporate taxes.

Macroeconomic variables w.r.t. GDP

The elasticities of different macroeconomic variables with respect to GDP differ however clearly from the respective OECD estimates. Indeed, we get markedly higher elasticities for average compensation of private sector employees, private consumption and the number of unemployed persons than the OECD, whilst that of gross operating surplus is significantly lower. Nevertheless, this is mainly owing to the divergences in the methodology of how the macroeconomic elasticities and the overall budgetary sensitivity are derived in the OECD and our calculations.

Table A9.12.1

Comparison of elasticities

Fiscal variables w.r.t. macroeconomic reference variables	Our approach ¹⁾	OECD ²⁾
Direct taxes on households w.r.t. average wages	1.69	1.90
Direct taxes on households w.r.t. employment	1.00	1.00
Direct taxes on enterprises w.r.t. gross operating surplus/ gross primary company income	1.00 ³⁾	1.00
Indirect taxes w.r.t. private consumption	1.10	1.00
Social contributions w.r.t. average wages	1.00	1.00
Social contributions w.r.t. employment	1.00	1.00
Unemployment-related expenditure w.r.t. number of unemployed	1.00	1.00
Elasticities of macroeconomic variables w.r.t. output		
Average compensation of private sector workers	0.43	0.12
Private sector employment	0.64	0.6
Gross operating surplus/gross primary company income	1.07	1.4
Private consumption	1.31	0.64
Number of unemployed	-10.23	-4.2

- 1) The macroeconomic elasticities w.r.t. output have been derived in this paper from the shock scenario which has been described in detail in Annex A4.
- 2) The OECD elasticities have been respectively taken from van den Noord (2000). The output elasticities of macroeconomic variables have been adjusted to our methodology.
- 3) Long-run elasticity. In the short-run it was considered an asymmetric lag.

A9.12.3 Budget sensitivity: comparison with OECD

The Portuguese budget sensitivity to a balanced shock in the private sector amounting to a 1 per cent change in GDP is estimated to be 0.50. This value differs from the one estimated by the OECD by 0.1 percentage point. The differences are displayed in Table A9.12.2.

Table A9.12.2

Comparison of the overall budget sensitivity to a balanced private sector shock amounting to a 1% change in GDP

	Our approach¹⁾	OECD²⁾
Overall budget sensitivity:	0.50	0.39
Difference w.r.t. OECD sensitivity	0.11	
on account of:		
Definition of the macroeconomic elasticities	0.18	
Refinements of budgetary categories	-0.08	
Budget elasticities	0.01	
Residual component	0.01	

1) Our sensitivity estimate refers to the impact in the long-run.

2) Published on the OECD website: www.oecd.org.

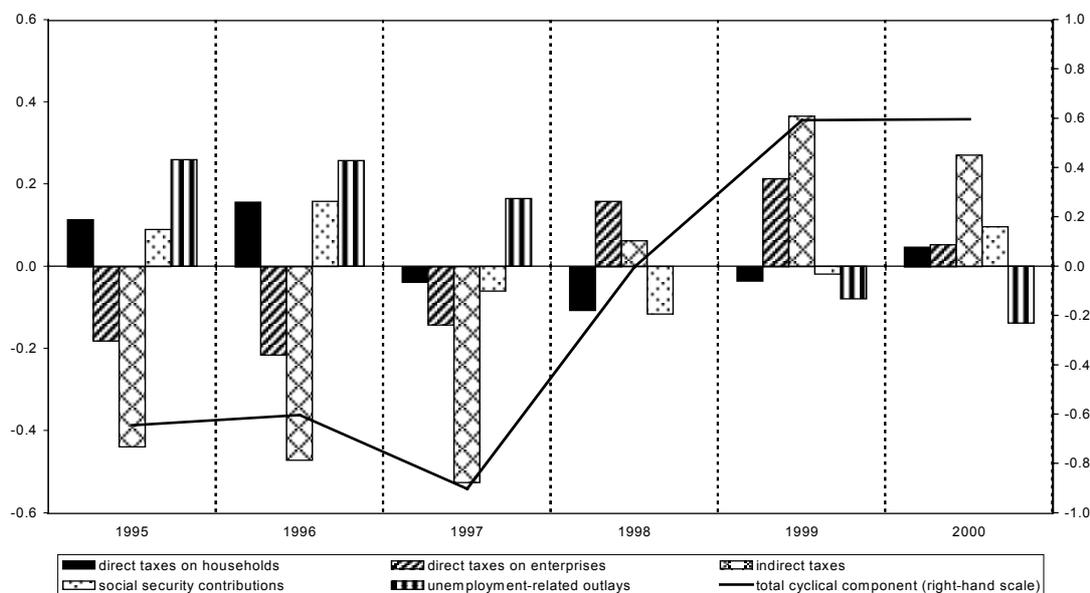
The difference with respect to the OECD overall budgetary sensitivity estimate can be broken down into four elements: a) a different calibration of the macroeconomic shock; b) the refinements of budget categories; c) the use of different budget elasticities; and d) a residual component which highlights that the two approaches are not exactly comparable.

A significant impact can be attributed to the different macroeconomic calibration of the shock. As explained in Chapter 4 of the working paper, the change in the macroeconomic bases is consistent with the assumption of a shock on the private components of GDP amounting to a 1 per cent change in the latter. The OECD has instead estimated the elasticity to GDP of the macroeconomic bases on the basis of past co-movements. With regard to applying the OECD elasticities, the choice made in our approach increases the overall budgetary sensitivity by 0.18 percentage point. In the Portuguese case, this is due to the values of the changes in the average compensation of private employees and in the private consumption, assumed in the shock scenario, significantly larger than those implied by the OECD macroeconomic elasticities (see Table A9.12.1).

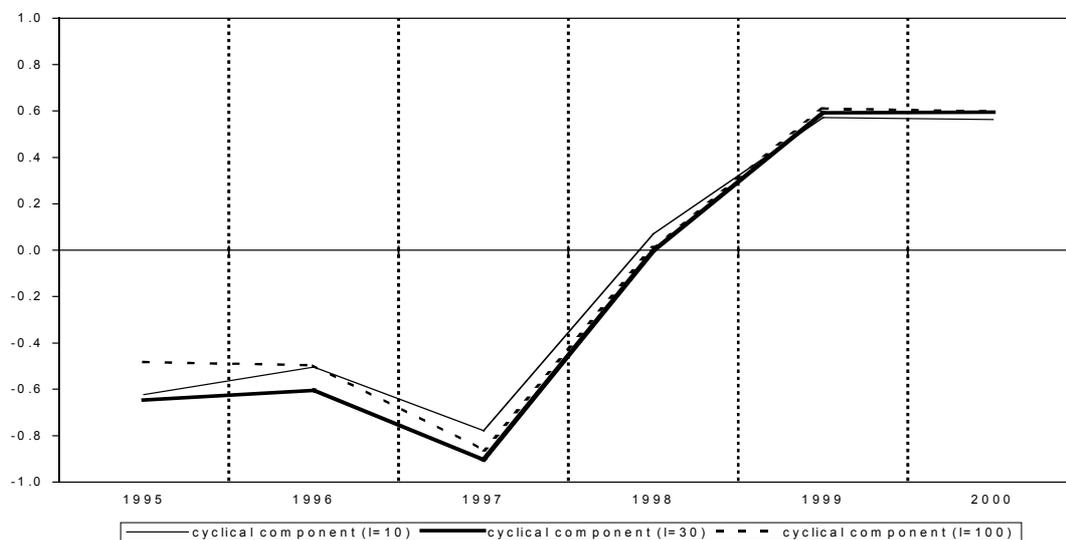
The refinements in the selection of budget categories – and, more specifically, the fact that in our method, contrary to the OECD approach, a significant part of government revenue exhibits a zero elasticity with respect to GDP – reduces the overall budgetary sensitivity by 0.08 percentage point. As the budget elasticities do not differ very much from the ones derived by the OECD, they only explain a negligible part of the difference in the overall sensitivity.

A9.12.4 Cyclical components of the balances: analysis of the results

Until 1998, the cycle had an unfavourable effect on the Portuguese general government accounts. The cyclical component of the budget balance became positive in 1998 reaching a peak of 0.6 per cent of GDP in 1999 and 2000 (see Chart A9.12.1). The evolution of the cyclical component of the deficit is not significantly affected by the choice of the Hodrick-Prescott filter smoothing parameter (see Chart A9.12.2). In fact, the estimated cyclical component of the budget is very similar for smoothing parameters equal to 10, 30 and 100, respectively.

Chart A9.12.1Cyclical components of the government budget, $\lambda = 30$ (in percentages of GDP)

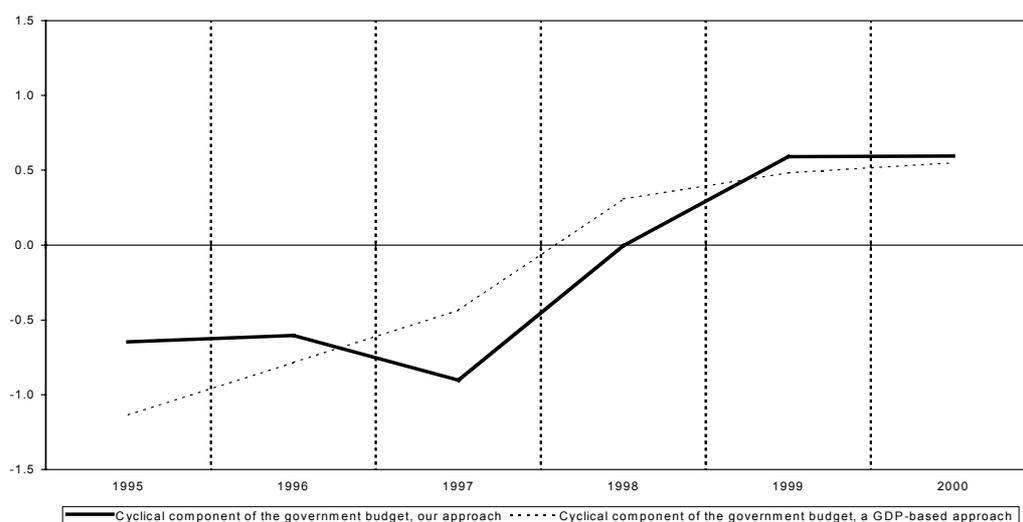
The sign of the overall impact and its developments were largely determined by the cyclical component of indirect taxes, linked to private consumption. Direct taxes on households contributed positively to the reduction of the deficit in 1995 and 1996. From 1999 to 2000, they are estimated to present an almost neutral cyclical component. Unemployment benefits have shown a cyclical component very similar to the output gap. This result was expected given the cyclical nature of the Portuguese unemployment.

Chart A9.12.2Sensitivity analysis on the cyclical component of the government budget balance: comparison to results obtained with $\lambda = 10$ and 100 (in percentages of GDP)

To assess the relevance of composition effects, the cyclical component of the budget has also been calculated using the output gap (derived by applying to real GDP a Hodrick-Prescott filter with a smoothing parameter of 30) and the overall budgetary sensitivity of 0.50 computed in this paper. As can be seen in Chart A9.12.3, the values and changes in the cyclical component computed in this way do not diverge significantly from the results of the disaggregated method adopted by us. Anyway, the disaggregated approach shows that in some years the composition effects can have a significant impact. In terms of levels, the differences between the two estimates are relatively large only in 1995 and in 1997, vis-à-vis the GDP-based approach. The composition effects are estimated to be negative in 1997 and 1998, but from 1999 onwards one obtains the opposite result. The cyclical component computed on the basis of the output gap shows an improvement during the whole period considered here.

Chart A9.12.3

Comparison of cyclical components showing composition effects (in percentages of GDP)



In order to solve the end-point problem of the HP-filter (see Section 3.2), the five macroeconomic variables were extended up to 2007. The forecasts that were available last spring were used up to 2003. Beyond 2003, the development of macroeconomic variables is consistent with the assumption of balanced growth at a trend rate of 3¼ per cent (approximately equal to the average growth in the period 1990-2000). A sensitivity analysis was conducted and it showed that using two alternative scenarios to extend the series beyond 2000 almost did not affect the results⁵.

⁵ In both alternative scenarios, the level of real GDP is extrapolated by growth rates such that the trend value of the growth rate is reached in 2007. The growth rates for the period 2001-2007 are linearly interpolated between the rate for 2000 and the targeted trend growth rate in 2007. The scenarios differ by the targeted trend growth rate in 2007. In scenario 1, the targeted trend growth rate in 2007 equals the average rate of growth between 1986 and 2000 (i.e. the last 15 years known). In scenario 2, the targeted trend growth rate in 2007 equals the average rate of growth between 1986 and 2000 plus 1 percentage point.

A9.13. Finland

A9.13.1 Budgetary and macroeconomic elasticities: method description and variable definitions

Methodological remarks

The elasticities of individual government revenue and expenditure items with respect to their macroeconomic bases are derived mainly from econometric regressions, as often as possible applying error correction models described in Section 2.1.1 of the working paper. Both step and level shift dummies have been used in the regressions to emulate discretionary changes in taxation, depending on whether temporary or permanent effects have resulted from the reforms. In general, the estimation period has been from 1971 to 1998 and the estimations are based on annual data. The equation specifications and estimation results on household and corporate sector direct taxes, indirect taxes, social security contributions and unemployment-related outlays with respect to the relevant macroeconomic variables are made available upon request.

In the end, the elasticities of corporate sector direct taxes and real social security contributions per employee with respect to gross operating surplus and average real wages are nevertheless set at one in the various calculations. This is done because the elasticity estimates of corporate sector direct taxes are very sensitive to equation specification and estimation period, therefore being uncertain. The social contributions paid are in turn generally based on flat rates, while discretionary fiscal policy changes may distort the estimation results to a large extent.

Budget categories and macroeconomic bases

The computations and estimations deviate in some cases slightly from the benchmark list of macroeconomic bases and fiscal variables explained in Section 2.2 due to the lack of detailed enough data. Indeed, the applied category of direct taxes on households includes also taxes other than those based merely on labour income. It contains inter alia taxes paid by self-employed as well as taxes paid out of capital income and social benefits. This should not however be a major problem for the assessment, since it can be taken into account in the estimations. The lower elasticity estimate obtained should actually compensate largely the effect that the size of the relevant budgetary item has been overestimated in the calculations.

Exclusion of public sector

Direct taxes, social security contributions and indirect taxes all include parts, which are paid either by the general government sector to itself or by the public sector employees. It has however been agreed to limit the analysis exclusively to private sector developments. Consequently, a zero elasticity was given to these items which show up both on the government revenue and expenditure side. So far, no corrections are made for direct taxes based on household transfers or indirect taxes paid by government employees or paid out of social payments.

In the case of Finland, the government sector average wages could also be assumed to be cyclically dependent and to follow private sector wage developments. This assumption is supported both by the econometric analysis, the prevailing macroeconomic model wage equation specifications, and the institutional setting. Indeed, the econometric regressions carried out in the context of the project and the estimated wage equation regarding average public sector wages in the BOF5 model suggest that the elasticity of average public sector wages with respect

to 1 per cent change in private sector unit wages is between 0.82-0.89.

A9.13.2 Budgetary and macroeconomic elasticities: comparison with OECD

Fiscal variables w.r.t. macroeconomic reference variables

The estimated elasticities of various government revenue and expenditure items with respect to relevant macroeconomic bases are in general rather close to those derived from the BOF5 macroeconomic model simulations. The elasticity estimates do not deviate to a large extent from the respective OECD estimates either (see Table A9.13.1). However, the elasticity of corporate sector direct taxes with respect to gross operating surplus of 1.36 is considerably higher than in the previous estimations. It should nevertheless be taken into account that corporate sector direct taxes have been relatively volatile in the past. Therefore, the results should be interpreted cautiously. Since the elasticity is also extremely sensitive to the equation specification and to the estimation period, the elasticity is finally set at 1.

It should also be kept in mind that during the present period of high economic activity earnings at the high income end of the income distribution have increased more than earnings at the low income end of the distribution. Because of the highly progressive income taxation this has increased income tax revenue more than in the case of unchanged income distribution assumed in the elasticity estimation. This means that at least for some time the elasticity of household sector direct taxes may be too low, resulting in a cyclical component which is too small and a cyclically adjusted surplus which is too large.

Macroeconomic variables w.r.t. GDP

The elasticities of different macroeconomic variables with respect to GDP seem to differ quite substantially from the respective OECD estimates. Indeed, we obtain markedly higher elasticities for average compensation of private sector employees, private consumption and gross operating surplus than the OECD, whilst that of number of unemployed persons is significantly lower. This is however mainly owing to the divergences in the methodology of how the macroeconomic elasticities and the overall budgetary sensitivity are derived in the OECD and our calculations.

Table A9.13.1

Comparison of elasticities

Fiscal variables w.r.t. macroeconomic reference variables	Our approach¹⁾	OECD²⁾
Direct taxes on households w.r.t. average wages	1.27	1.4
Direct taxes on households w.r.t. employment	1.00	1.0
Direct taxes on enterprises w.r.t. gross operating surplus/ gross primary company income	1.00	1.0
Indirect taxes w.r.t. private consumption	1.06	1.0
Social contributions w.r.t. average wages	1.00	0.9
Social contributions w.r.t. employment	1.00	1.0
Unemployment-related expenditure w.r.t. number of unemployed	1.07	1.0
Elasticities of macroeconomic variables w.r.t. output		
Average compensation of private sector employees	0.69	0.6
Private sector employment	0.70	0.7
Gross operating surplus/gross primary company income	1.39	0.7
Private consumption	1.28	0.9
Number of unemployed	-4.38	-5.2

- 1) *The macroeconomic elasticities w.r.t. output have been derived in this paper from the shock scenario which has been described in detail in Annex A4.*
- 2) *The OECD elasticities have been respectively taken from van den Noord (2000). The output elasticities of macroeconomic variables have been adjusted to our methodology.*

A9.13.3 Budget sensitivity: comparison with OECD

The overall sensitivity of the Finnish budget with respect to a balanced private sector growth shock, amounting to 1 per cent change in real GDP, is estimated to be 0.55 (see Table A9.13.2). This sensitivity estimate is fully consistent with the Bank of Finland and the Finnish Ministry of Finance previous estimates. However, it seems to be markedly lower than the most recent OECD estimate of 0.64.

The difference with respect to the OECD sensitivity estimate can be explained fully by the refinements of budgetary categories, more specifically by focusing the analysis exclusively on the private sector developments and by setting the elasticities of household sector direct taxes and social security contributions paid on public sector wages at zero. The differences in the definition of macroeconomic elasticities/calibration of shock and revenue and expenditure elasticity estimates do not seem to lead to any significant divergencies between the various sensitivity estimates.

The overall budgetary sensitivity would decrease by less than 0.05 percentage point of GDP to between 0.50-0.55 if public sector wages were assumed to be cyclically dependent. Indeed, the rise in the total revenue sensitivity would largely compensate the fall in the total expenditure sensitivity.

Table A9.13.2
Comparison of the overall budget sensitivity to a balanced private sector shock amounting to a 1% change in GDP

	Our approach	OECD¹⁾
Overall budget sensitivity:	0.55	0.64
Difference w.r.t. OECD sensitivity	-0.09	
on account of:		
Definition of the macroeconomic elasticities/calibration of shock	-0.01	
Refinements of budgetary categories	-0.09	
Budget elasticities	+0.01	
Residual component	0.00	

1) *Published on the OECD website: www.oecd.org.*

A9.13.4 Cyclical components of the balances: analysis of the results

The cyclically adjusted budgetary balances and the cyclical components of the budgets are calculated for the period 1990-2000 applying the Hodrick-Prescott filter. The filtering period is 1970-2007. The macroeconomic, price and fiscal projections for the years 2001-2003 are based on the forecasts that were available last spring. The long-term forecasts are derived utilising the Bank of Finland large-scale macroeconometric model (BOF5). This is simply because Finland experienced a very sharp recession in the early 1990s and real GDP fell by almost 15 per cent during 1991-1993. Thereafter, the economy has been growing at a very fast pace reflecting the emergence of telecommunications industry. For these reasons the extension of macroeconomic series beyond 2003 with the average rates of growth witnessed between 1986 and 2000 would not have made very much sense in the case of Finland.

Chart A9.13.1 presents the contribution of household sector direct taxes, corporate sector direct taxes, indirect taxes, social security contributions and unemployment-related outlays on the total cyclical component. The results illustrate that household sector direct taxes, social contributions and unemployment outlays have had the most significant effect on the cyclical part of fiscal balance in the past. This is largely explained by the relatively high elasticity of household sector direct taxes with respect to average wages, by the sharp decrease in the employment in the early 1990s, following the severe economic recession, and by the rather generous unemployment benefit system. On the other hand, the corporate sector direct taxes have had only a minor effect on the size of cyclical component.

Chart A9.13.1
Cyclical components of the government budget, $\lambda = 30$ (in percentages of GDP)

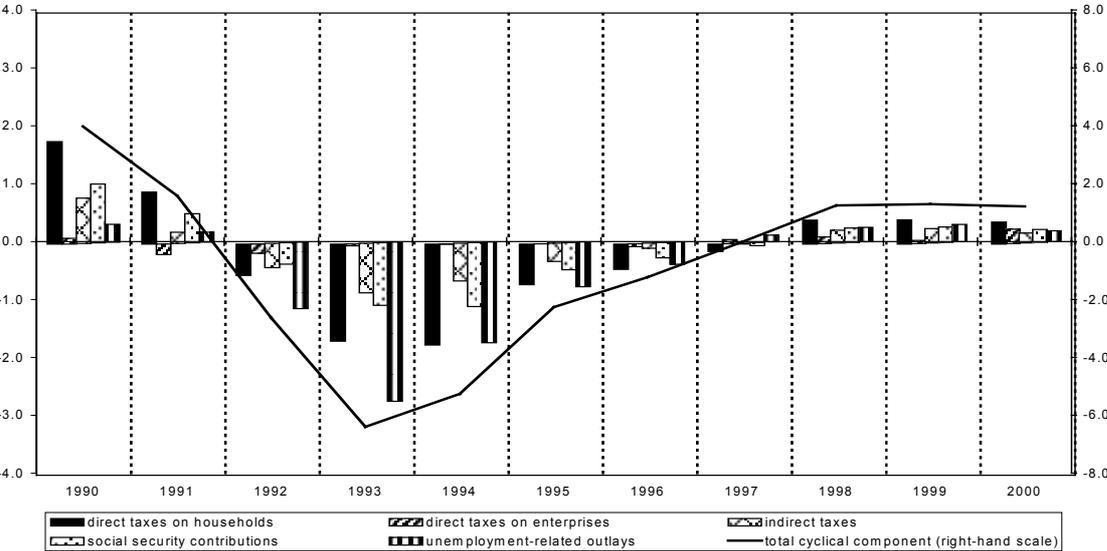
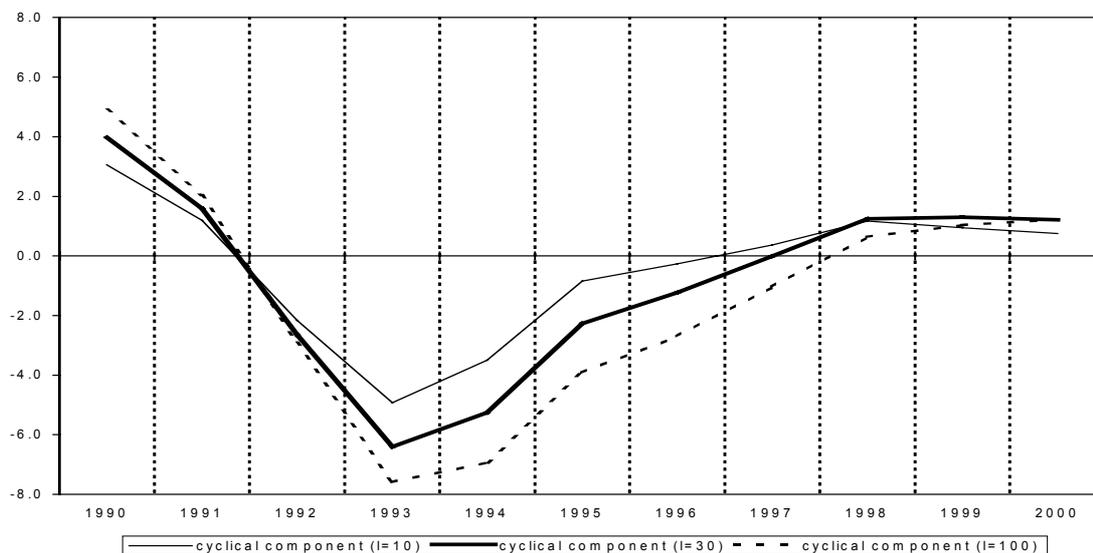


Chart A9.13.1 shows also that the negative cyclical component would have disappeared in Finland in 1997. The result may be difficult to understand in a broader economic context with modest inflationary pressures and relatively high level of unemployment prevailing still in 2000. Consequently, this kind of filtering approach is not a suitable approach to analyse changes in the cyclically adjusted budget balances in economies that have undergone deep economic recessions and structural changes in the past. This is because the method penalises countries for recovering quickly from economic slumps, although there would not be lack of resources or risk of economic overheating.

Chart A9.13.2 presents the size of total cyclical component by using the value of lambda equal to 30, 100 and 10. In this way it is possible to analyse how sensitive the results are to the chosen smoothing parameter value. A look at the chart reveals that the gaps in macroeconomic variables, the size of the cyclical component and the cyclically adjusted fiscal balance are highly sensitive to the chosen smoothing parameter value. This concerns particularly the results in terms of levels in the more distant past. Indeed, the estimates of total cyclical component differ as much as by some 2½-4 per cent of GDP from each other in 1994-1996. The profiles also differ quite a lot from each other, because even the changes in the cyclical components have sometimes different signs.

Chart A9.13.2

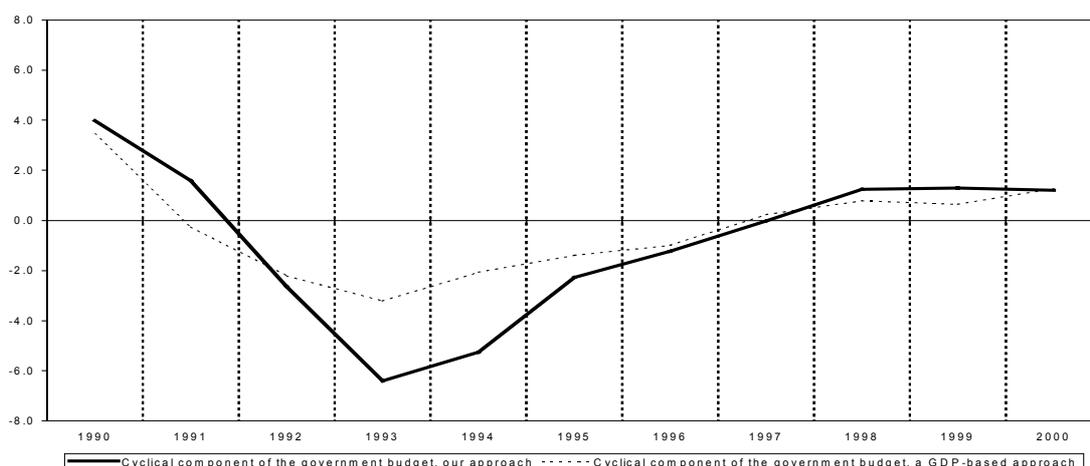
Sensitivity analysis on the cyclical component of the government budget balance: comparison to results obtained with $\lambda = 10$ and 100 (in percentages of GDP)



The cyclical components are also calculated using an aggregated approach that concentrates on the overall budgetary sensitivity of 0.55 and that employs only the output gap (i.e. the deviation of real GDP from its trend). This is done applying the HP-filter with a value of lambda of 30. The results based on the aggregated and disaggregated approaches are compared with each other in Chart A9.13.3. The differences between the aggregated and the disaggregated estimates can be attributed to the composition effects. The chart shows that in the past the differences between the aggregated and disaggregated approaches have sometimes been extremely large in terms of levels. This is mainly owing to the significant decline in the employment (about 20%) and sizeable rise in the number of unemployed persons (some 400%) in the early 1990s, whilst at the same time the fall in real GDP was considerably less (below 15%). However, given the large uncertainties related to this kind of computations in general, the profiles seem to follow relatively similar patterns.

Chart A9.13.3

Comparison of cyclical components showing composition effects (in percentages of GDP)



Before applying the HP-filter the five macroeconomic series have been extended to 2007 in order to be able to solve the end-point problem related to the use of the HP-filter (see Section 3.2 of the working paper). The projections for the years 2001-2003 are based on the forecasts that were available last spring, whilst the longer-term projections have been derived utilising the BOF5 model.

To assess the sensitivity of the estimates with regard to the extension used beyond 2000, a simple sensitivity analysis was conducted on the cyclical component of the budget balance. This was done by applying the aggregated approach (i.e. employing the budget sensitivity to the output gap) and by extending the real and nominal GDP series in two alternative ways for the period 2001-2007⁶. The obtained results were then compared to the baseline scenario, which also utilised the aggregated GDP-based approach. The comparison showed that the estimates are not too sensitive to the method used for extending the macroeconomic variables in the current economic juncture at least.

⁶ In both alternative scenarios, the level of real GDP is extrapolated by growth rates such that the trend value of the growth rate is reached in 2007. The growth rates for the period 2001-2007 are linearly interpolated between the rate for 2000 and the targeted trend growth rate in 2007. The scenarios differ by the targeted trend growth rate in 2007. In scenario 1, the targeted trend growth rate in 2007 equals the average rate of growth between 1986 and 2000 (i.e. the last 15 years known). In scenario 2, the targeted trend growth rate in 2007 equals the average rate of growth between 1986 and 2000 plus 1 percentage point.

A9.14 Sweden

A9.14.1 Budgetary and macroeconomic elasticities: method description and variable definitions

Methodological remarks

The elasticities of individual government revenue and expenditure items with respect to their macroeconomic bases are derived both from econometric regressions and tax legislation described in Sections 2.1.1 and 2.1.2 of the working paper. Both step and level shift dummies have been used in the regressions to emulate discretionary changes in taxation, depending on whether temporary or permanent effects have resulted from the reforms. In general, the estimation period has been from 1971 to 1998 and the estimations are based on annual data. The equation specifications and estimation results on household sector direct taxes, indirect taxes and unemployment-related outlays with respect to the relevant macroeconomic variables are made available upon request.

The elasticities of corporate sector direct taxes and social security contributions with respect to their tax bases are set at one in the various calculations. This is done because the results based on econometric regressions depended heavily on the equation specification or they were not found to be statistically significant, thus being uncertain. Moreover, the social security contributions paid are generally based on flat rates and the discretionary fiscal policy changes may distort the estimation results to a large extent.

Budget categories and macroeconomic bases

The computations and estimations deviate in some cases slightly from the benchmark list of macroeconomic bases and fiscal variables explained in Section 2.2 due to the lack of detailed enough data. Indeed, the applied category of direct taxes on households includes also taxes other than those based merely on labour income. It contains inter alia taxes paid by self-employed as well as taxes paid out of capital income and household transfers. This should not however be a major problem for the assessment, since it can be taken into account in the estimations. The lower elasticity estimate obtained should actually compensate largely the impact that the size of the relevant budgetary item has been overestimated in the computations.

Exclusion of public sector

Direct taxes, social security contributions and indirect taxes all include parts, which are paid either by the general government sector to itself or by the public sector employees. It has however been agreed to limit the analysis to concern private sector developments only. Hence, a zero elasticity was given to these items which show up both on the government revenue and expenditure side. So far, no corrections are made for direct taxes based on social benefits or indirect taxes paid by government employees or paid out of social payments.

In the case of Sweden, the government sector average wages could also be assumed to be cyclically dependent and to follow the private sector wage developments. This assumption is supported by the econometric analysis and by the prevailing institutional setting. Indeed, the econometric regressions carried out in the context of the project suggest that the elasticity of average public sector wages with respect to 1 per cent change in private sector unit wages is about 0.85.

A9.14.2 Budgetary and macroeconomic elasticities: comparison with OECD

Fiscal variables w.r.t. macroeconomic reference variables

The estimated elasticities of various government revenue and expenditure items with respect to relevant macroeconomic bases are in general rather close to the respective latest OECD estimates (see Table A9.14.1). We have found however the elasticity of indirect taxes with respect to private consumption to be considerably higher than the OECD, which has not estimated the elasticity directly.

Macroeconomic variables w.r.t. GDP

The elasticities of different macroeconomic variables with respect to GDP seem however to differ quite substantially from the respective OECD estimates, being generally markedly higher in our calculations. This is mainly owing to the divergences in the methodology of how the macroeconomic elasticities and the overall budgetary sensitivity are derived in the OECD and our computations.

Table A9.14.1
Comparison of elasticities

Fiscal variables w.r.t. macroeconomic reference variables	Our approach ¹⁾	OECD ²⁾
Direct taxes on households w.r.t. average wages	1.38	1.3
Direct taxes on households w.r.t. employment	1.00	1.0
Direct taxes on enterprises w.r.t. gross operating surplus/ gross primary company income	1.00	1.0
Indirect taxes w.r.t. private consumption	1.21	1.0
Social contributions w.r.t. average wages	1.00	0.9
Social contributions w.r.t. employment	1.00	1.0
Unemployment-related expenditure w.r.t. number of unemployed	0.95	1.0
Elasticities of macroeconomic variables w.r.t. output		
Average compensation of private sector employees	0.80	0.4
Private sector employment	0.60	0.6
Gross operating surplus/gross primary company income	1.40	0.9
Private consumption	1.35	0.9
Number of unemployed	-8.39	-7.0

1) The macroeconomic elasticities w.r.t. output have been derived in this paper from the shock scenario which has been described in detail in Annex A4.

2) The OECD elasticities have been respectively taken from van den Noord (2000). The output elasticities of macroeconomic variables have been adjusted to our methodology.

A9.14.3 Budget sensitivity: comparison with OECD

The overall sensitivity of the Swedish budget with respect to a balanced private sector growth shock, amounting to 1 per cent change in real GDP, is estimated to be 0.75 (see Table A9.14.2). This sensitivity estimate is more or less in line with the Sveriges Riksbank and the Swedish Ministry of Finance previous estimates. However, it seems to be significantly higher than the most recent OECD estimate of 0.68.

The difference with respect to the OECD sensitivity estimate can be explained by the markedly higher macroeconomic elasticities and by the slightly higher budgetary elasticities used to calculate our sensitivity estimate. This is nevertheless partly offset by refinements to budgetary categories. Indeed, by focusing the analysis on the private sector developments only and by setting the elasticities of household sector direct taxes and social security contributions paid on public sector wages at zero is lowering markedly our sensitivity estimate.

The overall budgetary sensitivity would decrease by less than 0.05 percentage point of GDP to between 0.70-0.75 if public sector wages were assumed to be cyclically dependent. Indeed, the rise in the total revenue sensitivity would largely compensate the fall in the total expenditure sensitivity.

Table A9.14.2

Comparison of the overall budget sensitivity to a balanced private sector shock amounting to a 1% change in GDP

	Our approach	OECD¹⁾
Overall budget sensitivity:	0.75	0.68
Difference w.r.t. OECD sensitivity	+0.07	
on account of:		
Definition of the macroeconomic elasticities/calibration of shock	+0.11	
Refinements of budgetary categories	-0.06	
Budget elasticities	+0.02	
Residual component	0.00	

1) Published on the OECD website: www.oecd.org.

A9.14.4 Cyclical components of the balances: analysis of the results

The cyclically adjusted budgetary balances and the cyclical components of the budgets are calculated for the period 1993-2000 applying the Hodrick-Prescott filter. The filtering period is 1970-2007. The macroeconomic, price and fiscal projections for the years 2001-2003 are based on the forecasts that were available last spring. The macroeconomic variables are extended beyond 2003 with rather cautious growth rates given that Sweden faced a serious economic recession in the early 1990s. Indeed, they are on average somewhat below the balanced growth assumption of an average rate of growth of 2.0 per cent observed between 1986 and 2000.

Chart A9.14.1 demonstrates the contribution of household sector direct taxes, corporate sector direct taxes, indirect taxes, social security contributions and unemployment-related outlays on the total cyclical component. The results show that in the past the household sector direct taxes, social contributions and unemployment expenditure have had the greatest effect on the cyclical part of fiscal balance. This is mainly due to the quite high elasticity of household sector direct taxes with respect to average wages, to the large fall in the employment in the early 1990s, following the severe economic recession, and to the rather open handed unemployment benefit system. The corporate sector direct taxes have in turn not played a major role in explaining the changes in the cyclical balance in the previous years, as their share in total government revenue is relatively small.

Chart A9.14.1

Cyclical components of the government budget, $\lambda = 30$ (in percentages of GDP)

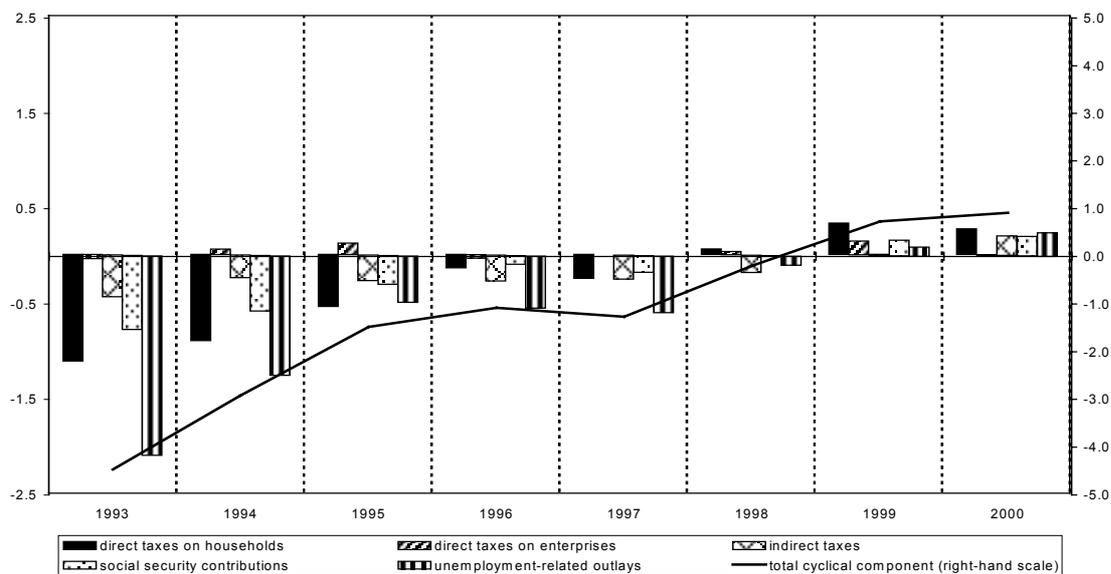
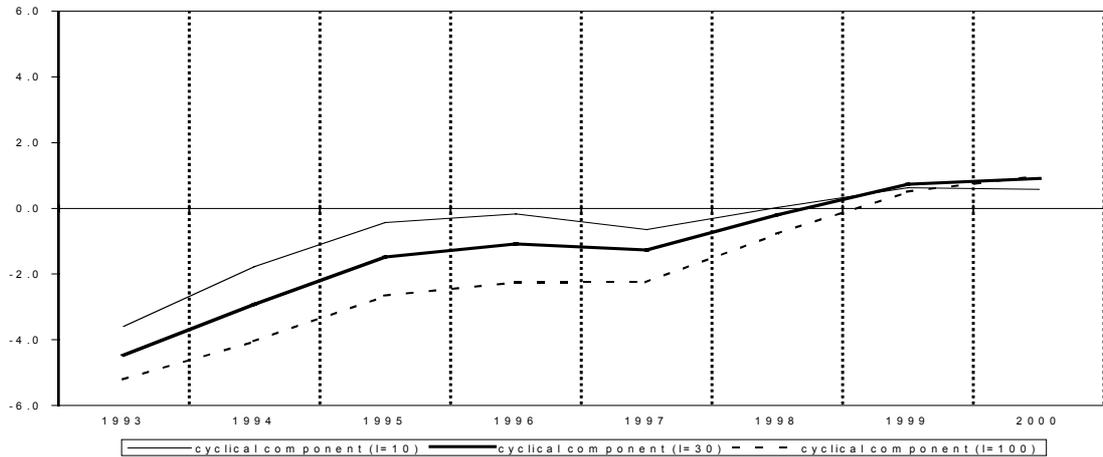


Chart A9.14.1 suggests also that the negative cyclical component would have fully disappeared in Sweden by 1999. The result is however problematic to interpret in a broader economic context, because inflation has continued to remain well under control in Sweden. Consequently, this kind of filtering approach is not a proper approach to evaluate changes in the cyclically adjusted fiscal balances in economies that have undergone deep recessions and structural changes in the past or they should be interpreted cautiously at least.

Chart A9.14.2 presents the size of total cyclical component by using a value of lambda equal to 30, 100 and 10. In this way it is possible to assess how sensitive the results are to the chosen smoothing parameter value. A look at the chart reveals that the gaps in macroeconomic variables, the size of the cyclical component and the cyclically adjusted fiscal balance depend very much on the chosen smoothing parameter value. This concerns particularly the results in terms of levels especially in the more distant past, since the estimates of total cyclical component deviate as much as by some 1½-2¼ per cent of GDP from each other during 1993-1996. The profiles also differ significantly from each other in some years and the changes in the total cyclical components have sometimes even different signs.

Chart A9.14.2

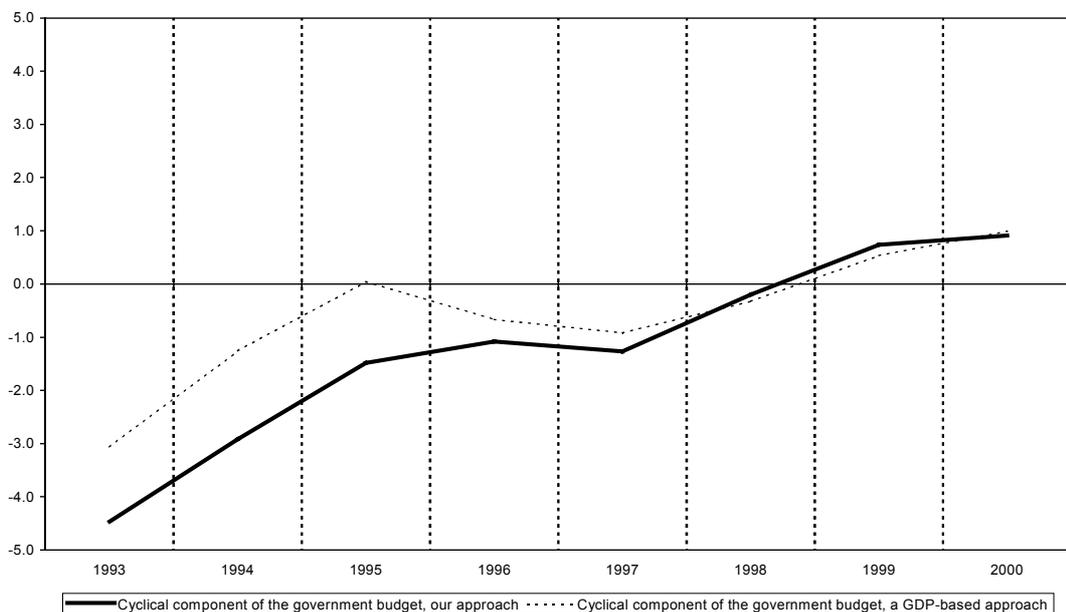
Sensitivity analysis on the cyclical component of the government budget balance: comparison to results obtained with $\lambda = 10$ and 100 (in percentages of GDP)



The cyclical components are also calculated using an aggregated approach that concentrates on the overall budgetary sensitivity of 0.75 and that employs the output gap (i.e. the deviation of real GDP from its trend). This is done applying the HP-filter with a value of lambda of 30. The results based on the aggregated and disaggregated approaches are compared with each other in Chart A9.14.3. The differences between the aggregated and the disaggregated estimates can be attributed to the composition effects. The chart shows that before the mid-1990s the differences between the aggregated and disaggregated approaches have been rather large in terms of levels. The different approaches seem however to produce relatively similar results both in terms of changes and levels between 1996 and 2000.

Chart A9.14.3

Comparison of cyclical components showing composition effects (in percentages of GDP)



Before applying the HP-filter the five macroeconomic series have been extended to 2007 in order to be able solve the end-point problem related to the use of the HP-filter (see Section 3.2 of the working paper). The projections for the years 2001-2003 are based on the forecasts that were available last spring. The macroeconomic variables have been extended beyond 2003 with rather cautious growth assumptions, which are below the balanced growth assumption based on the average rate of growth of 2.0 per cent witnessed between 1986 and 2000.

To assess the sensitivity of the estimates with regard to the extension used beyond 2000, a simple sensitivity analysis was conducted on the cyclical component of the budget balance. This was done by applying the aggregated approach (i.e. by employing the budget sensitivity to the output gap) and by extending the real and nominal GDP series in two alternative ways for the period 2001-2007⁷. The obtained results were then compared to the original baseline scenario that was also based on the aggregated GDP-based approach. The comparison showed that the growth assumptions used for extending the macroeconomic variables affect to some extent the estimates in the prevailing economic circumstances at least.

⁷ *In both alternative scenarios, the level of real GDP is extrapolated by growth rates such that the trend value of the growth rate is reached in 2007. The growth rates for the period 2001-2007 are linearly interpolated between the rate for 2000 and the targeted trend growth rate in 2007. The scenarios differ by the targeted trend growth rate in 2007. In scenario 1, the targeted trend growth rate in 2007 equals the average rate of growth between 1986 and 2000 (i.e. the last 15 years known). In scenario 2, the targeted trend growth rate in 2007 equals the average rate of growth between 1986 and 2000 plus 1 percentage point.*

A9.15 United Kingdom

A9.15.1 Budgetary and macroeconomic elasticities: method description and variable definitions

Methodological remarks

Most of the revenue and expenditure elasticity estimates have been taken from the Treasury's forecasting equations underlying the published Budget fiscal forecasts. These equations are derived from a variety of methods: most are either econometric regressions or micro-based models for more complex tax and spending regimes, such as corporation tax and unemployment benefits, respectively. Official estimates for the elasticity of social security contributions with respect to earnings are not available, in part reflecting significant recent changes to the tax regime, the revenue effects of which will depend upon the precise earnings distribution. In particular, the upper and lower earnings limits for employee contributions (and a lower earnings limit for employer contributions) imply significant non-linearities in the tax regime; it is assumed that on average the effects of the upper and lower earnings limits are offsetting such that there is a unit elasticity with respect to changes in average earnings.

Budget categories and macroeconomic bases

The tax bases on which the Treasury's tax equations are specified are sometimes different to those used in this working paper. For example, apart from household consumption, VAT is also collected on intermediate business consumption when the firm's output is exempt such that it can not reclaim VAT paid on its inputs. Because household consumption only forms part of the VAT base, we would not expect it to have a unit elasticity. However, given this is the sole macroeconomic determinant in our approach, the revenue elasticity has been adjusted upwards accordingly. Note, however, that the ratio of VAT receipts to household consumption has fallen significantly over the past 15 years, largely reflecting avoidance activity. This suggests the revenue elasticity is significantly less than one and an elasticity of 0.9 has been used.

In addition, there is no clear relationship between gross operating surplus as measured in the national accounts and companies' taxable profits – the relevant tax base for corporation tax. For example, in the UK accounts gross operating surplus excludes the net interest income of the banking sector (the main source of commercial banks' profits). Moreover, the tax base for financial companies has been increasing significantly relative to gross operating surplus for several years, in part reflecting the growth of the City of London as a financial centre. This may partly explain why econometric regressions suggest a corporation tax elasticity with respect to gross operating surplus of up to 2, although an elasticity much closer to one would seem more sensible. In these cases the elasticity estimates from the Treasury equations (based on different tax bases to this paper) have been used.

Exclusion of public sector

The elasticities in our approach relate exclusively to private sector variables. Clearly, however, the tax bases for household direct and indirect taxes and employee and employer social security contributions all relate to both the private and public sectors. In none of these cases is there a split between the two sectors in the tax receipts data, and estimates of the public sector contribution to receipts have had to be derived based on the relative numbers (and earnings) of public to private sector employees.

A9.15.2 Budgetary and macroeconomic elasticities: comparison with OECD

Having adjusted for differences in methodology (especially the assumed absence of cyclical effects with respect to public sector macroeconomic determinants), our elasticities of macroeconomic variables with respect to output are mostly similar to the corresponding OECD estimates, except for unemployment. Indeed, our estimate shows a greater sensitivity of this variable with respect to output change than indicated by the OECD figure (see Table A9.15.1).

Table A9.15.1

Comparison of elasticities

Fiscal variables w.r.t. macroeconomic variables	Our approach ¹⁾	OECD ²⁾
Direct taxes on households w.r.t. average earnings	1.2	1.5
Direct taxes on households w.r.t. employment	1.0	1.0
Direct taxes on companies w.r.t. gross operating surplus/ gross primary company income	1.0	1.0
Indirect taxes w.r.t. private consumption	0.9	1.0
Social contributions w.r.t. average earnings	1.0	1.0
Social contributions w.r.t. employment		
Unemployment-related expenditure w.r.t. number of unemployed	1.0	1.0
Macroeconomic variables w.r.t. output		
Average compensation of private sector workers	1.5	1.8
Private sector employment	1.0	1.0
Gross operating surplus/gross primary company income	1.6	0.6
Private consumption	1.2	1.1
Number of unemployed	-12.8	-5.5

1) The macroeconomic elasticities w.r.t. output have been derived in this paper from the shock scenario which has been described in detail in Annex A4.

2) The OECD elasticities have been respectively taken from van den Noord (2000). The output elasticities of macroeconomic variables have been adjusted to our methodology.

The reason for this difference is not entirely clear. However, our higher estimate for the unemployment elasticity may simply reflect different data vintages. Data for 1999 show the following:

Millions	<u>1999</u>
Total employment	27.6
o/w	
Private	22.6
Public	5.0
Unemployment	1.8
Unemployment rate (%)	6.1

Assuming a 1 per cent increase in output increases private employment by 1 per cent, then unemployment will fall by 226,000, equivalent to a fall in unemployment of about 12½ per cent, which is consistent with our estimates. In practice, however, increases in private employment are likely to be met in part from the inactive population, so increasing the labour force and implying a lower reduction in unemployment. This suggests that our elasticity estimate for unemployment should be regarded as an upper bound.

A9.15.3 Budget sensitivity: comparison with OECD

The overall sensitivity of the budget balance to a balanced growth shock in the private sector equivalent to 1 per cent of GDP is estimated to be 0.65. This compares with the most recent OECD estimate of 0.50 (see Table A9.15.2).

Table A9.15.2

Comparison of the overall budget sensitivity to a balanced private sector shock amounting to a 1% change in GDP

	Our approach	OECD¹⁾
Overall budget sensitivity of which:	0.65	0.50
tax revenues	0.05	0.3
public spending	-0.60	-0.2
Difference w.r.t. OECD sensitivity	+0.15	
on account of:		
Definition of the macroeconomic elasticities	+0.15	
Refinements of budgetary categories	+0.03	
Budget elasticities	-0.03	
Residual component	0.00	

1) Published on the OECD website: www.oecd.org.

Table A9.15.2 shows that the main explanation for the difference in the OECD and our budget elasticities is the difference in the spending estimates. This in turn fully reflects the differences in the estimates for the effect on unemployment of a 1 per cent change in output, shown in Table A9.15.1. This is confirmed by inputting the OECD estimated unemployment elasticity of -5.5 into our methodology, which changes the public spending component to -0.47, somewhat closer to that of the OECD estimate.

The part of the difference which is due to the specification of the macroeconomic base can be sized up within a combined approach in which fiscal elasticities from our method are combined with output elasticities of macroeconomic variables as estimated in van den Noord (2000) - the latter adjusted for the private sector as described in Annex A6 of the working paper. The combined approach yields a sensitivity of 0.50. Hence, a difference of 0.15 percentage point is due to the specification of fiscal elasticities and definitions of fiscal variables in our approach. It is largely attributable to the difference in the resulting output elasticity of unemployment-related expenditure to GDP.

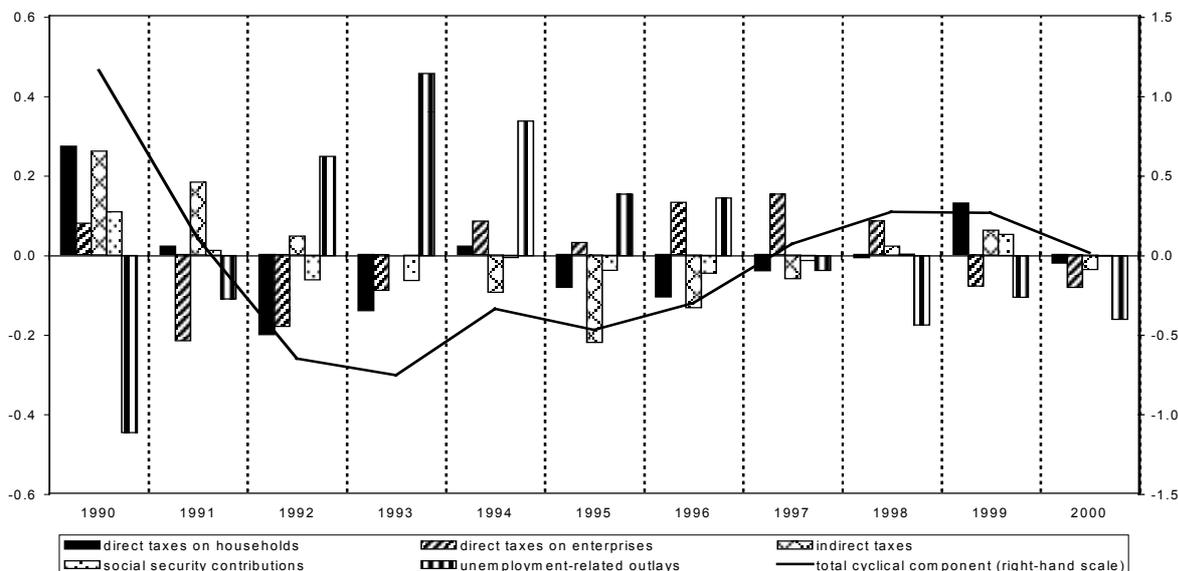
The remaining difference is nil, and the difference on the account of the refinements made to the budgetary categories offsets the difference in budget elasticities. Elasticities of fiscal variables with respect to their macroeconomic bases are slightly smaller in our (and thus also in the combined) approach than in van den Noord (2000), decreasing the budgetary sensitivity by 0.03 percentage point. Thus, the sensitivity in the combined approach would increase from 0.65 to 0.68 if the values of the fiscal elasticities were replaced by those in van den Noord (2000). The second effect however, which is attributable to different *definitions of fiscal variables* - especially the exclusion of certain components - compensates this increase (see Table A9.15.2).

A9.15.4 Cyclical components of the balances: analysis of the results

Chart A9.15.1 shows that the total cyclical component of the primary budget balance has swung from increasing the budget surplus by over 1 per cent of GDP in 1990 to contributing to the subsequent deficit by around $\frac{3}{4}$ per cent of GDP in 1993. The main contributions to the cyclical component of the budget balance over this period came from unemployment spending and household direct taxes.

Chart A9.15.1

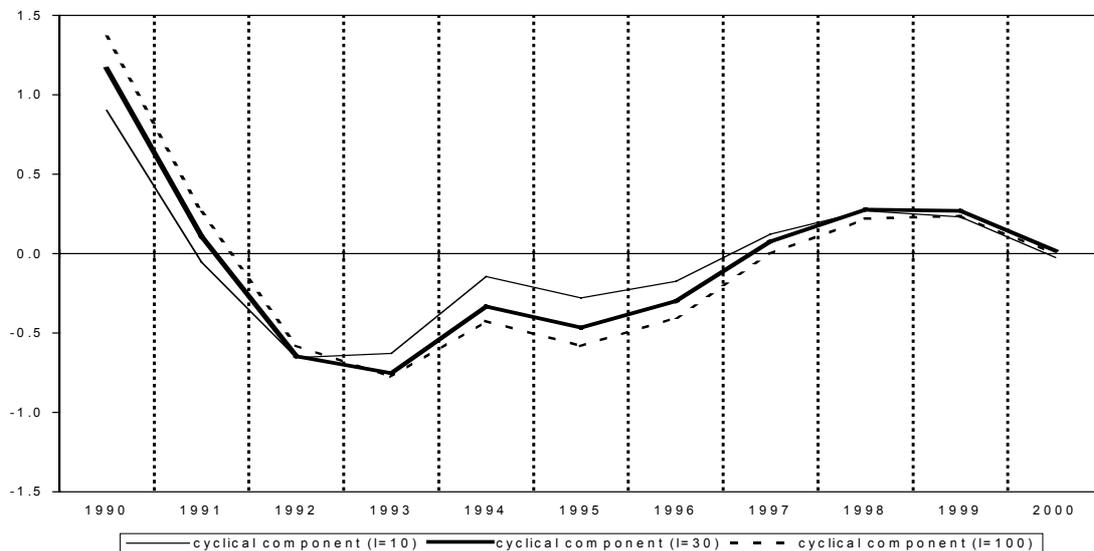
Cyclical components of the government budget, $\lambda = 30$ (in percentages of GDP)



The cyclical contribution to the budget deficit fell to zero by 1997 and then moved into a modest surplus over the following two years. The total cyclical component is estimated to have fallen from +0.3 per cent of GDP in 1999 to zero in 2000. Small negative contributions to the budget balance from household direct taxes and indirect taxes in 2000 are fully offset by a positive contribution from lower cyclical spending on unemployment benefits. Chart A9.15.2 shows that the estimates of cyclical components are not very sensitive to the chosen smoothing parameter value of the Hodrick-Prescott filter.

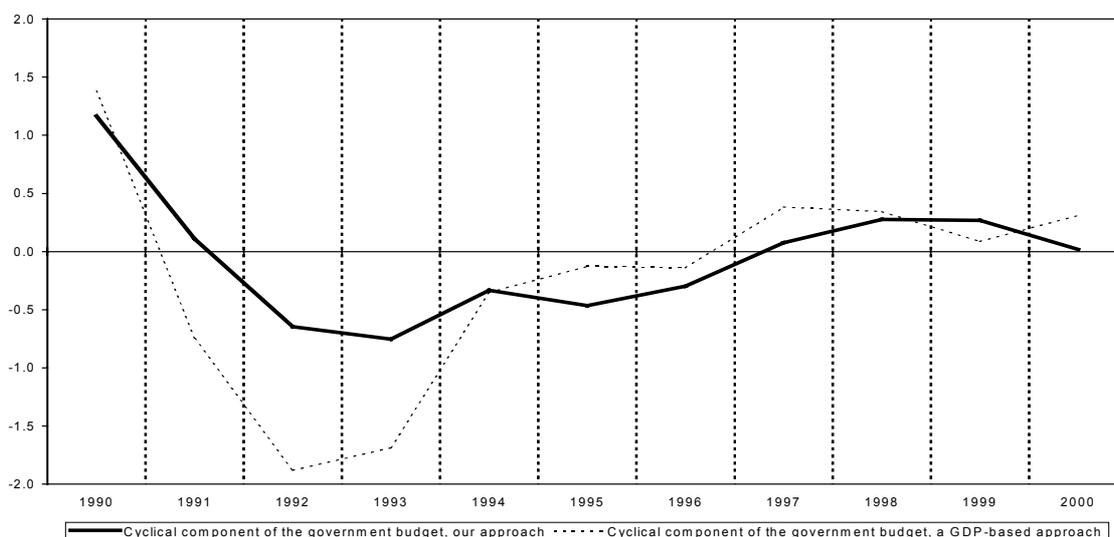
Chart A9.15.2

Sensitivity analysis on the cyclical component of the government budget balance: comparison to results obtained with $\lambda = 10$ and 100 (in percentages of GDP)



To assess the relevance of composition effects, the cyclical component of the budget has also been calculated using the output gap (derived by applying to real GDP a Hodrick-Prescott filter with a smoothing parameter of 30) and the estimate for the overall budgetary sensitivity of 0.65. As can be seen in Chart A9.15.3, the values and changes in the cyclical component computed in this way diverge significantly from the results of the disaggregated method adopted by us, highlighting the importance of taking into account shifts in composition of aggregate demand and national income in the case of the United Kingdom. In terms of levels, the differences between the two estimates are relatively large in 1992 (1.2 % of GDP) and in 1993 (0.9%). In terms of changes, particularly significant are the differences for the sub-period 1992-1994. The cyclical component computed on the basis of the output gap shows a marked improvement in this period, while a relatively stable pattern is shown by the cyclical component computed with the disaggregated approach.

Chart A9.15.3
Comparison of cyclical components showing composition effects (in percentages of GDP)



In order to solve the end-point problem of the HP-filter (see Section 3.2 of the working paper), the five macroeconomic variables are extended to 2007 before applying the HP-filter, using the forecasts that were available last spring up to 2003. Beyond this, the macroeconomic variables are assumed to go back to trend. To assess the sensitivity of the estimates with regard to the extension used beyond 2000, a simple sensitivity analysis was conducted on the cyclical component of the budget balance computed using the aggregated approach (i.e. applying the budget sensitivity to the output gap) and by extending the real and nominal GDP series in two alternative ways for the period 2001-2007⁸. The obtained results were then compared to the baseline scenario. The comparison revealed that, even in 2000, the estimates are not very sensitive to the method used for extending the macroeconomic variables.

⁸ In both alternative scenarios, the level of real GDP is extrapolated by growth rates such that the trend value of the growth rate is reached in 2007. The growth rates for the period 2001-2007 are linearly interpolated between the rate for 2000 and the targeted trend growth rate in 2007. The scenarios differ by the targeted trend growth rate in 2007. In scenario 1, the targeted trend growth rate in 2007 equals the average rate of growth between 1986 and 2000 (i.e. the last 15 years known). In scenario 2, the targeted trend growth rate in 2007 equals the average rate of growth between 1986 and 2000 plus 2 percentage points.