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Forecasting budgetary deficits

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PUBLISHER: European Parliament
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AUTHORS: Gerbert Romijn and Holger van Eden
NEI. B.V.
Division of Macro and Sector Policies
Rotterdam

EDITOR: Ben Patterson
Directorate General for Research
Economic Affairs Division
Tel.: (00352)4300-24114
Fax: (00352)4300-27721
E-Mail: GPATTERSON
Internet: gpatterson@europarl.eu.int

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Executive Summary

Objective

The aim of this study was to investigate the sensitivity of the components of government budgetary receipts and expenditures for the fifteen Member States of the European Union with respect to:

- economic conditions (for which we took GDP as a proxy), and
- past values of the budgetary components themselves (i.e. what is the budgetary component's own momentum).

Based on the estimated sensitivity of the individual budgetary components, forecasts were made for the development of Member States' budget deficits for the 1999-2000 period, using the Autumn 1998 DG-II GDP forecasts for this period as input (our **base case** scenario).

Then, with the help of two alternative scenarios, prospects and risks for EU Member States deficits were assessed. The two scenarios investigated were a 'sharp economic downturn' or **'bust'**-scenario and a **'loss of EMU discipline'** scenario. In the latter scenario all exceptional budgetary measures which were identified by our analysis, taken by individual Member States in the 1996-1998 period to comply with the Maastricht criteria, were reversed in the years 1999-2000.

Sensitivity analysis

The sensitivity of budgetary receipts and expenditure components was estimated using the well-known econometric technique of regression analysis. The regressions were performed on functions **relating each budgetary component of each country to present and lagged values of GDP and to lagged values of the budget component itself**. The estimation of these so-called *transfer* functions can be seen as a short cut to normal macro-economic modelling of national economies and their public finances.

The main findings of the regression analysis were:

- in all countries receipts categories as direct taxes, indirect taxes and social security contributions are heavily, positively correlated with GDP. Receipt categories thus behaved pro-cyclically;
- on the other hand, government expenditures were for many countries found to be determined to an important extent by own past values. This was true for the civil servant wage bill, government investment, interest payments and net purchase of goods and services;

- subsidies and social security benefits were in most cases negatively correlated with changes in GDP, implying counter-cyclical behaviour. Government investment behaved very pro-cyclical, confirming its role as easiest target for budgetary tightening. Other expenditure categories showed a very mixed reaction to GDP fluctuations across countries;

- with receipts behaving strongly pro-cyclical and expenditures being 'locked in' to a certain degree by their own momentum, the deficits of EU-Member States clearly show counter-cyclical behaviour, as macro-economic theory suggests. The responsiveness to GDP movements, however, varies greatly. On balance the following countries show deficits with a very strong anti-cyclical nature: Denmark, Spain and Sweden. On the other hand the deficits of the following countries are only affected to a limited degree by changes in growth of GDP: Austria, Germany, Portugal and Italy.

The decomposition of general government accounts used in the analysis consisted of 4 broad categories of receipts (direct taxes, indirect taxes, social security contributions and other income) and 7 categories of expenditures (civil servant wage bill, net purchase of goods and services, social benefits, interest payments, subsidies, government investment and net capital transfers).

Testing for EMU discipline

In the period leading up to the Third Phase of EMU the opinion has been voiced that a number of countries have taken exceptional one-off measures to improve their budgetary situation to qualify for EMU. We tested for such measures by looking if inclusion of so-called 'dummy variables' in the estimated transfer functions over the period 1996-1998 improved our estimation results. The coefficient of such a dummy variable, in a certain year, of a certain budgetary component, can be interpreted as the size of an exceptional, or EMU-induced, budgetary measure.

Table A: Type and size 'EMU-induced' exceptional budgetary measures in the period 1996-1998.*

(approximate cumulative percentage change from 1995 budgetary category level)	Direct taxes	Indirect taxes	Social security contributions	Other income	Civil servant wage payments	Net purchase of goods and services	Interest payments	Subsidies	Social security benefits	Investment	Net capital transfers**
Austria					-2.5			-24.0	-2.7		-10.8
Belgium		+4.5			-6.3	+15.8					
Denmark	-12.8				+9.3				+13.2	-21.8	
Finland			-27.9	-19.6	-10.5	-36.6					-3.9
France	+21.5	+3.4	-13.1					+16.0		-13.8	-43.3
Germany	-12.8		-2.1				-12.4	-22.2			+10.1
Ireland			-8.5				-31.6				
Italy	+6.8						-40.8			+29.4	-12500
Netherlands		+3.6									

Portugal					-9.1	+111.0	-18.4	-32.5	-26.1		
Spain						-10.7			-3.6	-16.2	-292.8
Sweden								-12.7	-11.1	-60.3	
UK					-17.1	-23.2				-51.3	+10.8

* The values in this table represent the cumulative, exceptional –i.e. not predicted by the model – change in the growth rate of the budgetary category involved over the 1996-1998 period.
** Cumulative 1996-1998 change from 1995 level in mrd local currency of 1990.

Only exceptional increases in receipts and decreases in expenditure can be interpreted as 'EMU-induced'. So the main categories of the 'EMU-measures' are direct and indirect taxes, subsidies, social security benefits and interest payments. The countries with the most evidence of 'EMU-induced' measures are Portugal, Italy, France, and Spain. Germany and Finland showed no EMU related budgetary actions, although strangely enough Sweden and the UK as non-Euro Members did.

Scenario analysis

The estimated equations of the budgetary categories for the fifteen Member States were used for forecasting the development of Member States deficits over the period 1999-2000. First we estimated deficits using the Autumn 1998 DG-II GDP forecasts for 1999-2000 as input in our equations (see table 2). This is our **base case** scenario.[1] As table 3 shows our deficit forecasts on the basis of these GDP figures are not significantly different from does supplied by DG II. DG II makes its forecasts on the basis of macro-economic modelling and/or estimates of Member States.[2] Only for Ireland is our deficit projection is more than 1 percent higher than those of DG II.

As was mentioned the two alternative scenarios for assessing prospects and risks of future deficit developments were an economic **'bust'** scenario and a **'loss of EMU discipline'** scenario.

For the 'bust' scenario our GDP projections for 1999-2000 were not based on other macro-economic forecasts (as these are all roughly in line with the DG II forecasts). Instead we took the sharpest decrease of GDP over a two-year period for each country over the last twenty years. Then we subtracted these reductions of GDP growth from the DG II GDP growth figures for 1998 to arrive at the 1999 and 2000 GDP growth projections. Differences in economic volatility between countries in this way show up in our GDP forecasts.

The 'bust' scenario leads to deficit forecasts which for many countries are higher than the 3.0% limit of the Growth and Stability Pact. The conclusion is that if countries experience an economic downturn similar to the worst they experienced in the last

[1] These forecasts are the most recent available from the European Commission. Since then the more recent GDP forecasts of multilateral organisations have become a bit more sombre, though not substantially. New DG II forecasts are expected at the end of March this year.

[2] The reason for the differences of our base case deficit forecasts and those of DG II is not solely attributable to different forecast methodology. They can also be partly be expained by the use of a different dataset. The Eurostat figures we used now and then differed from those of DG II.

twenty years additional budgetary tightening will clearly be necessary. Especially in Belgium, Denmark, Sweden, Spain, France and Finland required budgetary measures can be expected to be severe.

Table B: GDP projections for 1999-2000 used in Base case and 'Bust' scenario

	Base Case		Economic 'Bust'	
	DGII: Aug. 1998			
	1999	2000	1999	2000
Belgium	2.5	2.7	-4.7	-2.9
Denmark	1.9	2.1	-1.5	-1.6
Germany	2.2	2.6	-0.4	-1.3
Greece	3.5	3.8	0.3	-1.6
Spain	3.6	3.5	2.2	0.4
France	2.6	2.8	1.3	-0.4
Ireland	8.2	9.0	7.3	7.3
Italy	2.1	2.5	-0.4	-3.5
Luxembourg	3.8	4.3	4.1	-3.5
Netherlands	2.7	3.0	2.8	1.0
Austria	2.8	3.0	-0.1	-2.4
Portugal	3.4	3.6	1.9	0.1
Finland	3.4	2.9	-0.5	-7.6
Sweden	2.8	3.0	0.8	-0.9
United Kingdom	1.3	2.1	1.8	-0.9

Table C: Deficit forecasts in various scenarios (in % of GDP)

	DGII own forecasts		Base Case		Economic 'Bust'		'Loss of EMU discipline'	
	1999	2000	1999	2000	1999	2000	1999	2000
Belgium	1.2	1.0	1.2	1.0	5.0	5.5	1.5	1.7
Denmark	-.2.6	-2.9	-1.9	-2.8	1.9	6.9	nr	nr
Germany	2.2	2.2	2.4	2.2	2.7	3.1	nr	nr
Greece								
Spain	1.6	1.3	1.5	1.4	2.4	3.9	2.2	2.7
France	2.3	1.9	2.5	2.3	3.0	3.9	3.6	4.2
Ireland	-3.4	-4.6	-2.0	-2.8	-1.8	-2.5	-1.3	-1.3
Italy	2.3	2.0	2.2	2.1	2.2	2.5	3.8	6.6
Luxembourg								
Netherlands	1.4	0.6	1.3	0.6	1.3	1.6	1.5	1.0
Austria	2.1	1.9	1.3	0.9	1.4	2.5	1.9	2.7
Portugal	2.0	1.8	1.7	1.6	1.7	2.2	3.5	7.5
Finland	-1.8	-2.1	-1.3	-1.6	0.5	6.7	nr	nr
Sweden	-1.4	-2.3	-1.1	-2.0	0.6	3.8	0.9	2.0
United Kingdom	-0.1	0.2	0.8	-0.0	0.9	2.7	3.7	5.4

nr:: in these cases a 'loss of EMU discipline was nor relevant due to lack of special measures in the period 1996-1998, or because the country did not join EMU.

The 'loss of EMU discipline' scenario assumes that the sum of all exceptional budgetary measures taken by Member States in the 1996-1998 period were reversed for 50 percent in 1999 and for the rest in 2000. As GDP input in this scenario we used the same GDP forecasts as in the base scenario. The country deficit projections in table 3 show that in this scenario budget deficits for many countries easily transgress the 3.0% norm. Especially Portugal, Italy, France and the UK appear vulnerable to loss of EMU discipline. For countries in which no exceptional budgetary tightening could be witnessed in the 1996-1998 period, of course no new deficit projections could be made. Finally, we would like to note that budgetary prospects for Member States are even more worrisome if the 'bust' scenario and 'loss of EMU discipline' scenario take place together. Both scenarios reinforce each other.

Limitations of the analysis

It is important to state that our research approach is 'statistical/econometrical' in nature, and that it is no substitute for full macro-economic modelling or for close budgetary policy analysis. The value of our approach, in our opinion, lies in the fact that our methodology gives a good feeling of the order of magnitude of possible budgetary developments.

Another caveat to mention is that the analysis is not optimal for budgetary categories that are not determined mostly by GDP fluctuations and own momentum. An obvious category is interest payments in which the (long term) interest rate is the main determinant.

Table of contents

1 Introduction

The present document is the final report of the study "Forecasting the amount and composition of budgetary receipts and expenditure in the Member States in order to analyse the evolution of possible budgetary deficits". The Netherlands Economic Institute has been commissioned by the Directorate General for Research of the European Parliament (Project No. IV/99/08) to carry out this study.

Aim of the study was to investigate the sensitivity of the components of government budgetary receipts and expenditures for the fifteen Member States of the European Union to:

- economic conditions (for which we take GDP as a proxy), and to
- the past values of the budgetary components themselves (i.e. what is the budgetary component's own momentum).

Based on the estimated sensitivity of the individual budgetary components, forecasts were made for the development of Member States' budget deficits for the 1999-2000 period, based on the Autumn 1998 DG-II GDP forecasts for this period. Then, with the help of two alternative scenarios, prospects and risks for EU Member States deficits were assessed. The two scenarios investigated were a 'sharp economic downturn' or **'bust'**-scenario and a **'loss of EMU discipline'** scenario, in which the exceptional measures taken by individual Member States in the 1996-1998 period to comply with the Maastricht criteria are reversed in the coming two years.

This final report will focus on presentation of the empirical results for the fifteen EU Member States. On methodology, data-collection and the choice of forecast scenarios this report will only cover essentials. For more detailed information we refer you to Appendix B and the interim report of this study.

This report is organised as follows. Background and motivation for the study are discussed in chapter 2. Chapter 3 presents an overview of the methodology, the decomposition of budgetary receipts and expenditures used and the scenario's chosen for analysing deficit developments. Chapter 4 presents the empirical results and their interpretation, first extensively for France, and then in a more standardised format for the other EU Member States. Finally, chapter 6 draws some general conclusions from our analysis.

It is important to state here, at this juncture that our research approach is 'statistical/econometrical' in nature, and that it is no substitute for full macro-economic modelling or for close budgetary policy analysis. The value of the chosen approach, in our opinion, is that the methodology gives a good feeling of the order of magnitude of possible budgetary developments.

2 Background, motivation and objective

The budgetary discipline of the individual governments of the Member States of the European Union has important effects on the European Union's economic development and monetary stability. The importance of budgetary discipline has recently become even more pronounced with the introduction of the Euro and the race of individual governments leading up to this introduction to comply with the budgetary norms set for admission to the Euro-zone. Specifically, the 3% norm for general government deficits, as set forth in the Stability and Growth Pact, has been of major importance. This norm will continue to play an important role in the Members States' public finances in the future, both as a requirement for Members in the zone and as a target for those who in the future might wish to enter EMU.

Leading up to the introduction of the Euro, the suspicion has arisen, in a number of cases, that budgetary adjustments of Member States have not led to sustainably lower budget deficits and that, again, in some cases, government budgets have, through the measures taken, become more susceptible to economic conditions. Moreover, budgetary compliance with the norms for admission to the Euro-zone has been established in a time when economic conditions were generally favourable. It is widely recognised that government deficits tend to be counter-cyclical. As a result, the economic slowdown that appears to be pending may very well push government deficits above the 3% norm.

Should such a situation arise additional fiscal policy measures need to be taken to curb expanding deficits. Such measures are painful at all times, but may be more so in the near future as in a number of EU countries fiscal policy measures taken in the period preceding the introduction of the Euro have largely eroded popular support for further measures.

However, in general it is the case that the sooner action is taken to avoid excessive deficits, the less painful measures are likely to be. Therefore, it is of some importance to be able to signal likely adverse budgetary deficit developments in advance so that preventive action can be taken. Moreover, it is important to gain insight into the broad causes of the adverse budgetary deficit developments so that measures can be targeted to have maximal impact and minimal damage.

The objective of the present study is to address these issues and by doing so help the European Parliament to better judge the budgetary situation of the EU Member States within the context of the Stability and Growth Pact.

To attain this objective the present study assesses the economic sensitivity of the various categories of government budgetary receipts and expenditure for each of the EU Member States. On the basis of estimated sensitivities future developments of fiscal deficits can then be estimated given certain scenarios, i.e. assumptions on GDP and other developments.

3 Methodology

In this chapter we present briefly the main methodological issues. First, the way sensitivity of budgetary categories is measured is addressed. Secondly, we discuss the selected decomposition of budgetary categories. Finally, we explain our choice of scenarios for assessing the prospects and risks of Member States deficits.

3.1 Transfer functions

The sensitivity of budgetary receipts and expenditure components was estimated using the well-known econometric technique of regression analysis. The regressions were performed on functions relating each budgetary component of each country to present and lagged values of GDP and to lagged values of the budget component itself.[3] The estimation of these so-called *transfer* functions can be seen as a short-cut to normal macro-economic modelling of national economies and their public finances.[4] Transfer functions are an easy method for finding out how much individual budgetary components, and the deficit of a country, fluctuate with GDP, and to what extent they are determined by their own momentum.

In the period leading up to the Third Phase of EMU the opinion has been voiced that a number of countries have taken exceptional one-off measures to improve their budgetary situation to qualify for EMU. We tested for such measures by looking if inclusion of so-called 'dummy variables' in the estimated transfer functions over the period 1996-1998 improved our estimation results. The coefficient of such a dummy variable, in a certain year, of a certain budgetary component, can be interpreted as the size of an exceptional, or EMU-induced, budgetary measure.[5]

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[3] We acknowledge that some categories of government expenditure or revenues by their nature are more directly related to other economic variables than GDP, for example interest payments are clearly strongly related to interest rates. However, choosing a single variable to measure economic conditions very clearly classifies each category of government revenue or expenditure by its degree of sensitivity to economic conditions. Moreover, the reduced form nature of transfer function methodology implies that any systematic relation between our choice of variable to measure economic conditions, i.e. GDP, and other possible relevant variables is automatically taken into account.

[4] For an extensive exposé on the transfer function methodology we refer to appendix A.

[5] The final transfer function estimated reads as follows:

$$\begin{aligned}\Delta \ln x_t &= \alpha_0 + \alpha_1 d_t^{96} + \alpha_2 d_t^{97} + \alpha_3 d_t^{98} + \\ &+ \beta_0 \Delta \ln y_t + \beta_1 \Delta \ln y_{t-1} + \beta_2 \Delta \ln y_{t-2} + \\ &+ \gamma_1 \Delta \ln x_{t-1} + \gamma_2 \Delta \ln x_{t-2}\end{aligned} \qquad \text{(equation 1b, see Appendix A)}$$

Here x_t is a particular budgetary category in a particular country in the year t in real terms, d^{96}, d^{97} *and* d^{98} are the dummy variables for the years 1996-1998, y_t is a proxy for the economic conditions (for which we take GDP), y_{t-1} and y_{t-2} are lagged values, and x_{t-1} and x_{t-2} are lagged values of the budgetary category.

3.2 The decomposition of government budgetary receipts and expenditures

The scope of the definition of government that has been used in the present analysis is that of "general government." The reason is that this is also the definition of government that is referred to in the Stability and Growth Pact.

The decomposition of general government budgetary receipts and expenditure that will be employed considers broad categories. A choice for broad categories facilitates comparison across the different EU Member States. A finer decomposition very rapidly has to deal with the added difficulty that budgetary items that appear in the accounts of one country are recorded very differently for another country or not at all.

The chosen decomposition is:

General Government Receipts

Reference name	full name	EUROSTAT classification
Direct taxes	Current taxes on income and wealth	R61
Indirect taxes	Taxes linked to production (VAT) and imports	R20
Social Security contributions	Actual social contributions	R62
Other income	Property and entrepreneurial income and accident insurance claims **plus** received subsidies and other unrequited transfers	R40 + R50 + R30 + R60 + R72

General Government Expenditure

Reference name	full name	EUROSTAT classification
Civil servant wage bill	Actual compensation of employees	R101 + R102
Net purchase of goods and services	Intermediate consumption minus sales of goods and services and production on own account	P20 – various items
Interest payments	Property and entrepreneurial income and net accident insurance premiums	R40 + R50
Subsidies	Subsidies	R30
Social Benefits	Unrequited transfers	R60
Government investment	Final capital expenditure	P40 + P70
Net Capital Transfers	Net Capital Transfers – Capital taxes received	R70 – R71 – R72 – R79

The data for these categories of government revenue and expenditure are for the largest part obtained from EUROSTAT, which publishes government accounts statistics that have been harmonised across the EU member states. The Eurostat data are available mostly up to 1996, with important gaps for several countries. For the years 1997-1998 and for some of the gaps in the data series DG II data was used.[6] In

[6] For Luxembourg a large data gap in almost all of the government budget categories remained which made regression analysis impossible. For Greece no Eurostat data at all were available, making a comparable empirical analysis for Greece also impossible

many cases the values from both sources did not correspond perfectly. Any problems have been addressed by applying the growth rate that is observed in the DG II data to available EUROSTAT figures. [7]

3.3 Scenarios for forecasting budgetary categories and deficits

For projecting the development of budgetary receipts and expenditure of the Member states we have chosen three scenarios with a high relevance for policy makers. The likelihood of any of these scenarios occurring is, however, not the subject of the research study.

As the **base case scenario** we use the GDP projections of the European Commission as published by DG II in Autumn 1998 Economic Forecasts. For this study the Spring 1999 forecasts where not yet available. The OECD GDP forecast of December 1998 where available, but it was judged that for discussion with the European Commission it was better to use the Commission's forecast as the base scenario. The OECD's December projections for GDP growth for the EU-15 for 1999 are 0.2 percentage point lower than the Commission's projections and for 2000 0.3 percentage point lower. Only in the case of Ireland was there a substantial downward adjustment of projections. Table 1 presents the GDP projections of the European Commission and the OECD.

Table 1: Base case GDP volume growth rate projections for the EU Member States

[7] Note that the fact that DG II is up to date to 1998, probably implies that at least their 1998 data, but possibly also their 1996 and 1997 data, can be considered provisional budgetary data that may be subject to future revision.

	Base Case		**Comparison**	
	DGII: Aug. 1998		OECD: Dec. 1998	
	1999	2000	1999	2000
Belgium	2.5	2.7	2.3	2.3
Denmark	1.9	2.1	2.0	1.9
Germany	2.2	2.6	2.2	2.5
Greece	3.5	3.8	3.2	3.4
Spain	3.6	3.5	3.4	3.4
France	2.6	2.8	2.4	2.6
Ireland	8.2	9.0	6.7	6.5
Italy	2.1	2.5	2.1	2.6
Luxembourg	3.8	4.3	3.4	3.5
Netherlands	2.7	3.0	2.7	2.5
Austria	2.8	3.0	2.4	2.6
Portugal	3.4	3.6	3.3	3.2
Finland	3.4	2.9	3.2	3.0
Sweden	2.8	3.0	2.2	2.4
United Kingdom	1.3	2.1	0.8	1.5
EU-15	2.4	2.8	2.2	2.5
EU-11	2.6	2.9	2.5	2.7

A second scenario to predict the budgetary categories and deficit development is a **'sharp economic downturn'** or **'bust'** scenario. Our 'bust' scenario is not based on a macro-economic model but represents the sharpest economic downturn over a two year period for the data period 1979-1998 for each of the EU member States. Table 2 presents these registered drops in GDP growth rates and subtracts them from the 1998 GDP growth estimate of DG II to arrive at the GDP volume growth rate projections in the 'bust' scenario.

Table 2: 'Bust' case GDP projections for the EU Member States

	Sharpest two year growth slowdown over last 20 years		DG II	'Bust' projections	
	year 1	year 2	1998	1999	2000
Belgium	-7.5	1.8	2.8	-4.7	-2.9
Denmark	-3.9	-0.1	2.4	-1.5	-1.6
Germany	-3.2	-0,9	2.8	-0.4	-1.3
Greece	-3.1	-1.9	3.4	0.3	-1.6
Spain	-1.6	-1.8	3.8	2.2	0.4
France	-1.8	-1.7	3.1	1.3	-0.4
Ireland	-4.1	-0.0	11.4	7.3	7.3
Italy	-2.1	-3.1	1.7	-0.4	-3.5
Luxembourg	-0.1	-7.6	4.2	4.1	-3.5
Netherlands	-1.0	-1.8	3.8	2.8	1.0
Austria	-3.3	-2.3	3.2	-0.1	-2.4
Portugal	-2.3	-1.8	4.2	1.9	0.1
Finland	-5.6	-7.1	5.1	-0.5	-7.6
Sweden	-2.2	-1.7	3.0	0.8	-0.9
United Kingdom	-0.7	-4.4	2.5	1.8	-2.6

For most Member States the years with the sharpest output growth reductions fell in the 1980-1981 and the 1990-1991 periods. While most economists will say this 'bust' case scenario will never happen, it gives us the opportunity to asses the development of budgetary categories and the deficit in a worst case situation as experienced by each individual country over the last twenty years. A 'boom' case scenario seems less relevant as most EU countries are at present not far removed from their peak in the business cycle.

The third scenario for making forecasts that we develop is the '**Loss of EMU discipline'** scenario. As described the estimated transfer functions takes into account the additional actions taken in the budgetary sphere to qualify for EMU membership by Member States. The function does this by including so-called dummy variables. For countries in which we find a significant 'Emu discipline' effect in the 1996-1998 period, in one or more of the budgetary categories, we will forecast what happens if this EMU discipline effect disappears in the 1999-2000 period. The EMU effect fades away in this scenario for 50% in 1999 and for the rest in 2000. This scenario employs the GDP forecasts of the base scenario (the DG II GDP forecasts) as GDP inputs in the transfer functions.

4 The empirical results

In this chapter we will discuss the empirical results for all fifteen EU Member States. The case of France is looked at extensively then the other countries follow in a more standardised format. For every country the discussion first focuses on the regression results of the 4 budgetary receipts categories and the 7 expenditure categories. The tables with estimation results for all countries are presented in Appendix B. Following the discussion of sensitivities, each country's deficit forecasts are presented on the basis of the scenarios discussed in the previous chapter.

It should be noted that where we speak of exceptional, EMU-induced budgetary measures we do this solely on the basis that our model identified an increase in receipts or decrease of expenditure which could not be explained form GDP movements or the budget categories own momentum. No effort has been done to corroborate these statements by scrutiny of national budgets

4.1 France

Sensitivity of budgetary categories

Appendix B, page b6 reports the estimation results for France. We first discuss the current receipts, then the current expenditure and finally the capital expenditure.

Current receipts

Firstly note that all current receipts categories behave pro-cyclical as can be seen from the positive β–coefficients in appendix B, page b6. This means that an improvement in economic conditions as measured by GDP volume growth results, *ceteris paribus*, in higher receipts. Obviously, the opposite also holds. The economic downturn that appears to be pending, can thus have important effects on the receipts side of the budget.

Second note that for the three major budgetary receipts categories, i.e. direct taxes, indirect taxes and social contributions, the GDP coefficients (the β's) sum to unity. This implies that these budgetary receipts categories eventually grow at the same pace as GDP. Given the fact that these categories constitute more than 95% of total current receipts (1995), we can safely say that French current government receipts in the long run tend to grow in tandem with GDP.

The equation for direct taxation shows signs of instability. Especially the years after 1995 do not follow the same pattern as before. The obvious interpretation is that this is due to extra effort to rake in more tax to comply with EMU. The instability is taken into account by including a dummy variable for 1997 and 1998 each. The estimated coefficients for these dummy variables suggest that direct tax revenue grew by an extra

5.6 percentage points in 1997 and by an extra 15.9 percentage points in 1998. These are quite sizeable amounts.

The coefficient for contemporaneous GDP volume growth is restricted to unity. Formal statistical tests cannot reject this hypothesis. Given its economic appeal we impose it. It implies that *ceteris paribus* direct tax receipts grow at the same pace as GDP volume. Given the absence of any additional dynamics (no lags) this holds both in the short run and in the long run.

Corporate taxes account for 16.3% of direct tax receipts in 1995. Unfortunately, the DG II data do not include this as a separate category so that we only have data up to and including 1995. Estimation results suggest that corporate tax receipts react much stronger to GDP development than other direct taxes.

For indirect tax receipts testing does not reveal any evidence for instability. However, including a dummy variable for 1996 to test for extra EMU discipline does yield a significant coefficient. The significance of this dummy is only marginal. However, the absolute magnitude of the coefficient is large in comparison to the constant term. Just like for direct tax receipts, we could not reject that the contemporaneous effect of GDP volume growth is unity for indirect tax receipts either. This restriction is imposed and has the same interpretation as for direct tax receipts.

Social security contributions also have a long run GDP elasticity of unity since the coefficient of contemporaneous and one year lagged GDP volume growth sum to unity. Surprisingly, in the period leading up to the introduction of the Euro the French government has received less than expected social security contributions. This is witnessed by the dummies for 1997 and 1998. Their coefficients indicate that social security contributions growth was lower by 3.1 percentage points in 1997 and by 10.0 percentage points in 1998 relative to what could be expected in the basis of behaviour in other years. [8]

Finally, other current income is an amalgam of highly different categories, which together still amount to less than 5% of current receipts. The amalgam-character accounts for the rather diffuse set of estimated coefficients that do not have a very clear interpretation.

Current expenditure

For current expenditure categories little evidence for structural instability of the equations exists. Additionally, only in one case, Subsidies in 1996, did any EMU convergence effect appear present. However, the suspicion arises that the inclusion of this dummy variable is only due to some problems with the data, especially regarding the correspondence between DG II and EUROSTAT data.

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[8] A possible interpretation is that, given the higher than expected direct tax revenues some switching from social security contributions to income tax took place..

Also note that current expenditure categories generally have a much stronger own momentum than current receipts categories. This implies that any rise of the budget implies the danger of a lock-in of expenditure. In economic down-turns this implies that, whereas receipts start falling in tandem with GDP, expenditure, driven by its much stronger own momentum will remain high for a while. Hence, the deficit, at least temporarily, rises.

Other salient findings include:

- Although for the civil servant wage bill the long run GDP elasticity is unity, the response of the wage bill to changes in GDP volume growth are slow.

- Interest payments react strongly to lagged GDP volume growth. This is not a priori obvious. A possible explanation that accounts for this and one that highlights the reduced form nature of the equation chosen, is that apparently interest rates react with a lag to developments in GDP. In addition, interest payments have important own dynamics.

- Net purchase of goods are not affected by GDP volume growth.
- ▲ Current transfers are counter-cyclical and have a cyclical response pattern. Social benefits are weakly counter-cyclical and subsidies strongly counter-cyclical.

Capital expenditure

The strongest evidence of EMU convergence adjustment on the expenditure side for France is in government investment. For three consecutive years (1996-98) has the French government decreased the growth rate of its investment expenditure by 4.6 percentage points. This amounts to a total EMU investment expenditure growth slowdown of 13.8 percentage point. Investment spending as a share in GDP dropped during those years from 3.2% in 1995 to 2.8% in 1998 accounting for a quarter of the drop in the deficit-GDP ratio in France.

Scenarios and deficits

In this chapter we analyse the implications of the estimation results of the previous chapter for the development of the government deficit of France. Table 4 reports the development of the government deficit as a percentage of GDP for four different scenarios. The first concern the forecasts of DG II itself. The other three are scenarios that have been projected with the model that was developed in the previous chapters. Note that for the years 1996-1998 the reported figures in the base scenario are EUROSTAT deficit figures. These are consistently higher than DG II figures throughout this period. This must be taken into account when interpreting any differences between our projections and DG II's.

The scenarios have been discussed in paragraph 3.3. One extra word about the reversal of EMU discipline scenario is in order, however. This scenario has been generated by subtracting 50% of the sum of the 1996-1998 EMU dummies from the growth rate for 1999 and 50% from the growth rate of 2000. The interpretation is that the EMU discipline wanes in two years time. This has not been applied to Subsidy expenditure because we feel that the 1996 dummy for this variable reflects only a data problem. In the reversal of EMU discipline scenario GDP growth has been set to that of the base scenario.

Government deficit as percentage of GDP for France

	1996	1997	1998	1999	2000
DG II	4.1	3.0	2.9	2.3	1.9
Base scenario	4.8	3.6	3.1	2.5	2.3
Bust scenario	4.8	3.6	3.1	3.0	3.9
Reversal of EMU discipline scenario	4.8	3.6	3.1	3.6	4.2

Taking into account the difference for observed years, our base scenario projections are by and largely consistent with the projections of DG II. This enhances confidence in our model.

The bust scenario projects what happens if French GDP volume growth drops to 1.4% in 1999 and to –0.4% in 2000. We see that this immediately results in problems for the French government to comply with EMU norms. Even allowing for generally lower DG II figures will still result in a deficit that is in excess of 3% of GDP in 2000.

The gradual waning of EMU discipline has much worse consequences, however. If 50% of the measures taken in the years 1996-1998 are reversed, the French government will already in 1999 run into EMU trouble. For the year 2000 problems are even more severe.

Of course an economic bust will make it less likely for any government to adhere to strict budgetary discipline. Hence, if the bust scenario becomes reality, it is not unlikely that EMU discipline fades a bit two. These two scenarios reinforce each other and the Stability and Growth Pact criteria are out the window.

4.2 Austria

Estimation

For the largest part the dependence structure on GDP of current receipts of the Austrian government is simple and remarkably uniform. For all categories, the growth of receipts is affected by lagged GDP volume growth. In addition a negative dependence on the own past is estimated. The latter suggests that the initial response overshoots the long run response. Note that for all receipts categories the long run response to GDP has an elasticity that is close to unity.

The pattern for current expenditure categories is more varied. Social benefits and subsidies do not appreciably depend on GDP developments. Interest payments are strongly pro-cyclical albeit one year lagged. Purchase of goods is counter-cyclical, also one year lagged. The effect of GDP developments on wage payments is mixed with an initial downward response, followed by an equally large upward response. The long run response is zero. In addition, wage and interest payments and subsidies are significantly driven by their own momentum.

Government investment expenditure is strongly pro-cyclical and has a short reaction time. Finally, net capital transfers react negatively to GDP growth but have a very diffuse temporal pattern.

Given the strongly pro-cyclical character of receipts and the mixed results for expenditures, deficit is expected to be counter-cyclical.

Extra policy effects for 1996-1998 are detected for all expenditure categories with the exception of interest payments and purchase of goods and services. In all cases the sign of the extra policy effect conforms to what would be expected if it concerned EMU convergence policies. No such effects could be detected for the receipts categories.

Scenarios and deficits

In this section we analyse the implications of the estimation results of the previous section for the development of the government deficit of Austria. The table below reports the development of the government deficit as a percentage of GDP for the four different scenarios discussed earlier. Note that for the years 1996-1998 the reported figures in the base scenario are EUROSTAT deficit figures augmented using DG II growth estimates. For Austria these are consistently and substantially lower than DG II figures throughout this period. This must be taken into account when interpreting any differences between our projections and DG II's.

Government deficit as percentage of GDP for Austria

	1996	1997	1998	1999	2000
DG II	4.0	2.5	2.3	2.1	1.9
Base scenario	3.8	1.6	1.4	1.3	0.9
Bust scenario	3.8	1.6	1.4	1.4	2.5
Reversal of EMU discipline scenario	3.8	1.6	1.4	1.9	2.7

Our base scenario projects a slowly declining budget deficit for Austria in 1999 and 2000. This is in line with the projections of DG II. The difference between our base case projections and DG II's projections remains more or less the same as for the observed period 1996-1998.

In the bust scenario the Austrian economy is projected to contract sharply. In 1999 GDP volume growth shrinks to –0.1% and in 2000 it shrinks –2.4%. Despite this very adverse development, the government budget deficit's response in 1999 is almost negligible. In 2000 it is quite substantial. However, in comparison to the economic contraction the budgetary response is still quite limited.

The empirical analysis has shown that the Austrian government has taken additional measures in 1996-1998 to comply with EMU. These measures mainly have had there effect on the wage bill, subsidies and social benefits and investment. Reversing these measures in two years yields a quite sharp deterioration of the budget deficit. In 2000 it is projected to reach 2.7%.

4.3 Belgium

Estimation

Analogous to the results for Austria, the dependence of receipts categories on GDP volume development has a relatively uniform and simple structure: For the most recent years all receipts categories depend solidly on contemporaneous GDP growth, with some additional own momentum. In all cases the long run response elasticity to GDP is unity.

Expenditure categories exhibit a much stronger dependence on their own past and a diffuse reaction to GDP. Wage and interest payments both react positively to GDP. Surprisingly social benefits do so as well. Hence, apparently for Belgium social benefits payments are pro-cyclical. This is a counter-intuitive result. Net purchase of goods and services responds negatively to GDP volume developments. Subsidy disbursements exhibit a mixed pattern.

Belgian government investment spending is strongly counter-cyclical. This points to Keynesian use of government investment policy in Belgium. Net capital transfers show a mixed and diffuse pattern.

For Belgium additional EMU convergence measures are apparent in indirect tax receipts. The growth rate was raised by 4.5 percentage points in 1996. Additionally, measures were taken that limited the growth of wage payments. The extra effort reduced wage payment growth by 2.1 percentage points in 1996, 1997 and 1998. These cutbacks are balanced by higher than normal growth of purchases of goods and services in 1997 and 1998.

Scenarios and deficits

Like before, we analyse the implications of the estimation results by looking at the effects of economic growth scenarios on the budget deficit in 1999 and 2000. The results are reported in the table below.

Government deficit as percentage of GDP for Belgium

	1996	1997	1998	1999	2000
DG II	3.2	2.1	1.7	1.2	1.0
Base scenario	2.9	2.0	1.7	1.2	1.0
Bust scenario	2.9	2.0	1.7	5.0	5.5
Reversal of EMU discipline scenario	2.9	2.0	1.7	1.5	1.7

The results of the base scenario compare excellently with realised and projected figures of DG II and predict a healthy development of the Belgian budget deficit down to 1.0% of GDP in 2000.

Under the bust scenario the Belgian economy is projected to contract very strongly. In 1999 the GDP growth projection is –4.7% and in 2000 it is –2.9%. Given this very adverse scenario, in fact with the exception of Finland it is the worst of all EU countries, it comes as no surprise that the budget deficit will also be severely affected. It is projected to rise to an unacceptable 5.0% in 1999 and to an even worse 5.5% in 2000. Note, however, that the worsening of the budget deficit per percentage point GDP growth decline is only 0.5% of GDP in 1999 and 0.8% of GDP in 2000. These are average responses compared to other EU countries so that the conclusion must be that the very poor performance of Belgium in the bust scenario is mainly due to the strong economic contraction projected that was based on Belgium's severe recession in the years 1981-1982.

The Belgian government has taken certain measures that have affected the budgetary categories in 1996-1998 beyond what could have been expected based on the experience in other years. In particular these have negatively affected wage payments to Belgian civil servants and positively affected indirect tax receipts and purchase of goods and services. This latter effect cannot, however, be interpreted as an attempt to comply with EMU norms. Since part of the rise in indirect tax receipts may have been motivated to balance the rise in spending on goods and services, a fair treatment of Belgian policy measures in 1996-1998, requires that in our 'loss of EMU discipline' scenario we reverse them all. The results indicate that a reversal of EMU discipline has only limited effects and that no danger is present that EMU norms will be violated in this scenario.

4.4 Denmark

Estimation

When interpreting the Danish results two things should be kept in mind. The first is that ever since 1985 the Danes have had little budgetary problems, experiencing only small deficits or even surpluses. The second is that the Danes said 'nej' to the Euro. Therefore the Danish government did not have any obligation to conform to the convergence criteria.

Nevertheless, the empirical results indicate that some significant changes have taken place in the Danish budget in recent years. Although it is possible that the Danish government had a desire to be prepared for a rapid joining of the Euro-zone, this is not the most plausible motivation for these observations. Keeping in mind that the Danish total budgetary burden is among the highest in the EU – only topped by Sweden – it is much more plausible that the Danish government simply wanted to reduce this burden. This is borne out by the fact that the empirical results show that the main source of income for the Danish government, i.e. direct taxes, grows at significantly reduced growth rates during the period 1995-1998. This has resulted in a fall of the direct tax burden in Denmark from 31.8% of GDP in 1994 to 30.3% of GDP in 1998.

Our results indicate that the reduction of the government receipts burden is accompanied by simultaneous changes on the expenditure side. The reduction of social benefits most likely serves to match the reduction in receipts. On the other hand government spending on wages and salaries of its employees rise. Although the balance of the reduction of social benefits growth and the acceleration of wage spending growth is still negative (0.8% extra reduction of spending growth at 1994 shares) this is not nearly enough to match the reduction in receipts growth (3.4% in 1995-97 and 6.0% in 1998). The favourable development of the budget deficit, which even turned into a surplus in 1997 and 1998, must therefore be mainly attributed to:

(i) The favourable development of the economy. The strongly pro-cyclical character of all receipts categories, the counter-cyclical character of two main categories of current spending and the strong economic performance of 1995-98 has helped to increase current receipts by 16.9% and current spending by only 9.4%. GDP grew by 22.1% over the same period.

(ii) The large reduction in government investment spending growth that occurred in 1998.

(iii) The reduction in the level of net capital transfers. After having been positive (net expenditure) for many years, net capital transfers turned negative (net receipts) in 1995 and have remained negative since then.

Scenarios and deficits

The implications of the estimation results of the previous section for the development of the government deficit of Denmark are reported in the table below.

Government deficit (+) or surplus (-) as percentage of GDP for Denmark

	1996	1997	1998	1999	2000
DG II	0.7	-0.7	-1.1	-2.6	-2.9
Base scenario	0.4	-0.9	-1.3	-1.9	-2.8
Bust scenario	0.4	-0.9	-1.3	1.9	6.9

Given the fact that Denmark is not part of the Euro zone and budgetary measures in 1996-1998 can thus hardly be attributed to EMU discipline, the "reversal of EMU discipline" scenario is not relevant for Denmark and is not reported.

The base scenario exhibits some differences with the figures and projections reported by DG II. Nevertheless, for 1999 both DG II and our base scenario forecast that the Danish government surplus rises further at an accelerated pace. For 2000 both projections are very similar.

The bust scenario projects that the Danish economy will contract by 1.5% and 1.6% in 1999 and 2000, respectively. The response of the budgetary balance is enormous showing that the Danish budget deficit is highly counter-cyclical. The Danish public deficit will have grown from –1.3% of GDP in 1998 to +6.9% of GDP in 2000.

4.5 Finland

Estimation

With the exception of other current income, Finnish current receipts categories respond to GDP developments strongly and pro-cyclically, with a little bit of correction on the initial response as witnessed by the negative own momentum effects.

The response of subsidy and social benefits disbursements to GDP developments clearly shows counter-cyclical characteristics as well as a strong own momentum, as expected. The purchase of goods and services as well as wage payments to civil servants are strongly positively affected by two year GDP growth. Like the receipts categories both also show some evidence of overshooting as witnessed by the small negative own momentum coefficients. Interest payments are markedly counter-cyclical and overshoot as well.

Finnish government investment is strongly pro-cyclical, but reacts with a lag of two years. In addition, a tendency exists for investment to correct on the initial response. For net capital transfers no systematic effect of GDP development could be detected.

For Finland some exceptional developments in several budgetary categories took place during 1996-1998. On the expenditure side the Finnish government decreased the spending on civil servants' wages and its purchases of goods and services. On the receipts side this was balanced by a simultaneous reduction of social security contributions and other current income. The exceptional pattern for these categories is

better explained as an attempt by the Finnish government to lower the overall public burden on the economy and not as being the result of EMU discipline.

Scenarios and deficits

The implications of the estimation results of the previous section for the development of the government deficit of Finland are reported in the table below.

Government deficit as percentage of GDP for Finland

	1996	1997	1998	1999	2000
DG II	3.3	0.9	-0.3	-1.8	-2.1
Base scenario	2.5	0.1	-1.1	-1.3	-1.6
Bust scenario	2.5	0.1	-1.1	0.5	6.7

For the observed years 1996-1998 our data are slightly different from DG II's data. This must be kept in mind when interpreting the outcomes of the scenario analyses. Despite the differences, both the base scenario and DG II's figures and projections show a steady growth of the Finnish budget surplus.

The bust scenario projects a disastrous development of GDP volume for Finland in 1999 and 2000, matching the GDP contraction of 1990-1991. This results in an equally disastrous development of the Finnish government deficit. It is projected to rise to 6.7% of GDP in 2000 and thus will bring considerable problems for Finland to comply with EMU.

4.6 Greece

For the Greek government accounts no data at all are available in EUROSTAT. This precludes empirical analysis that is comparable to that for the other countries and no analysis results will be presented. The impossibility of carrying out the empirical analysis for Greece prevents simulation of scenarios.

4.7 Germany

Estimation

For the interpretation of the estimation results for Germany it should be noted that the data used for estimation concern West Germany for the period up to and including 1990. For 1991 and later the data concern unified Germany. The fall of the Berlin wall, however, took place in 1989 and actual formal unification itself took place on 3 October

1990. It comes therefore as no surprise that in many instances it was necessary to include a dummy variable for 1989, 1990 or 1991.

On the other hand, the unification of Germany presents a unique opportunity in the sense that it generates a well-documented degree of variation in the data that is usually not available. In as far as government policies were not affected by the unification, this allows for very precise estimation. The idea is that if the equation can track the large shifts in both GDP and the budgetary category following unification, this lends a measure of credibility to the estimate.

Direct tax receipts react to contemporaneous GDP volume with a highly significant elasticity of 1.44. This implies that German direct tax receipts are strongly pro-cyclical. A one percent increase in GDP volume growth results in an immediate growth acceleration of direct tax receipts by 1.44%. In the convergence years 1996 and 1997 direct tax receipts growth was decelerated by 6.4%. This can hardly be explained as attempts to conform to the convergence criteria since *ceteris paribus* these measures only widen the deficit.

Indirect taxes behave clearly pro-cyclically as well with a coefficient of +1.08 on contemporaneous GDP volume growth.

In 1998 measures were taken that shifted social security contributions down by 2.1% from what they would have been at unchanged policies. Just like the downward shift of direct tax receipts, this cannot be connected to the convergence for the Euro. It is much more likely that this is related to the general elections that took place in Germany in 1998.

The responsiveness of social security contributions to GDP volume is limited: the elasticity of 0.35 is rather small and the effect is reversed after a year. Hence, social security legislation in Germany is such that a change in the GDP volume growth rate will only have a small and temporary effect on social security contributions. In the long run no appreciable effect of GDP growth on social security contributions could be detected.

Other current income reacts strongly positively to one year lagged GDP growth, with a hint of overshooting as witnessed by the small negative coefficient of lagged growth of other current income.

The initial response to an acceleration of GDP growth of wage payments, interest payments and purchase of goods and services is positive. For wage payments, the positive own momentum implies that the initial effect will be felt in subsequent years as well. However, for interest payments and the purchase of goods and services the initial effect is offset by a negative response one or two years later. In addition, especially for purchase of goods and services, a mixed and unstable own momentum results in a very diffuse response pattern after the initial reaction.

Subsidy and social benefit disbursement are clearly counter-cyclical as expected. The own momentum of these categories is minor.

Government investment is strongly pro-cyclical as borne out by its large positive coefficient on contemporaneous GDP growth. The coefficient of 0.44 on lagged investment growth implies that the response to GDP developments is persistent. Net capital transfers initially react procyclically to GDP developments. However, this effect if more than reversed after two years.

During the period 1996-1998 the German government has taken extra policy measures that have budgetary effects that fall outside previously established patterns. Direct tax receipts, social security contributions exhibit, interest payments and subsidy disbursements all show a deceleration of growth during this period. Net capital transfers grew more than normal in 1998. The whole of these measures does not in particular seem to be targeted at German compliance with the EMU convergence criteria. Instead other forces have been at work. The only real "EMU effect" seems to be a lowering of the interest payments.

Scenarios and deficits

The implications of the estimation results of the previous section for the development of the government deficit of Germany are analysed using scenario analysis. The results are summarised as the deficit to GDP ratio and reported in the table below.

The figures and projections of our base scenario conform remarkably close to the figures and projections of DG II. The base scenario for Germany shows a steady decline of the deficit to 2.2% of GDP in 2000.

In the bust scenario the German economy shrinks by 0.4% in 1999 and by 1.3% in 2000. Under these adverse conditions, our analysis shows that the German deficit will be higher than under the base scenario. In 2000 the German deficit is projected to violate the 3% criterion. Despite this unfortunate conclusion, we feel that the German budget is only weakly counter-cyclical.

Government deficit as percentage of GDP for Germany

	1996	1997	1998	1999	2000
DG II	3.4	2.7	2.5	2.2	2.2
Base scenario	3.5	2.9	2.8	2.4	2.2
Bust scenario	3.5	2.9	2.8	2.7	3.1
Reversal of 1996-1998 policies	3.5	2.9	2.8	1.8	1.1

We analyse a scenario in which the whole of additional policies during 1996-1998 is reversed. As mentioned above, this scenario cannot be interpreted as purely the reversal of EMU discipline. This is also borne out by the results. We see that a reversal

of all 1996-1998 additional policy measures (direct taxation, social security contributions, interest payments, subsidies and net capital transfers) during 1999-2000 actually improves the government deficit.

4.8 Ireland

Estimation

Irish tax receipts and social security contributions are all clearly pro-cyclical. The magnitude of the responses are, however, not particularly strong as witnessed by the moderate values for the coefficient on GDP growth. The response pattern of other current income is more complicated. The initial response is positive, but is fully reversed in the subsequent two years. The long run effect of GDP on other current income is not significant.

Subsidy and social benefits disbursements are both counter-cyclical as expected and react promptly to changes in GDP growth. Note that the response of social security disbursements is quite small. The own momentum for these two spending categories is limited. Net purchase of goods and services and interest payments are both strongly pro-cyclical. The civil servant wage bill is counter-cyclical.

Government investment is found to be pro-cyclical. It reacts positively to GDP developments with a lag of a year. Note, however, the large negative coefficient on lagged government investment implies that the initial effect vanishes quickly. Government net capital transfers exhibit a mixed response to GDP growth. The initial reaction is positive. However, after two years no significant effect remains.

Evidence for effects of additional policy measures on the budget in 1996-1998 is limited. Only for social security contributions and interest payments could significant effects be found. Both are negative. For interest payments this can be interpreted as being due to EMU. The lowering of social security contributions in 1996 cannot be interpreted in that way since such an effect only widens the deficit.

Scenarios and deficits

The implications of the estimation results of the previous section for the development of the government deficit of Ireland are reported in the table below.

Government deficit as percentage of GDP for Ireland

	1996	1997	1998	1999	2000
DG II	0.4	-0.9	-1.1	-3.4	-4.6
Base scenario	0.1	-1.4	-1.5	-2.0	-2.8
Bust scenario	0.1	-1.4	-1.5	-1.8	-2.5
Reversal of EMU discipline scenario	0.1	-1.4	-1.5	-1.3	-1.3

For the observed years 1996-1998 our figures show a stable difference with DG II's figures. For 1999 and 2000 the base scenario suddenly deviates much more from DG II's figures. Or base scenario predicts a much less enthusiastic rise of Ireland's fiscal surplus.

The effect of a bust on the Irish government deficit is limited. It only slows down the growth of the surplus a little bit. One has to keep in mind, that the "bust" scenario for Ireland still implies GDP volume growth rates of 7.3% in 1999 and 2000. These growth figures constitute a bust compared to Ireland's extremely buoyant economic growth in 1998.

For the reversal of EMU discipline scenario, we only consider reversing the measures that have resulted in the large growth deceleration of interest payments. Reversing only these has a sizeable negative impact on the evolution of the Irish government deficit. However, there is not threat whatsoever that Ireland violates the EMU government deficit criterion.

4.9 Italy

Estimation

Italy's tax receipts and social security contributions are decidedly pro-cyclical as expected. What is surprising about the results for these categories for Italy, is the long response lag. Direct tax receipts react with a lag of one year to GDP developments. Indirect tax receipts and social security contributions lag GDP developments by two years. As usual other current income is the odd one out on the receipts side of the budget: for Italy it responds to GDP developments within a year and counter-cyclically.

Wage and interest payments are both pro-cyclical with a limited own momentum. Subsidy disbursements' response to GDP developments is negative as expected, albeit with a lag of one year. However, this effect almost completely is reversed after two years. Purchase of goods and services and social benefits disbursements are both counter-cyclical.

Note that Italy is a bit out of the ordinary in the sense that the own momentum of receipts categories is more important than the own momentum of current expenditure categories.

Government investment is pro-cyclical. Net capital transfers do not respond to GDP developments. They also appear not to have any own momentum. This suggests that this category is almost entirely at the discretion of policymakers.

The Italian government has achieved Euro convergence criteria mainly by adjusting the long run interest rate. Given the large public debt of Italy, this significantly reduces the

debt servicing burden for the Italian government. These measures do not show up in the sensitivity of budgetary categories for GDP volume developments that is investigated in the present analysis. It does show up as unaccounted for lowering of interest payments in the convergence years. Note that a rising long term interest rate will largely erode the progress made regarding the Italian government deficit. In the next sub-section the effect of a rise in this long term interest rate is investigated in the reversal of EMU discipline scenario. For the Italian case this scenario effectively means that the long term interest rate is gradually brought back to its pre-convergence level.

Finally, note the sizeable down-scaling of net capital transfers that occurred in 1997.

Scenarios and deficits

The implications of the estimation results of the previous section for the development of the government deficit of Italy are reported in the table below.

Government deficit as percentage of GDP for Italy

	1996	1997	1998	1999	2000
DG II	6.7	2.7	2.5	2.3	2.0
Base scenario	6.7	3.0	2.8	2.2	2.1
Bust scenario	6.7	3.0	2.8	2.2	2.5
Reversal of EMU discipline scenario	6.7	3.0	2.8	3.8	6.6

The figures and projections of our base scenario conform remarkably close to the figures and projections of DG II. The base scenario for Italy highlights its narrow compliance with EMU. Our projections indicate a steady decline of the deficit to 2.1% of GDP in 2000.

In the bust scenario Italy's budget deficit is hardly affected. However, as the regression results indicate, the categories of the Italian government budget respond slowly but significantly to GDP. As a result, the deficit is expected to worsen significant after 2000 as response to the bust scenario. We have calculated the deficit for 2001 for Italy using the actual 1998 GDP growth for the year 2001. The result is that for 2001 the Italian deficit will gave grown to 3.3% of GDP despite a major improvement of economic growth in 2001 compared to 2000. Nevertheless, the Italian government budget deficit remains among the least sensitive among the EU member states.

For the reversal of EMU discipline for Italy, we only consider a reversal of the effects of the strong decline of interest payments since this appears to have been the main factor in the Italian policy adjustments towards EMU. The results is quite devastating with the deficit shooting sharply upward to 3.8% of GDP in 1999 and 6.6% of GDP in 2000.

4.10 Luxembourg

Estimation

The availability of data for the government budget of Luxembourg, or rather the lack thereof, prevent useful empirical analysis. With the exception of taxation EUROSTAT reports budgetary categories for Luxembourg until 1987. DG II has some additional figures for 1996-1998. However, for most budgetary categories no data are available for the period 1988-1995. This gap prevents regression analysis. The empirical analysis can also not be carried out for more aggregated totals like total receipts, total expenditure or the deficit because the same problem applies there.

Scenarios and deficits

The impossibility of carrying out the empirical analysis for Luxembourg prevents simulation of scenarios. We have the strong suspicion, however, that Luxembourg will experience little trouble complying with the EMU general government deficit norm under any of the scenarios. The main motivation for this suspicion is that available data on net government lending show that the Luxemburgian government actually has consistently run a surplus since 1983. If Luxembourg runs into trouble, everybody else will too.

4.11 The Netherlands

Estimation

With the exception of social security contributions, all budgetary receipts' categories for the Netherlands react particularly strongly to GDP developments, are pro-cyclical and have very little own momentum. Social security contributions, however, are almost entirely driven by their own momentum.

Wage payments and purchase of goods and services of the Dutch government are both pro-cyclical. Interest payments show a 'humped' reaction to GDP developments: in the first year the effect is negative, in the second year it is positive and in the third year it is negative again. In the long run no appreciable effect of GDP developments on Dutch government interest payments is present. Social benefits disbursements are counter-cyclical as expected. Subsidy disbursements on the other hand are almost entirely driven by their own momentum.

Government investment is pro-cyclical and has important own dynamics. The latter are absent for net capital transfers that do exhibit a humped pattern similar to the pattern found for interest payments.
For only one category could budgetary effects of additional measures in the period 1996-1998 be detected. This category is indirect tax receipts, which were higher than expected by 3.6% in 1996.

Scenarios and deficits

The implications of the estimation results of the previous section for the development of the government deficit of The Netherlands are reported in the table below.

Government deficit as percentage of GDP for The Netherlands

	1996	1997	1998	1999	2000
DG II	2.3	1.4	1.6	1.4	0.6
Base scenario	2.5	1.7	1.7	1.3	0.6
Bust scenario	2.5	1.7	1.7	1.3	1.6
Reversal of EMU discipline scenario	2.5	1.7	1.7	1.5	1.0

The base scenario tracks the DG II projection quite well and shows a steady decline of the deficit to 0.6% of GDP in 2000.

The bust scenario simulates the effects on the government budget when economic growth in The Netherlands reduces to 2.7% in 1999 and to 1.0% in 2000. Note that for 1999 no differences occur between the base and bust scenario because the economic development is the same for that year. The bust scenario does deviate importantly from the base scenario in 2000. We see this reflected in a rise of the deficit.

The reversal of EMU discipline has only limited effects and only slows down the fall of the deficit a little bit. This is due to the fact that very little evidence was found for the Netherlands of additional policy measures in 1996-1998. Only for indirect tax receipts a small growth acceleration took place in 1996. This is the only measure that is reversed.

4.12 Portugal

Estimation

Direct tax receipts and social security contributions for Portugal are strongly pro-cyclical with some evidence of overshooting. The response of indirect tax receipts and other current income to GDP developments is initially positive. However, one year after the initial response it is entirely or almost entirely reversed leaving no appreciable long run effect. For all receipts categories the own momentum is only moderate in magnitude if at all present.

Subsidy and social security contributions both respond negatively to GDP developments as expected. These categories do not have appreciable own momentum for Portugal. Interest payments are strongly counter-cyclical with unimportant own

dynamics. The response of net purchase of goods and services is initially negative. This reverses one year later leaving no lasting effect. Own momentum is quite important for Portuguese material government consumption. Wage payments are strongly pro-cyclical.

Portuguese government investment reacts strongly to GDP developments. A one percentage point growth acceleration of GDP volume leads to a 2.46 percentage points growth acceleration of government investment in the same year. One year later government investment will accelerate by a further 2.90 percentage points. Two years after the initial growth acceleration, government investment decelerates again by 3.30 percentage points. Over these three years therefore the total growth acceleration of government investment is 2.05 percentage points.

The Portuguese government has taken quite a number of policy measures that have had additional budgetary effects in 1996-1998. All of these concern current expenditure and affects all categories of current expenditure. With the exception of net purchase of goods and services all current expenditure categories underwent cut backs in 1996-1998 and can thus be interpreted as EMU criteria compliance measures.

Scenarios and deficits

The implications of the estimation results of the previous section for the development of the government deficit of Portugal are reported in the table below.

Government deficit as percentage of GDP for Portugal

	1996	1997	1998	1999	2000
DG II	3.2	2.5	2.2	2.0	1.8
Base scenario	3.2	2.4	2.0	1.7	1.6
Bust scenario	3.2	2.4	2.0	1.7	2.2
Reversal of EMU discipline scenario	3.2	2.4	2.0	3.5	7.5

Our base scenario projects a slightly faster decline of the Portuguese budget deficit than DG II. The bust scenario shows very little effect of the bust in 1999, but a marked increase in the deficit in 2000. The weak response in 1999 is due to the fact that all the larger categories of the budget do not respond to contemporaneous GDP developments. The main expenditure category reacts with a lag of two years and the taxation and social security contributions with a lag of one or two years.

This also implies that the effect that is visible for 2000 is mainly based on economic developments in 1998 and 1999. The worst part of the bust is in 2000 when GDP growth will come to a virtual stop. This will have its main effect on the budget in 2001 and 2002. We have analysed what happens to the Portuguese budget deficit if after the bust in 1999 and 2000 GDP growth resumes at its 1998 level for 2001 and 2002. Despite hypothesised favourable economic conditions in those years, the budget deficit will

rise spectacularly to 4.3% of GDP in 2001 and 5.7% of GDP in 2002. This clearly illustrates the slow response of the Portuguese budget: the economic bust of 1999-2000 has its main effect in 2001-2002.

The reversal of EMU discipline scenario for Portugal reverses the effects of all measures that have affected the budget in 1996-1998 and includes the reversal of the rise of government material consumption. The projected deficit development is disastrous and leads to a deficit of 7.5% of GDP in 2000. The Portuguese government is thus well advised to stick to the measures taken in 1996-1998.

4.13 Spain

Estimation

Direct tax receipts react strongly positively to GDP developments. The reaction pattern is however rather diffuse and complicated by the presence of important own momentum. The pattern for indirect tax receipts is more clear cut: it reacts positively to contemporaneous GDP growth with an elasticity of 0.81 with almost negligible own momentum. Almost the same holds for social security contributions. The main difference is that it reacts to lagged GDP growth instead of contemporaneous GDP growth. Other current income has again a very diffuse response pattern. Note that GDP developments have no appreciable lasting effect on other current income.

Spain's government wage and interest payments as well as its purchase of goods and services all respond to GDP growth accelerations by decelerating in the same year and accelerating one year later. Purchase of goods and services are further characterised by important own momentum dynamics. Contrary to expectations both subsidy and social disbursements are pro-cyclical. Spain is the only EU country for which this was found.

Government investment is strongly pro-cyclical albeit with a lag of two years. Net capital transfers are weakly counter-cyclical.

The Spanish government has taken some additional measures to ensure Spain's accession to EMU. These additional measures have mainly had their effect on the purchase of goods and services, social benefits disbursements, government investment and net capital transfers. All effects are downward implying that the Spanish government has realised important cutbacks on the categories mentioned.

Scenarios and deficits

The implications of the estimation results of the previous section for the development of the government deficit of Spain are reported in the table below.

The projection for our base scenario matches the projections made by DG II. The projections indicate continued decline of the Spanish government deficit in 1999 and 2000 to a level of 1.4% of GDP.

Government deficit as percentage of GDP for Spain

	1996	1997	1998	1999	2000
DG II	4.6	2.6	2.2	1.6	1.3
Base scenario	4.7	2.6	2.0	1.5	1.4
Bust scenario	4.7	2.6	2.0	2.4	3.9
Reversal of EMU discipline scenario	4.7	2.6	2.0	2.2	2.7

The analysis shows that this favourable deficit development can easily be thrown off course. Under the bust scenario the Spanish economy is projected to grow at 2.2% in 1999 and 0.4% in 2000. This is by no means an excessive growth deceleration compared to other countries. Still the budget deficit is seen to instantly start growing again. In 2000 it is already well in excess of the 3% boundary.

The extra budgetary measures that were taken by the Spanish government for compliance with EMU criteria have had only very limited detectable effects on the actual budget. In fact only the purchase of goods and services and spending on social benefits show any signs of additional measures. Reversing these effects results in a limited rise of the budget deficit in 1999. In 2000, however, the budget deficit is projected to come close to the 3% boundary.

4.14 Sweden

Estimation

Swedish tax receipts and social security contributions are all estimated to be pro-cyclical. For direct tax receipts a particularly simple response pattern was found with direct tax receipts reacting only to contemporaneous GDP growth. Indirect tax receipts react to contemporaneous and one year lagged GDP growth. Social security contributions react to contemporaneous, one year lagged and two years lagged GDP growth. In addition social security contributions are characterised by important own dynamics that further complicate its reaction pattern.

Other current income is counter-cyclical, reacts with a lag of two years and has very significant own dynamics that ensure a very protracted saw-tooth response pattern.

As for most EU countries and conforming to expectations, subsidy and social benefits disbursements are counter-cyclical. For Sweden only subsidy disbursements show some evidence of own dynamics. Interest payments and purchase of goods and

services are counter-cyclical with some own dynamics. Government wage payments are pro-cyclical.

Government investment reacts very strongly positively to contemporaneous GDP developments. However, the initial reaction is reversed in the subsequent two years leaving no appreciable lasting effect. Net capital transfers are counter-cyclical.

Despite not wanting to enter into EMU, the Swedish government did take measures in 1996-1998 that have had additional effects and, by the direction of their effects, could all be interpreted as EMU criteria compliance measures. The measures include reductions in subsidies, social benefit disbursements and government investment.

Scenarios and deficits

The implications of the estimation results of the previous section for the development of the government deficit of Sweden are reported in the table below.

Government deficit as percentage of GDP for Sweden

	1996	1997	1998	1999	2000
DG II	3.5	0.8	-0.5	-1.4	-2.3
Base scenario	3.6	0.8	-0.3	-1.1	-2.0
Bust scenario	3.6	0.8	-0.3	0.6	3.8
Reversal of EMU discipline scenario	3.6	0.8	-0.3	0.9	2.0

The projection for our base scenario predicts a further rise of the Swedish budget surplus in 1999 and 2000. The pace at which this is projected to occur is, however, slightly slower than projected by DG II.

Under the bust scenario the Swedish economy is projected to grow at 0.8% in 1999 and contract by 0.9% in 2000. As a result of this the Swedish government balance is projected to slide into a deficit again. Only modest in 1999, but substantial and in excess of the 3% boundary in 2000.

Although Sweden is not part of the Euro zone, evidence was found for additional measures taken by the Swedish government in 1996-1998. The associated budgetary effects only affect government spending categories, i.e. subsidy disbursement, social benefits disbursement and government investment. Reversal of these measures in 1999 and 2000 has some effects on the government balance, although not excessively much. In 1999 the budget is projected to show a deficit of 0.9% of GDP. In 2000 it is projected to show a deficit of 2.0% of GDP. Both are still quite far removed from the 3% boundary, should this become an issue in Sweden.

4.15 The United Kingdom

Estimation

Like every other EU country British tax receipts are strongly pro-cyclical. The response patterns of social security contributions is somewhat more involved. The initial response to contemporaneous GDP growth is positive. This is followed one year later by a negative response that partly offsets the initial response. Finally, in the second year after the initial response another small positive response follows. The overall effect is positive, which qualifies social security contributions as pro-cyclical. Other current income is counter-cyclical.

British Government wage payments are pro-cyclical and respond to GDP developments with a lag of one year and no additional dynamics. Net purchase of goods and services and interest payments are characterised by a similar pattern in which an initial positive response is completely offset one year later. Social benefit disbursements are clearly counter-cyclical with no additional dynamics. Subsidy disbursements initially respond negatively to GDP growth. This is completely offset one year later. A similar pattern but much more pronounced characterises government investment. Net capital transfers respond positively to GDP developments with a lag of two years.

The British government has taken measures that have had extra effects in 1996-1998 beyond those accounted for by our model. The affected categories are wage payments, net purchase of goods and services, government investment and net capital transfers. Given the British stance on EMU it is highly unlikely that these are related to EMU convergence criteria. Nevertheless, the direction of the adjustments, which are all cut backs of expenditures, is in line with EMU and induced budgetary tightening.

Scenarios and deficits

The implications of the estimation results of the previous section for the development of the government deficit of the UK are reported in the table below.

Government deficit as percentage of GDP for the UK

	1996	1997	1998	1999	2000
DG II	4.8	1.9	0.6	-0.1	0.2
Base scenario	4.3	1.6	0.5	0.8	-0.0
Bust scenario	4.3	1.6	0.5	0.9	2.7
Reversal of EMU discipline scenario	4.3	1.6	0.5	3.7	5.4

The projection for our base scenario does not track the projections of DG II very well for the UK. The difference in 2000 is not very large, but in 1999 a quite substantial gap exists between our projection and the projection of DG II. The worsening of the

government balance that is projected by our base scenario for 1999 is caused by the fact that GDP volume growth in 1999 is only 1.3% for the UK, which is the lowest by far of the entire EU.

The bust scenario for the UK is actually very much identical to the base scenario for 1999. As a result the government balance under the bust scenario for 1999 is virtually identical to the base scenario projection. For 2000 a substantial worsening relative to the base scenario is projected.

Although Britain is not part of the Euro zone, sizeable additional measures during the period 1996-1998 have had their effect on the British government budget. Specifically, substantial additional reductions of the government wage payments, the net purchase of goods and services, government investment and net capital transfers have been achieved. Reversing these measures as a hypothetical reversal of EMU discipline scenario has important adverse effects on the government balance. The results indicate that the budget deficit immediately shoots up to 3.7% of GDP in 1999 and to 5.4% in 2000. Hence, if the British government contemplates joining EMU, it is well advised to strictly adhere to the measures taken in 1996-1998.

5 Conclusions

1. On the basis of our sensitivity analysis of budgetary receipts and expenditure categories it is possible to draw the following conclusions:

- in all countries receipts categories as direct taxes, indirect taxes and social security contributions are heavily, positively correlated with GDP. Receipt categories thus behaved pro-cyclically;

- on the other hand, government expenditures were for many countries found to be determined to an important extent by own past values. This was true for the civil servant wage bill, government investment, interest payments and net purchase of goods and services;

- subsidies and social security benefits were in most cases negatively correlated with changes in GDP, implying counter-cyclical behaviour. Government investment behaved very pro-cyclical, confirming its role as easiest target for budgetary tightening. Other expenditure categories showed a very mixed reaction to GDP fluctuations across countries;

- with receipts behaving strongly pro-cyclical and expenditures being 'locked in' to a certain degree by their own momentum, the deficits of EU-Member States clearly show counter-cyclical behaviour, as macro-economic theory suggests. The responsiveness to GDP movements, however, varies greatly. On balance the following countries show deficits with a very strong anti-cyclical nature: Denmark, Spain and Sweden. On the other hand the deficits of the following countries are only affected to a limited degree by changes in growth of GDP: Austria, Germany, Portugal and Italy.

2. Our analysis of possible EMU induced budgetary tightening in the 1996-98 period leads to the following overview of exceptional budgetary measures in this period. Only exceptional increases in receipts and decreases in expenditure can be interpreted as 'EMU-induced'. So the main categories of the 'EMU-measures' are direct and indirect taxes, subsidies, social security benefits and interest payments. The countries with the most evidence of 'EMU-induced' measures are Portugal, Italy, France, and Spain. Germany and Finland showed no EMU related budgetary actions, although strangely enough Sweden and the UK as non-Euro Members did.

Table 3: Type and size 'EMU-induced' exceptional budgetary measures in the period 1996-1998.*

(approximate cumulative percentage change from 1995 budgetary category level)	Direct taxes	Indirect taxes	Social security contributions	Other income	Civil servant wage payments	Net purchase of goods and services	Interest payments	Subsidies	Social security benefits	Investment	Net capital transfers**
Austria					-2.5			-24.0	-2.7		-10.8
Belgium		+4.5			-6.3	+15.8					
Denmark	-12.8				+9.3				+13.2	-21.8	
Finland			-27.9	-19.6	-10.5	-36.6					-3.9
France	+21.5	+3.4	-13.1					+16.0		-13.8	-43.3
Germany	-12.8		-2.1				-12.4	-22.2			+10.1
Ireland			-8.5				-31.6				
Italy	+6.8						-40.8			+29.4	-12500
Netherlands		+3.6									
Portugal					-9.1	+111.0	-18.4	-32.5	-26.1		
Spain						-10.7			-3.6	-16.2	-292.8
Sweden								-12.7	-11.1	-60.3	
UK					-17.1	-23.2				-51.3	+10.8

* The values in this table represent the cumulative, exceptional –i.e. not predicted by the model – change in the growth rate of the budgetary category involved over the 1996-1998 period.

** Cumulative 1996-1998 change from 1995 level in mrd local currency of 1990.

3. All countries remain within the 3.0% norm of the Stability and growth pact in 1999-2000 in our **base case** scenario as can been seen in table 6. In general our deficit forecasts in the base case are pretty much in line with those of DG II. Difference arises mainly from the difference in Eurostat and DG II data before the forecast interval. Our **'bust' case** scenario is based on the worst economic recession experienced by each individual country over the past twenty years. A number of countries show a severe transgression of the 3.0% deficit limit, but others surprisingly do not. The latter has to do with the relative low economic volatility experienced in these countries in the past and to the only moderately counter-cyclical nature of some Member States public finances.

   Especially Belgium, Denmark, Sweden, Spain, France and Finland would in case of a sharp economic recession experience serious problems in complying with the EMU norms. The government deficits of Ireland, The Netherlands, Italy and Portugal on the other hand seem relatively recession proof. Note, however, that due to the reaction lags of certain budgetary categories Italy and Portugal will in this scenario experience difficulties after the year 2000.

   Our '**loss of EMU discipline'** scenario shows transgressions of the 3.0% norm for a number of countries who took exceptional measures in the 1996-1998 period to be admitted to EMU. Especially Portugal, Italy, France and the UK ppear vulnerable to loss of EMU discipline.

A worrisome point for some countries is that the 'bust' scenario and the 'loss of EMU discipline' scenario mutually reinforce each other.

Table 4: Deficit forecasts in various scenarios (in % of GDP)

	DGII own forecasts		Base Case		Economic 'Bust'		'Loss of EMU discipline'		
	1999	2000	1999	2000	1999	2000	1999	2000	
Belgium		1.2	1.0	1.2	1.0	5.0	5.5	1.5	1.7
Denmark		-.2.6	-2.9	-1.9	-2.8	1.9	6.9	nr	nr
Germany		2.2	2.2	2.4	2.2	2.7	3.1	nr	nr
Greece									
Spain	1.6	1.3	1.5	1.4	2.4	3.9	2.2	2.7	
France	2.3	1.9	2.5	2.3	3.0	3.9	3.6	4.2	
Ireland	-3.4	-4.6	-2.0	-2.8	-1.8	-2.5	-1.3	-1.3	
Italy	2.3	2.0	2.2	2.1	2.2	2.5	3.8	6.6	
Luxembourg									
Netherlands	1.4	0.6	1.3	0.6	1.3	1.6	1.5	1.0	
Austria	2.1	1.9	1.3	0.9	1.4	2.5	1.9	2.7	
Portugal		2.0	1.8	1.7	1.6	1.7	2.2	3.5	7.5
Finland	-1.8	-2.1	-1.3	-1.6	0.5	6.7	nr	nr	
Sweden	-1.4	-2.3	-1.1	-2.0	0.6	3.8	0.9	2.0	
United Kingdom		-0.1	0.2	0.8	-0.0	0.9	2.7	3.7	5.4

nr:: in these cases a 'loss of EMU discipline was nor relevant due to lack of special measures in the period 1996-1998, or because the country did not join EMU.

4. The bust scenario employs different GDP projections for each country, reflecting different economic volatility across countries. We can however, by comparing the base and bust scenario, construct an indicator for the sensitivity of the fiscal deficit per percentage point change of GDP growth. Table 7 shows this standardised indicator.

   The table shows that the Danish budget deficit is by far the most sensitive to changes in GDP growth. On average the Danish deficit rises by 1.87 percentage points of GDP for every percentage point drop in GDP growth. Sweden and Spain also have a high budget deficit economic sensitivity coefficient. Low economic sensitivity coefficients are found for Austria, Germany, Ireland, Italy and Portugal.

Table 5: The economic sensitivity of the government budgetary deficit

	Budgetary deficit economic sensitivity (ratio of change in GDP and change in budget deficit)		
	1999	2000	Average
Austria	-0.03	-0.30	-0.17
Belgium	-0.53	-0.80	-0.67
Denmark	-1.12	-2.62	-1.87
Finland	-0.46	-0.79	-0.63
France	-0.38	-0.50	-0.44
Germany	-0.12	-0.23	-0.18
Greece			
Ireland	-0.22	-0.18	-0.20
Italy	0.00	-0.07	-0.04
Luxembourg			
Netherlands	0.00	-0.50	-0.25
Portugal	0.00	-0.17	-0.09
Spain	-0.64	-1.19	-0.92
Sweden	-0.85	-1.49	-1.17
United Kingdom	-0.20	-0.57	-0.39
Average	-0.35	-0.72	-0.54

Appendix A

The transfer function methodology

To assess economic sensitivity a statistical model is set up that relates the amount associated with a particular budgetary category to an indicator for the condition of the economy. A particular convenient form of such a statistical model is the so-called *transfer function* methodology.[9] A transfer function is a reduced form of a structural model that focuses exclusively on the strength and dynamics of the relationship of interest. As such it provides a shortcut to the issue at hand without having to specify and estimate a full macro-econometric model, which could take years to complete.

In the present study **we choose for a transfer function which relates a particular budgetary category to current and lagged economic conditions and to lagged realisations of the budgetary category itself**. For any budgetary category the specification of the transfer function specifically provides answers to the following issues:

- How strong does the budgetary category react to changes in economic conditions?
- ▲
- Is a budgetary category pro- or counter-cyclical?
- How fast, i.e. within what timeframe, does a budgetary category respond to changes in economic conditions?
- Is a budgetary category mainly driven by its own momentum or by economic conditions?

We now turn to the formalisation of the transfer function methodology for the present investigation. To facilitate the discussion we first introduce some notation. Denote the value taken by the index of the economic condition of country in year t as y_t. Furthermore, denote the amount associated with the particular budgetary category under investigation for the same year and country, and deflated by the GDP deflator, by x_t. The transfer function that models the effect of the economic condition on a certain budgetary category, in a certain Member State, takes the following general form:

$$\Delta \ln x_t = \alpha_0 + \sum_{k=0}^{q} \beta_k \Delta \ln y_{t-k} + \sum_{k=1}^{p} \gamma_k \Delta \ln x_{t-k} \qquad \textbf{(1)}$$

In equation **(1)** the function ln takes the natural logarithm of its argument and the operator Δ takes the first difference of its argument. The combined operator Δln can be shown to equal the growth rate of its argument. Thus equation (1) estimates growth rates of individual budgetary categories. The use of natural logarithms and

[9] Transfer function methodology is discussed in: Granger and Newbold, 1986, "Forecasting economic time series," Academic Press.

growth rates implies that the coefficients of equation **(1)** can be interpreted as elasticities.[10]

As indicator for economic conditions we will use GDP. We limit the number of lags, both of the economic conditions variable and of the estimated budget category itself, to two. The reason for this is somewhat technical. Firstly, it is highly unlikely that developments of more than two years ago have **independent** influences on present day growth rates of the estimated variable. Secondly, our data series span the period 1979-1998. A data set of twenty limits the number of explanatory variables that can be estimated. Thirdly, as discussed in Box 1 , the range of response patterns that can be generated with lags limited to two years is wide enough to virtually encompass any pattern that is observed in practice. Thus equation (1) can, for a specific budgetary category, for a specific country, be simplified to:

$$\begin{aligned}\Delta \ln x_t &= \alpha_0 + \beta_0 \Delta \ln y_t + \beta_1 \Delta \ln y_{t-1} + \beta_2 \Delta \ln y_{t-2} + \\ &+ \gamma_1 \Delta \ln x_{t-1} + \gamma_2 \Delta \ln x_{t-2}\end{aligned} \qquad \textbf{(1a)}$$

Equation (1a) implies that a budget category is affected by current economic conditions as well as by past economic conditions of up to 2 years ago. The strength of the response of a budget category to the economic condition is therefore measured by β_0, β_1 and β_2. The issue of pro- or counter-cyclicality of a budget category depends on the sign of these β's.

The current development of a budget category is also affected by the past development of the same budget category of up to 2 years ago. This measures the own momentum of a particular budget category that is independent of developments in the rest of the economy. The own momentum of a particular budgetary category can be due to the legislation, rules and regulation that underlie the expenditure or receipts for a particular budgetary category. One can think for instance of the expenses on compensation of employees, which depends on the number of civil servants employed and their wage rate. The number of civil servants is subject to labour law and the wage rate is subject to the institutions governing wage formation. When both are flexible the government can respond quickly. However, in most EU member states labour is relatively rigid and wage formation is sticky in general. Hence, government expenditure on compensation of employees is expected to be to a large extent driven by its own momentum with economic conditions only weakly and slowly having an effect.

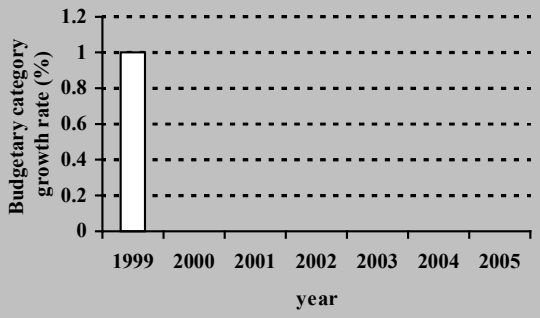
The degree to which a budget category is driven by its own momentum is measured by γ_1 and γ_2. The relative importance of own momentum vis-à-vis the condition of the economy for the development of a budget category thus depends on the relative size of the coefficients $\gamma$and β.

[10] Elasticities are measures of the sensitivity of one variable to movements of another. The income-elasticity of a budgetary category is the percentage change caused in that budgetary category by a one- percent change of income.

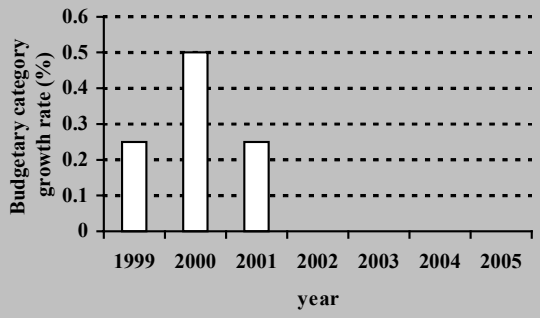
Box 1 The pattern of a budgetary category's response to changes in economic conditions

The model of equation **(1)** can generate a large variety of reactions of a budgetary category x to changes in the index of economic condition y even when the number of lags for the budgetary category (p) and the economic condition (q) is at most two. To get an idea of the various response patterns that are possible and to be able to better interpret the estimation results, this box presents some examples. The examples assume that an imaginary temporary positive one percent change in the growth rate of the economic condition index occurs in the base year, which, for the sake of concreteness, is taken to be 1999. Below the growth percentages of an arbitrary budgetary category as a response to the shock in economic conditions are graphed for different sets of coefficients of equation **(1)**.

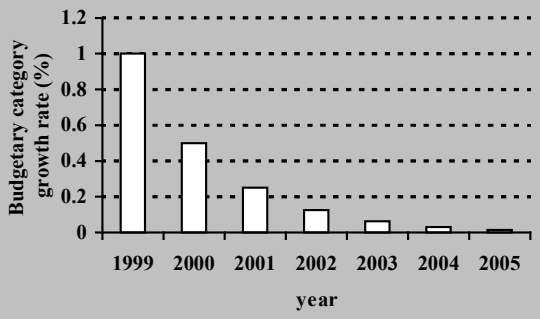
I. $\beta_0 = 1, \beta_1 = 0, \beta_2 = 0,$ $\gamma_1 = 0, \gamma_2 = 0$



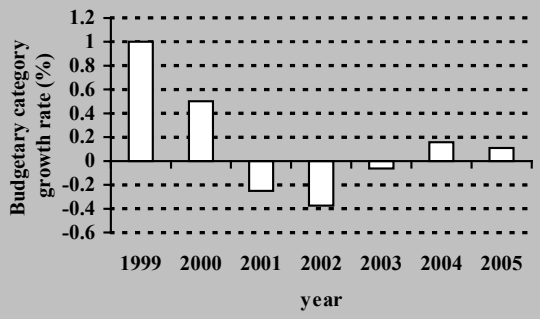
II. $\beta_0 = 0.25, \beta_1 = 0.5, \beta_2 = 0.25,$ $\gamma_1 = 0, \gamma_2 = 0$



III. $\beta_0 = 1, \beta_1 = 0, \beta_2 = 0,$ $\gamma_1 = 0.5, \gamma_2 = 0$



IV. $\beta_0 = 1, \beta_1 = 0, \beta_2 = 0,$ $\gamma_1 = 0.5, \gamma_2 = -0.5$



Graph I shows what the response is if no dynamics are present. In that case the shock to economic conditions in 1999 has a one-off effect in the same year on the budgetary category. No effect is present after this year. Graph II shows what happens if the effect of the change of economic conditions is not only felt immediately, but also for the subsequent two years. The total effect of the shock is then spread over the first three years according to the pattern of β's. In graphs I and II the budgetary category has no own momentum. Graph III introduces a simple form where the budgetary category does have its own momentum. The graph shows a situation where the primary effect of the change in economic conditions takes place in the first year (1999). However, the own momentum of the budgetary category – here represented by $\gamma_1 = 0.5$ – implies that any change in the budgetary category has after effects. In graph II this is represented by the slow decay of the initial effect. Finally, graph IV shows the effect of a more complicated own momentum. The particular one shown produces a damped cyclical response after the initial effect.

The speed with which a budget category reacts to developments of the economic condition of a country is the result of the interaction between the lag pattern of the effect of the economic condition, i.e. the pattern of the β's, and the own momentum of the budget category, i.e. the pattern of the γ's. To better grasp the implications of the transfer function and the magnitudes of the γ's and β's, the box above discusses

some examples and the implied reaction patterns for an imaginary individual budgetary category.[11]

Estimation

Operational values for the coefficients of equation (1a) need to be estimated for each of the budgetary categories for each of the EU member states. Estimation proceeds using the well-known econometric technique of Ordinary Least Squares regression analysis. This technique is applied to equation (1a) using observed historical data. This method has the benefit that each budgetary category is looked at individually. This enhances the transparency of the results and allows a thorough investigation of the properties of the transfer function, its coefficients and the functional stability.[12]

A potential hazard for the present regression analysis is the stability of the estimated equations. Policy changes can affect the stability of estimated economic sensitivity coefficients. This can seriously impede meaningful empirical analysis if not taken into account. Box 2 outlines how such policy changes and the ensuing parametric instability are dealt with within the present methodology. As discussed there, the possible presence of policy changes motivates specifying the transfer functions in growth rates.

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11 Some concern may exist regarding the direction of causation and the possibility that the transfer functions that will be estimated are affected by simultaneous equation bias. The formulation of the transfer function suggests a uni-directional chain of causation, i.e. from economic conditions to the government budget. Many will argue that causation may actually be the other way around, at least for some budget categories. Rising taxes, for instance, may depress economic activity and thus cause a deterioration in economic conditions. In many cases one can easily imagine two-sided causation with, for instance, economic conditions having a positive effect on government tax receipts, but government tax receipts having a negative effect on economic activity. In that case contemporaneous economic conditions may violate one of the assumption underlying the OLS method, i.e. independence of regressors and disturbance term. This may require the use of a variant of OLS estimation, i.e. instrumental variable (IV) estimation. In our experience, however, the use of IV estimation using annual time series data hardly ever produces useful results. Either the results become totally uninterpretable, or the results hardly differ from using OLS.

12 Another method to estimate transfer function coefficients is systems regression. In this approach the transfer functions for different categories or countries are estimated simultaneously. The advantage of this method becomes apparent when the transfer functions for different categories or countries share some of their features. Within the system these shared features can be tested for and imposed, which enhances estimator's efficiency. Moreover, the possibility to directly test for shared features for a budget category across different countries yields possibly interesting insights. However, the sheer size of the estimation exercise using this methodology precludes the productive use of system estimators within the present research study.

Box 2 Policy changes, the Lucas Critique, structural breaks and the estimation of the economic sensitivity of budgetary categories

One can think of a policy as a set of laws, rules and regulations with an associated set of policy parameters. Think, for instance of tax law and the marginal tax rate. Given the set of laws, rules and regulations the policy parameters mainly affect the level of the associated budgetary category. The economic sensitivity of a budgetary category is mainly dependent on the laws, rules and regulations and not so much on the specific policy parameter.

A policy change usually merely involves adjusting a policy parameter (i.e. the marginal tax rate in the example). Only in very few cases do policy changes involve the body of laws, rules and regulations itself. Hence, the majority of policy changes therefore mainly affect the level of budgetary receipts or expenditure categories, but not the economic sensitivity. In empirical analysis the level change may nevertheless affect the estimated economic sensitivity parameter. Level shifts need to be included in the regressions to avoid this problem. For the present study a more convenient method is to estimate the transfer function in growth rates. A level change of a budgetary receipts or expenditure category translates into an excessively large or small growth rate for a single year only. Dummy variables can be included in the regression to account for these. The use of dummy variables can be motivated by prior knowledge of the timing of major policy parameter revisions or by inspection of empirical results.

Some policy changes do affect the economic sensitivity of budgetary categories. This can seriously impede meaningful empirical analysis because estimated transfer function coefficients are then not stable over time. This is an instance of the so-called Lucas Critique named after Robert Lucas Jr., who first discussed the phenomenon in a paper in 1976. The Lucas Critique holds that as soon as one estimates an equation that is a reduced form of an underlying structural model, its coefficients are likely to be affected by changes in the economic environment. Government fiscal policy parameters are usually mentioned as a prime example. Major policy revisions thus may cause structural breaks in the coefficients of the equation estimated.

In the present analysis this implies that tests need to be performed to assess whether estimated economic sensitivity coefficients are constant over the regression sample period. If tests indicate that they are not, this can be taken into account in one of two ways. The first is to discard the earlier part of the sample period for use in the regression analysis. The second, subtler, approach is to identify which coefficients are affected for which years and re-estimate the equation with appropriate dummies included. The analysis of structural breaks and their subsequent treatment is sometimes referred to as "intervention analysis."

A special case of structural instability can be expected a priori in the years leading up to the introduction of the Euro. In the years 1996-1998 Member States took extra budgetary measures to comply with the convergence criteria as agreed in the Stability and Growth Pact. For this reason we specifically investigate for structural breaks, i.e. lower or higher than expected growth rates, of each of the budgetary categories. We do this by including, so-called 'dummy variables' in the years 1996-1998 in equation (1a) when warranted. The coefficient of the dummy variable signifies the extent to which the growth rate of a certain budget category was lowered (or increased, in case of receipts) beyond what could have been expected from evolution of economic conditions. The coefficients of the dummy variables thus signifies the extent of 'EMU-discipline' on the individual budget categories. Inclusion of the dummy variables leads to our final estimation equation (1b):

$$\begin{aligned}\Delta \ln x_t &= \alpha_0 + \alpha_1 d_t^{96} + \alpha_2 d_t^{97} + \alpha_3 d_t^{98} + \\ &+ \beta_0 \Delta \ln y_t + \beta_1 \Delta \ln y_{t-1} + \beta_2 \Delta \ln y_{t-2} + \\ &+ \gamma_1 \Delta \ln x_{t-1} + \gamma_2 \Delta \ln x_{t-2}\end{aligned} \qquad \textbf{(1b)}$$

Once the coefficients of equation (1b) have been estimated, for all budgetary categories for all EU member states, a model emerges in which for each Member State all the different categories of the government accounts are related to a measure for the economic condition of the Member State. The sensitivity of each category to the economic conditions can then be analysed and the differences between the budgetary categories and countries can be assessed.

Finally, using projections for the economic conditions, the estimated transfer function equations are used to generate projections for the evolution of each budgetary category of the government accounts and by implication of the budget deficit.

Appendix B

Regression results for budgetary categories of EU Member States

In this appendix we present the estimation results for each budgetary category on a country by country basis. The procedure for estimating the transfer function of individual budgetary categories was as follows. In the first step equation (1b) (see appendix A) was estimated unrestrictedly and without any dummy variables. Subsequently a test was performed for the stability of the equation using the so-called Chow forecast tests.[13] If needed we then included dummy variables in the regression.

The next step was to test for and impose restrictions on the coefficients. Interesting restrictions concern zero-restrictions as well as unit-restrictions.[14] The zero-restrictions set a particular coefficient to zero. For the unit-restrictions a test is performed whether the long run elasticity of GDP volume on the evolution of the budgetary category is unity. The appeal of this hypothesis is that it implies that in the long run the GDP volume and the budgetary category (deflated by the GDP deflator) grow at the same rate, implying a stable role of the government. During the entire process of formulating, hypotheses, testing for their statistical validity and imposing the associated restrictions, an eye is kept on the residual serial correlation properties of the regression. In the present analysis these are measured by the Durbin-Watson statistic and the 3-rd order Ljung-Box statistic. The latter will be indicated as LB3.[15]

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13 The Chow forecast test re-estimates the equation but omits observations for years after a selected cut-off year. It then proceeds to generate forecasts for the omitted years on the basis of the re-estimation and performs statistically assesses whether these "forecasts" differ significantly from the actual observed values. In the present analysis this test is performed for cut-off years 1990 and 1995.

14 The time series at our disposal have a length of 19 years: 1980-1998. The year 1979 is lost due to the use of growth rates. With unrestricted estimation of equation (1) observations for the years 1980 and 1981 are also lost due to the use of two lags for the dependent variable. This leaves 17 years of data for estimation. The empirical analysis will therefore benefit from imposing restrictions on the coefficients to be estimated in as far as this is statistically tenable and economically sensible.

15 In the absence of residual serial correlation the Durbin-Watson is two. At all times the Durbin Watson statistic is between zero and four. When the Durbin Watson statistic deviates from two this signifies that additional dynamics are present. Adding additional lags to the regression usually remedies this problem. Note that with the inclusion of lagged dependent variables the Durbin Watson statistic is biased towards two and should be interpreted with caution. The Ljung Box statistic is a proper statistic that is more reliable. We use the 3-rd order variant because of the inclusion of two lags. When this statistic is in excess of 6.63 (one per cent significance level) there is serious cause for alarm.

This process ultimately leads to a restricted specification of the transfer function that grasps the main relations in the data, makes sense economically and statistically, and is not burdened by excess unimportant relations.

Empirical results for Austria

Budgetary category	Explanatory variables (*t*-values)										Regression statistics			Stability test *p*-value of Chow forecast F test. Unrestricted equation, no dummies included		Sample
	Constant	EMU convergence dummies			Other significant policy change	Growth rate of GDP volume			Lagged dependent							
		1996	1997	1998		contemporaneous	one year lagged	two years lagged	one year lagged	two years lagged	R-squared	Durbin Watson	LB3	1990	1995	
	α_0	α_1	α_2	α_3		β_0	β_1	β_2	γ_1	γ_2						
Government current receipts																
Direct taxes	0.045				1989, 1994					-0.96	0.95	1.59	2.60	0.48	0.51	1983-98
	(6.3)									(-5.6)						
1989-1998							0.99			-0.28						
							(3.4)			(3.5)						
Indirect taxes	0.018				1984, 1989,		0.33			-0.27	0.99	2.49	2.05	0.10	0.00	1983-98
	(9.3)				1995		(4.4)			(-7.3)						
1996-1998							0.81									
							(6.4)									
Social security contributions								0.41	0.59		0.18	2.11	1.40	0.47	0.34	1982-98
								(2.5)	(3.6)							
Other current income	-0.0080				1995		1.33		-0.33		0.52	1.89	1.88	0.40	0.12	1982-98
	(-0.6)						(7.5)		(-1.9)							
Government current expenditure																
Civil servant wage bill	0.027		-0.025				-0.74	0.74	0.74	-0.74	0.69	2.64	2.31	0.59	0.61	1983-95
	(9.0)		(-2.1)				(-4.5)	(4.5)	(4.5)	(-4.5)						
Net purchase of goods and services**	2.2E-4						-1.84				0.46	2.70	2.65	0.16	0.91	1982-98
	(0.1)						(-3.6)									
Interest payments***	0.187						0.98		-0.39		0.57	2.47	5.38	0.03	0.33	1982-98
	(3.9)						(1.3)		(-1.6)							
Subsidies	0.033	-0.24			1994				0.23	-0.35	0.71	1.45	6.06	0.41	0.41	1983-98
	(2.3)	(-3.3)							(1.4)	(-1.6)						
Social benefits	0.029		-0.027		1993						0.61	2.12	3.71	0.80	0.48	1981-98
	(9.6)		(-2.2)													
Government investment	-0.028				1995	1.36					0.51	2.32	0.59	0.81	0.32	1981-98
	(-1.4)					(1.8)										
Government net capital transfers*	11.56		-5.94	-4.87		-0.069	-0.038	-0.084	-0.74		0.81	2.55	2.06	0.53	0.59	1982-98

	(5.5)	(-2.9)	(-2.4)		(-2.5)	(-1.4)	(-3.2)	(-4.5)
1980-1989	-5.77							
	(-4.8)							

* Estimated in absolute changes instead of growth rates.
** Estimated as second logarithmic difference, i.e. the growth rate of the growth rate.
*** Including a time trend, 1975=0, coefficient: -0.0095

Empirical results for Belgium

Budgetary category		Explanatory variables (*t*-values)										Regression statistics			Stability test *p*-value of Chow forecast F test. Unrestricted equation, no dummies included		Sample
		Constant	EMU convergence dummies			Other significant policy change	Growth rate of GDP volume			Lagged dependent							
			1996	1997	1998		contemporaneous	one year lagged	two years lagged	one year lagged	two years lagged	R-squared	Durbin Watson	LB3	1990	1995	
		α_0	α_1	α_2	α_3		β_0	β_1	β_2	γ_1	γ_2						
Government current receipts																	
Direct taxes		0.013				1994				-0.45		0.53	2.31	0.70	0.61	0.06	1981-98
		(1.7)								(-2.3)							
	1995-1998						1.45										
							(7.4)										
Indirect taxes			0.045			1995	0.79			0.21		0.47	1.98	0.90	0.86	0.55	1981-98
			(2.3)				(4.0)			(1.1)							
Social security contributions						1984	0.60			0.40		0.49	1.97	4.65	0.52	0.76	1981-98
							(5.2)			(3.5)							
Other current income		-0.053					1					0.62	2.21	1.49	0.72	0.27	1980-98
		(-3.1)															
	1980-1982	0.152															
		(3.8)															
Government current expenditure																	
Civil servant wage bill		-0.029	-0.021	-0.021	-0.021				0.69	-0.40	-0.29	0.75	2.08	6.28	0.01	0.69	1982-98
		(-4.4)	(-1.9)	(-1.9)	(-1.9)				(3.9)	(-2.7)	(-2.3)						
	1991-1998	0.027															
		(4.1)															
Net purchase of goods and services		0.018		0.079	0.079	1991		-1.32	-1.32		0.42	0.87	1.46	5.18	0.10	0.52	1982-98
		(1.8)		(4.6)	(4.6)			(-5.4)	(-5.4)		(3.8)						
Interest payments		-0.036						1.09	1.09	0.54		0.67	2.19	0.76	0.32	0.88	1981-98
		(-1.7)						(2.3)	(2.3)	(4.0)							
Subsidies		-0.019					1.80	-1.16			0.36	0.21	2.11	0.43	0.82	0.46	1982-98
		(-1.1)					(2.1)	(-1.2)			(1.6)						
Social benefits							0.23	0.41		0.35		0.46	2.20	1.73	0.77	0.97	1981-98
							(1.6)	(2.2)		(2.4)							
Government investment		0.115					-4.62	-4.62		-0.25	-0.87	0.65	2.42	1.72	0.22	0.51	1982-98
		(1.9)					(-3.4)	(-3.4)		(-1.4)	(-3.9)						
	1982-1986	-0.133															
		(-2.6)															
Government net capital transfers*		2.48					-0.073	0.034	0.039	-1.14	-0.41	0.83	2.09	1.00	0.50	0.08	1982-98
		(1.5)					(-4.0)	(2.5)	(1.8)	(-4.7)	(-2.3)						
	1983-1990	-13.10															
		(-3.7)															

* Estimated in absolute changes instead of growth rates.

Empirical results for Denmark

Budgetary category	Explanatory variables (*t*-values)										Regression statistics			Stability test *p*-value of Chow forecast F test. Unrestricted equation, no dummies included		Sample
	Constant	EMU convergence dummies			Other significant policy change	Growth rate of GDP volume			Lagged dependent							
		1996	1997	1998		contemporaneous	one year lagged	two years lagged	one year lagged	two years lagged	R-squared	Durbin Watson	LB3	1990	1995	
	α_0	α_1	α_2	α_3		β_0	β_1	β_2	γ_1	γ_2						
Government current receipts																
Direct taxes	0.013	-0.034	-0.034	-0.060	1982, 1990,	1.54					0.91	2.77	3.04	0.29	0.29	1982-98
	(2.2)	(-4.4)	(-4.4)	(-4.9)	1995	(6.7)										
Indirect taxes	-0.028					1.78	0.59				0.70	2.51	2.74	0.72	0.98	1980-98
	(-2.9)					(4.9)	(1.6)									
Social security contributions					1986-1988	1.09					0.84	1.74	4.73	0.97	0.88	1980-98
						(1.8)										
1980-1983	0.24															
	(7.0)															
Other current income**	0.21				1992	3.68	-1.65		-0.28	-0.75	0.77	2.63	4.09	0.02	0.24	1982-98
	(4.3)					(3.8)	(-2.0)		(-1.5)	(-3.9)						
Government current expenditure																
Civil servant wage bill	0.019	0.031	0.031	0.031	1987, 1995	0.66	-1.26		0.28	-0.45	0.79	2.69	4.71	0.71	0.83	1982-98
	(2.2)	(3.6)	(3.6)	(3.6)		(2.1)	(-4.2)		(1.7)	(-3.0)						
Net purchase of goods and services	0.026					-0.68			-0.31		0.19	2.19	0.92	0.59	0.96	1981-98
	(1.8)					(-1.3)			(-1.6)							
Interest payments	-0.045				1985, 1993				-0.29		0.94	2.53	2.28	0.96	0.89	1981-98
	(-4.2)								(-2.1)							
1980-1984	0.31															
	(8.6)															
Subsidies	0.203						-5.22		-0.55	-0.51	0.54	2.74	3.81	0.38	0.70	1982-98
	(4.5)						(-3.7)		(-2.5)	(-2.4)						
Social benefits	0.072	-0.044	-0.044	-0.044	1994	-0.82	-0.91		-0.19		0.88	2.30	2.03	0.03	0.34	1981-98
	(7.0)	(-3.7)	(-3.7)	(-3.7)		(-2.5)	(-3.3)		(-1.4)							
Government investment	0.235			-0.218	1985	-4.46			-0.49		0.71	2.17	2.66	0.54	0.96	1981-98
	(3.7)			(-1.8)		(-2.3)			(-2.9)							
1980-1991	-0.043															
	(-0.9)															
Government net capital transfers*					1995					-0.42	0.72	2.04	1.78	0.11	0.05	1982-98
										(-2.0)						

* Estimated in absolute changes instead of growth rates.

** Including a time trend 1975 = 0, coefficient: -0.015.

Empirical results for Finland

Budgetary category	Explanatory variables (*t*-values)										Regression statistics			Stability test *p*-value of Chow forecast F test. Unrestricted equation, no dummies included		Sample
	Constant	EMU convergence dummies			Other significant policy change	Growth rate of GDP volume			Lagged dependent							
		1996	1997	1998		contemporaneous	one year lagged	two years lagged	one year lagged	two years lagged	R-squared	Durbin Watson	LB3	1990	1995	
	α_0	α_1	α_2	α_3		β_0	β_1	β_2	γ_1	γ_2						
Government current receipts																
Direct taxes	0.0176						1.54		-0.54		0.50	1.99	0.54		0.68	1985-98
	(1.0)						(6.0)		(-2.1)							
Indirect taxes	0.0040				1995	1.20					0.82	1.70	0.76		0.16	1984-98
	(0.5)					(8.4)										
Social security contributions	0.080	-0.093	-0.093	-0.093		0.39			-0.33		0.37	1.86	0.12		0.28	1985-98
	(3.0)	(-2.4)	(-2.4)	(-2.4)		(1.1)			(-1.1)							
Other current income	0.099		-0.098	-0.098	1994				-0.34		0.91	1.31	4.72		0.52	1985-98
	(7.4)		(-3.1)	(-3.1)					(-3.5)							
Government current expenditure																
Civil servant wage bill	0.018	-0.035	-0.035	-0.035				1.13	-0.17	-0.17	0.94	2.54	2.65		0.15	1986-98
	(4.3)	(-4.5)	(-4.5)	(-4.5)				(11.8)	(-3.3)	(-3.3)						
Net purchase of goods and services	0.054	-0.122	-0.122	-0.122	1988			2.05	-0.44		0.90	1.87	2.40		0.51	1985-98
	(4.3)	(-4.7)	(-4.7)	(-4.7)				(6.4)	(-3.4)							
Interest payments	0.147				1993		-2.66		-0.31		0.88	1.82	0.69		0.45	1985-98
	(5.0)						(-4.4)		(-2.2)							
Subsidies	0.0054				1989	-0.99					0.56	1.40	1.15		0.25	1984-98
	(0.3)					(-2.7)										
Social benefits	0.073					-1.05	0.46		-0.44		0.92	1.54	2.01		0.30	1985-98
	(4.7)					(-10.9)	(1.9)		(-2.1)							
1985-1992	0.126															
	(6.5)															
Government investment	-0.049							2.30	-0.76	-0.54	0.61	2.08	0.40		0.99	1986-98
	(-2.0)							(5.7)	(-3.0)	(-2.4)						
Government net capital transfers*	-0.017		-1.97	-1.97					-0.86		0.94	2.28	2.89		0.55	1986-98
	(-`1.7)		(-5.8)	(-5.8)					(5.7)							

* Estimated in absolute changes instead of growth rates.

Empirical results for France

Budgetary category	Explanatory variables (*t*-values)										Regression statistics			Stability test *p*-value of Chow forecast F test. Unrestricted equation, no dummies included		Sample
	Constant	EMU convergence dummies			Other significant policy change	Growth rate of GDP volume			Lagged dependent		R-squared	Durbin Watson	LB3	1990	1995	
		1996	1997	1998		contemporaneous	one year lagged	two years lagged	one year lagged	two years lagged						
	α_0	α_1	α_2	α_3		β_0	β_1	β_2	γ_1	γ_2						
Government current receipts																
Direct taxes	0.014		0.056	0.159		1.00					0.77	1.96	1.51	0.12	0.01	1980-98
	(2.0)		(1.9)	(5.3)												
Indirect taxes	0.0015	0.034			1986	1.00					0.44	1.35	3.59	0.61	0.37	1980-98
	(0.4)	(2.2)														
Social security contributions	0.0082		-0.031	-0.10		0.47	0.53				0.74	1.86	1.65	0.42	0.01	1980-98
	(2.1)		(-1.9)	(-6.1)		(2.0)	(2.3)									
Other current income	0.012				1981, 1994	1.94	-1.62		-0.30		0.75	2.46	3.75	0.12	1.00	1981-98
	(0.4)					(1.6)	(-1.1)		(-2.0)							
Government current expenditure																
Civil servant wage bill	-5.9E-4				1995	0.25			0.75		0.36	2.02	1.44	0.56	0.57	1981-98
	(-0.2)					(2.3)			(6.8)							
Net purchase of goods and services	0.035								-0.26		0.49	2.01	3.22	0.87	0.40	1981-98
	(2.9)								(-1.5)							
Interest payments	-0.022						1.94		0.35	0.68	0.54	1.91	2.13	0.62	0.47	1982-98
	(-0.6)						(1.6)		(1.9)	(3.6)						
Subsidies	0.067	0.16			1988		-2.12				0.60	2.44	1.85	0.55	0.17	1980-98
	(2.6)	(2.6)					(-2.0)									
Social benefits	0.028					-0.24			0.55	-0.35	0.41	2.30	3.08	0.76	0.87	1982-98
	(2.4)					(-0.9)			(2.7)	(-1.6)						
Government investment	-0.034	-0.046	-0.046	-0.046		2.75					0.49	2.21	2.88	0.38	0.33	1980-98
	(-1.9)	(-1.8)	(-1.8)	(-1.8)		(3.6)										
Government net capital transfers*	2.41		-43.3		1991				-0.33		0.71	1.96	5.23	0.01	0.01	1981-98
	(1.0)		(-4.6)						(-1.8)							

* Estimated in absolute changes instead of growth rates.

Empirical results for Germany

Budgetary category		Explanatory variables (*t*-values)										Regression statistics			Stability test *p*-value of Chow forecast F test. Unrestricted equation, no dummies included		Sample
		Constant	EMU convergence dummies			Other significant policy change	Growth rate of GDP volume			Lagged dependent							
			1996	1997	1998		contemporaneous	one year lagged	two years lagged	one year lagged	two years lagged	R-squared	Durbin Watson	LB3	1990	1995	
		α_0	α_1	α_2	α_3		β_0	β_1	β_2	γ_1	γ_2						
Government current receipts																	
Direct taxes		-0.010	-0.064	-0.064		1990	1.44					0.84	2.88	4.77	0.04	0.31	1980-98
		(-1.3)	(-3.6)	(-3.6)			(7.1)										
Indirect taxes		-0.0054					1.08					0.67	1.56	2.43	0.50	0.60	1980-98
		(-0.8)					(5.8)										
Social security contributions		0.022			-0.021	1983, 1991	0.35	-0.35		0.26		0.98	2.13	0.73	0.23	0.82	1981-98
		(6.7)			(-2.9)		(2.8)	(-2.8)		(3.0)							
Other current income		-0.049				1989		2.05		-0.42		0.48	1.47	1.34	0.53	0.74	1981-98
		(-1.2)						(1.8)		(-1.1)							
	1981-1990									0.41							
										(1.6)							
Government current expenditure																	
Civil servant wage bill		-0.029				1988-90, 1994	1.86			0.13	0.26	0.96	1.68	2.10	0.15	1.00	1982-98
		(-5.4)					(14.9)			(2.1)	(3.7)						
Net purchase of goods and services		0.016						1.72	-2.84	0.68	-0.40	0.80	2.24	2.06	0.14	0.01	1982-98
		(0.9)						(3.5)	(-5.7)	(2.5)	(-1.9)						
	1988-1995									-0.70	0.89						
										(-3.0)	(3.4)						
Interest payments		0.062	-0.124				0.39		-1.62	0.64		0.97	2.59	2.21	0.28	0.48	1981-98
		(6.0)	(-6.8)				(2.2)		(-10.1)	(9.3)							
	1981-1992								0.90								
									(3.6)								
	1983-1990	-0.030															
		(-3.4)															
Subsidies		0.108	-0.092	-0.092	-0.038	1980-83, 1991		-1.26	-1.26			0.95	2.36	1.44	0.49	0.56	1980-98
		(9.8)	(-4.7)	(-4.7)	(-1.5)			(-9.3)	(-9.3)								
Social benefits		0.016				1990-91		-0.42		0.55		0.92	1.27	2.93	0.64	0.76	1982-98
		(3.6)						(-1.6)		(2.5)							
	1982-1990										-0.50						
											(-2.0)						
Government investment		-0.071					2.40			0.44		0.86	1.59	0.84	0.64	0.38	1981-98
		(-6.0)					(7.9)			(4.6)							
Government net capital transfers*					10.05	1991	0.028		-0.061	-0.18	0.48	0.97	2.39	3.04	0.03	0.11	1982-98
					(5.4)		(2.6)		(-7.8)	(-3.3)	(5.1)						

* Estimated in absolute changes instead of growth rates.

Empirical results for Ireland

Budgetary category		Explanatory variables (*t*-values)										Regression statistics			Stability test *p*-value of Chow forecast F test. Unrestricted equation, no dummies included		Sample
		Constant	EMU convergence dummies			Other significant policy change	Growth rate of GDP volume			Lagged dependent							
			1996	1997	1998		contemporaneous	one year lagged	two years lagged	one year lagged	two years lagged	R-squared	Durbin Watson	LB3	1990	1995	
		α_0	α_1	α_2	α_3		β_0	β_1	β_2	γ_1	γ_2						
Government current receipts																	
Direct taxes		0.074				1985, 1989, 1995	0.63			-0.22	0.21	0.94	2.27	2.11	0.33	0.77	1982-98
		(6.3)					(4.1)			(-2.6)	(-2.5)						
Indirect taxes		-0.012					1.00			-0.20	0.33	0.56	1.83	1.03	0.65	0.71	1982-98
		(-0.7)					(3.7)			(-1.0)	(1.7)						
Social security contributions		0.015	-0.085			1986		0.55		-0.32	0.52	0.60	1.64	2.14	0.91	0.27	1982-98
		(0.6)	(-2.5)					(1.8)		(-1.6)	(2.5)						
Other current income		0.012				1986	-2.20	0.62	1.58	-0.63	-0.63	0.90	2.29	2.89	0.94	0.98	1982-98
		(0.4)					(-3.6)	(0.9)	(2.3)	(-6.4)	(-6.4)						
	1982-1993	0.147															
		(7.1)															
Government current expenditure																	
Civil servant wage bill		0.106					-0.44			-0.16	-0.31	0.85	1.97	1.04	0.05	0.89	1982-98
		(6.9)					(-2.8)			(-1.2)	(-3.1)						
	1982-1989	0.033															
		(3.9)															
Net purchase of goods and services		-0.082				1990-91	1.58			-0.28	0.56	0.77	2.37	1.83	0.40	0.07	1982-98
		(-3.1)					(3.4)			(-1.8)	(3.7)						
Interest payments**		-0.161	-0.108	-0.108	-0.108	1994-95	1.32	1.35				0.87	2.52	3.66	0.94	0.34	1980-98
		(-5.0)	(-4.3)	(-4.3)	(-4.3)		(2.8)	(3.1)									
Subsidies		0.182				1989	-1.99					0.82	2.25	1.26	0.89	0.69	1980-98
		(2.4)					(-1.7)										
	1980-1985	-0.014															
		(-0.2)															
Social benefits		0.106					-0.38			-0.29		0.81	2.38	2.76	0.17	0.47	1981-98
		(4.0)					(-1.3)			(-2.0)							
	1981-1989	0.013															
		(0.7)															
Government investment		0.063				1987-88		1.18		-0.98		0.90	1.64	3.55	0.85	0.34	1981-98
		(2.1)						(2.9)		(-4.0)							
Government net capital transfers*		-26.9				1994	-0.026	-0.023	0.049			0.71	1.84	0.53	0.38	0.71	1980-98
		(-2.1)					(-1.4)	(-1.0)	(2.8)								

* Estimated in absolute changes instead of growth rates.
** Estimated in values instead of volumes.

Empirical results for Italy

Budgetary category		Explanatory variables (t-values)										Regression statistics			Stability test p-value of Chow forecast F test. Unrestricted equation, no dummies included		Sample
		Constant	EMU convergence dummies			Other significant policy change	Growth rate of GDP volume			Lagged dependent							
			1996	1997	1998		contemporaneous	one year lagged	two years lagged	one year lagged	two years lagged	R-squared	Durbin Watson	LB3	1990	1995	
		α_0	α_1	α_2	α_3		β_0	β_1	β_2	γ_1	γ_2						
Government current receipts																	
Direct taxes		-0.024		0.068		1986, 1993		1.91				0.90	2.71	3.80	0.24	0.40	1981-98
		(-2.5)		(4.0)				(6.1)									
	1981-1989									0.63							
										(7.6)							
Indirect taxes		0.035				1985			0.54	-0.62		0.70	2.76	3.60	0.34	0.25	1982-98
		(4.4)							(1.5)	(-3.4)							
	1982-1990									0.27							
										(2.1)							
Social security contributions		0.025				1984, 1994			0.68	-0.33		0.71	1.31	1.86	0.19	0.14	1982-98
		(3.5)							(2.0)	(-2.2)							
Other current income		0.110					-4.80			-0.47	-0.28	0.96	2.50	1.67	0.97	0.59	1987-98
		(5.6)					(-4.8)			(-3.9)	(-3.4)						
Government current expenditure																	
Civil servant wage bill		-0.026							2.29	-0.31		0.53	2.03	1.55	0.51	0.98	1981-98
		(-2.1)							(3.8)	(-1.4)							
Net purchase of goods and services		0.035				1995			-0.76		0.34	0.75	2.54	2.50	0.43	0.07	1982-98
		(2.6)							(-1.4)		(2.4)						
Interest payments		-0.0115	-0.136	-0.136	-0.136			2.44		0.24		0.70	2,44	1.76	0.31	0.18	1981-98
		(-0.3)	(-3.3)	(-3.3)	(-3.3)			(2.3)		(1.8)							
Subsidies		-0.023				1988		-4.04	3.36	-0.49		0.61	2.52	2.93	0.70	0.41	1981-98
		(-0.9)						(-2.9)	(3.0)	(-3.4)							
	1981-1989	0.095															
		(2.3)															
Social benefits		0.035				1984	-0.68					0.55	2.05	2.68	0.46	0.84	1980-98
		(3.8)					(-1.7)										
	1980-1989	0.072															
		(6.2)															
Government investment		-0.105	0.098	0.098	0.098	1982-85	1.18	2.52			0.20	0.91	2.07	2.78	0.50	0.05	1982-98
		(-9.0)	(7.1)	(7.1)	(7.1)		(2.4)	(5.3)			(2.5)						
Government net capital transfers*				-12.47		1984-85, 1992, 1993						0.88	1.91	1.30	0.51	0.86	1980-98
				(-3.1)													

* Estimated in absolute changes instead of growth rates.

Empirical results for The Netherlands

Budgetary category		Explanatory variables (*t*-values)										Regression statistics			Stability test *p*-value of Chow forecast F test. Unrestricted equation, no dummies included		Sample
		Constant	EMU convergence dummies			Other significant policy change	Growth rate of GDP volume			Lagged dependent							
			1996	1997	1998		contemporaneous	one year lagged	two years lagged	one year lagged	two years lagged	R-squared	Durbin Watson	LB3	1990	1995	
		α_0	α_1	α_2	α_3		β_0	β_1	β_2	γ_1	γ_2						
Government current receipts																	
Direct taxes		-0.150						2.68	3.00	-0.29		0.67	2.29	3.24	0.04	0.33	1981-98
		(-4.0)						(2.8)	(2.1)	(-1.2)							
	1981-1990	-0.075															
		(-3.0)															
Indirect taxes			0.036			1989	1.24					0.68	1.84	1.01	0.78	0.31	1980-98
			(1.7)				(5.3)										
	1980-1986						1.89										
							(5.4)										
Social security contributions		0.049				1983, 1990				-0.61	-0.34	0.63	2.25	0.77	0.86	0.68	1982-98
		(4.2)								(-3.0)	(-1.8)						
Other current income		-0.047				1986	2.44			0.75		0.63	2.16	0.76	0.76	0.65	1981-98
		(-1.2)					(1.7)			(4.2)							
Government current expenditure																	
Civil servant wage bill		-0.0077				1990			0.95			0.81	2.40	2.86	0.57	0.89	1980-98
		(-0.7)							(3.1)								
	1980-1990	-0.031															
		(-4.3)															
Net purchase of goods and services								0.99		0.17	-0.26	0.44	2.13	0.38	0.72	0.94	1986-98
								(4.8)		(1.2)	(-1.8)						
Interest payments							-1.23	2.46	-1.23	1.00		0.74	2.28	1.82	0.89	0.73	1981-98
							(-2.2)	(3.1)	(-2.2)								
Subsidies		0.016				1985, 1995				-0.11	-0.51	0.87	1.53	0.49	0.48	0.04	1982-98
		(0.7)								(-0.8)	(-3.9)						
	1980-1988									-0.32	1.00						
										(-1.2)	(3.0)						
Social benefits		0.034				1990	-0.52					0.80	2.42	2.17	0.21	0.67	1980-98
		(8.0)					(-3.1)										
	1993-1998	0.018															
		(3.0)															
Government investment		-0.031				1985	1.84			0.43	-0.34	0.79	2.35	5.40	0.90	0.99	1982-98
		(-1.7)					(2.9)			(3.0)	(-2.5)						
Government net capital transfers*		897.0					-0.12	0.13	-0.11			0.27	1.65	1.27	0.65	0.79	1980-98
		(1.1)					(-1.9)	(1.7)	(-1.7)								

* Estimated in absolute changes instead of growth rates.

Empirical results for Portugal

Budgetary category	Explanatory variables (*t*-values)										Regression statistics			Stability test *p*-value of Chow forecast F test. Unrestricted equation, no dummies included		Sample
	Constant	EMU convergence dummies			Other significant policy change	Growth rate of GDP volume			Lagged dependent							
		1996	1997	1998		contemporaneous	one year lagged	two years lagged	one year lagged	two years lagged	R-squared	Durbin Watson	LB3	1990	1995	
	α_0	α_1	α_2	α_3		β_0	β_1	β_2	γ_1	γ_2						
Government current receipts																
Direct taxes								3.21		-0.34	0.49	2.46	2.33	0.99	0.78	1982-98
								(4.6)		(-1.9)						
Indirect taxes	0.034				1992, 1993		1.91	-1.91	-0.23	0.23	0.84	1.42	3.65	0.70	0.99	1982-98
	(6.6)						(6.6)	(-6.6)	(-3.6)	(3.6)						
Social security contributions	0.025				1982, 1986		1.26		-0.19	-0.19	0.77	1.74	0.43	0.97	0.69	1982-98
	(1.7)						(3.0)		(-1.4)	(-1.4)						
Other current income	0.086						5.44	-4.73			0.22	1.97	5.31	0.11	0.78	1982-98
	(1.1)						(1.9)	(-1.7)								
Government current expenditure																
Civil servant wage bill	-0.0020	-0.031	-0.031	-0.031		0.98	0.98				0.71	1.71	2.09	0.68	0.42	1980-98
	(-0.2)	(-1.9)	(-1.9)	(-1.9)		(6.1)	(6.1)									
Net purchase of goods and services	-0.018	0.37	0.37	0.37	1991		-3.59	3.59	-0.66	-0.38	0.79	2.04	0.95	0.35	0.34	1982-98
	(-0.6)	(4.8)	(4.8)	(4.8)			(-2.5)	(2.5)	(-4.2)	(-2.4)						
Interest payments	0.068	-0.184			1990, 1993	-2.80	-1.33		0.10		0.96	2.14	2.82	0.01	0.64	1982-98
	(3.5)	(-4.4)				(-4.4)	(-2.1)		(1.9)							
1983-1989	0.184															
	(8.5)															
Subsidies	-0.031	-0.325				-1.69					0.54	2.19	2.08	0.27	0.09	1982-98
	(-0.9)	(-3.5)				(-1.6)										
Social benefits	0.172	-0.087	-0.087	-0.087	1994-1995			-2.11			0.68	2.10	4.57	0.80	0.85	1982-98
	(7.2)	(3.5)	(3.5)	(3.5)				(-3.8)								
1982-1985	0.007															
	(0.3)															
Government investment					1981, 1992	2.46	2.90	-3.30			0.91	2.52	2.43	0.15	0.92	1980-98
						(4.2)	(3.98)	(-6.0)								
1980-1989	-0.062															
	(-3.7)															
Government net capital transfers*	-13.9					-0.099	0.151	-0.052			0.18	2.68	3.88	0.99	0.98	1986-98
	(-1.7)					(-1.4)	(1.5)	(0.9)								

• Estimated in absolute changes instead of growth rates.

Empirical results for Spain

Budgetary category		Explanatory variables (t-values)										Regression statistics			Stability test p-value of Chow forecast F test. Unrestricted equation, no dummies included		Sample
		Constant	EMU convergence dummies			Other significant policy change	Growth rate of GDP volume			Lagged dependent							
			1996	1997	1998		contemporaneous	one year lagged	two years lagged	one year lagged	two years lagged	R-squared	Durbin Watson	LB3	1990	1995	
		α_0	α_1	α_2	α_3		β_0	β_1	β_2	γ_1	γ_2						
Government current receipts																	
Direct taxes		-0.062				1986, 1990	1.78	1.78	1.78	-0.86	-0.37	0.97	2.30	1.86	0.85	0.55	1983-98
		(-5.8)					(10.1)	(10.1)	(10.1)	(-10.7)	(-5.2)						
	1980-1990	0.079															
		(5.8)															
Indirect taxes		0.024				1993	0.81			-0.28		0.81	1.70	1.85	0.62	0.68	1982-98
		(1.2)					(1.3)			(-1.6)							
	1980-1986	0.101															
		(5.9)															
Social security contributions						1985, 1995		1.30		-0.20	0.28	0.60	2.55	2.25	0.53	0.58	1983-98
								(3.9)		(-0.8)	(1.5)						
Other current income		0.075				1984, 1994	-2.37	-1.42	3.79	-0.36		0.86	2.55	3.69	0.61	0.98	1982-98
		(5.5)					(–2.1)	(-0.9)	(3.7)	(-2.6)							
Government current expenditure																	
Civil servant wage bill		-0.020					-0.60	2.06		-0.64	0.50	0.95	1.98	2.76	0.38	0.13	1983-98
		(-3.6)					(-2.3)	(6.8)		(-4.5)	(5.5)						
	1983-1992	0.014															
		(1.6)															
Net purchase of goods and services		0.068	-0.107				-1.78	1.78		-0.65	-0.18	0.77	2.38	2.42	0.02	0.94	1988-98
		(3.9)	(-2.7)				(-2.5)	(2.5)		(-3.7)	(-1.0)						
Interest payments		0.036					-2.82	2.82		0.32		0.81	1.96	3.09	0.85	0.90	1982-98
		(1.3)					(-1.8)	(1.8)		(2.1)							
	1980-1985	0.349															
		(5.0)															
Subsidies		-0.041				1988, 1993	0.60					0.97	1.73	1.03	0.99	0.94	1987-98
		(-3.0)					(1.5)										
Social benefits		0.0087		-0.018	-0.018	1983			1.64	-0.19		0.91	2.45	2.56	0.26	0.06	1982-98
		(1.6)		(-2.3)	(-2.3)				(10.3)	(-2.2)							
	1980-1990	-0.0054															
		(-0.9)															
Government investment		-0.081	-0.162						2.38	-0.19	-0.43	0.82	2.31	3.43	0.18	0.44	1983-98
		(-2.6)	(-2.4)						(2.6)	(-1.4)	(-3.4)						
	1980-1990	0.106															
		(2.8)															
Government net capital transfers*		67.6	-146.4	-146.4		1994	-0.051					0.49	2.15	1.83	0.71	0.38	1981-98
		(1.6)	(-2.0)	(-2.0)			(-1.8)										

* Estimated in absolute changes instead of growth rate

Empirical results for Sweden

Budgetary category		Explanatory variables (*t*-values)										Regression statistics			Stability test *p*-value of Chow forecast F test. Unrestricted equation, no dummies included		Sample
		Constant	EMU convergence dummies			Other significant policy change	Growth rate of GDP volume			Lagged dependent							
			1996	1997	1998		contemporaneous	one year lagged	two years lagged	one year lagged	two years lagged	R-squared	Durbin Watson	LB3	1990	1995	
		α_0	α_1	α_2	α_3		β_0	β_1	β_2	γ_1	γ_2						
Government current receipts																	
Direct taxes		0.020				1990-91	1.36					0.77	1.79	3.16	0.65	0.88	1980-98
		(1.6)					(3.0)										
	1980-1986	-0.010															
		(-0.7)															
Indirect taxes		-0.0092					1.04	1.28				0.43	1.82	0.75	0.23	0.74	1980-98
		(-0.6)					(1.7)	(2.1)									
Social security contributions		-0.021					1.16	0.99	2.06	-0.33	-0.56	0.81	2.20	0.63	0.91	0.57	1982-98
		(-2.1)					(2.5)	(2.2)	(4.3)	(-1.7)	(-2.8)						
	1984-1987	-0.091															
		(-4.5)															
Other current income		0.057				1988, 1993			-1.05	-0.23	-1.09	0.87	2.19	2.56	0.68	0.57	1982-98
		(4.9)							(-2.4)	(-1.6)	(-6.3)						
	1982-1985	0.176															
		(8.0)															
Government current expenditure																	
Civil servant wage bill		-0.0092				1990		0.45	0.84	-0.45	0.25	0.96	1.82	1.99	0.40	0.92	1982-98
		(-3.9)						(3.9)	(7.9)	(-6.2)	(3.3)						
	1982-1988	-0.024															
		(-7.5)															
Net purchase of goods and services		0.022				1990, 1995			-0.95		0.15	0.93	2.23	0.69	0.16	0.08	1982-98
		(3.4)							(-3.1)		(1.7)						
Interest payments		0.033					-2.68				0.58	0.51	2.10	1.72	0.96	0.43	1982-98
		(1.2)					(-2.2)				(3.6)						
Subsidies		0.0042		-0.127			-2.11				0.41	0.86	2.03	3.74	0.11	0.07	1982-98
		(0.4)		(-4.1)			(-4.8)				(2.6)						
	1982-1998	0.057															
		(3.9)															
Social benefits		0.039	-0.037	-0.037	-0.037	1992	-0.50					0.90	2.04	2.80	0.16	0.25	1980-98
		(7.8)	(-4.7)	(-4.7)	(-4.7)		(-2.9)										
	1980-1984	0.019															
		(3.3)															
	1985-1988	0.058															
		(8.5)															
Government investment		0.128			-0.603	1993	5.74	-0.94	-4.80	-0.68	-0.34	0.97	1.94	1.00	0.05	0.04	1982-98
		(3.9)			(-5.9)		(3.2)	(-0.3)	(2.8)	(-5.3)	(-3.6)						
	1982-1988	-0.139															
		(-3.9)															
Government net capital transfers*		10.7					-0.57			-0.44		0.61	2.02	3.05	0.59	0.32	1981-98
		(3.0)					(-4.6)			(-2.6)							

* Estimated in absolute changes instead of growth rate

Empirical results for the United Kingdom

Budgetary category	Explanatory variables (*t*-values)										Regression statistics			Stability test *p*-value of Chow forecast F test. Unrestricted equation, no dummies included		Sample
	Constant	EMU convergence dummies			Other significant policy change	Growth rate of GDP volume			Lagged dependent							
		1996	1997	1998		contemporaneous	one year lagged	two years lagged	one year lagged	two years lagged	R-squared	Durbin Watson	LB3	1990	1995	
	α_0	α_1	α_2	α_3		β_0	β_1	β_2	γ_1	γ_2						
Government current receipts																
Direct taxes	-0.014					1.38			0.38		0.43	1.90	0.24	0.17	0.25	1981-98
	(-0.9)					(2.7)			(2.0)							
Indirect taxes	-0.0060					1.65			-0.29	-0.29	0.35	2.13	0.49	0.56	0.76	1982-98
	(-0.4)					(2.7)			(-1.5)	(-1.5)						
Social security contributions					1989	1.31	-1.00	0.16	-0.55		0.93	2.10	3.31	0.42	0.99	1981-98
						(10.5)	(2.8)	(1.6)	(-2.3)							
1980-1983	0.040															
	(10.5)															
Other current income	0.104				1990	-4.28			-0.33	-0.33	0.74	1.42	3.05	0.26	0.99	1982-09
	(1.5)					(-1.8)			(-2.0)	(-2.0)						
Government current expenditure																
Civil servant wage bill**	-0.053	-0.171			1984			2.03			0.94	2.38	2.61	0.23	0.34	1980-98
	(-6.5)	(-10.7)						(5.7)								
Net purchase of goods and services	0.143		-0.116	-0.116			1.33	-1.33	-0.43		0.72	2.37	2.95	0.14	0.43	1981-98
	(7.2)		(-3.8)	(-3.8)			(2.9)	(-2.9)	(-2.7)							
1981-1998	0.047															
	(3.4)															
Interest payments	0.032						1.07	-1.07	0.43		0.50	1.86	1.43	0.69	0.79	1981-98
	(1.4)						(1.5)	(-1.5)	(2.3)							
1982-1991	-0.018															
	(-1.0)															
Subsidies					1995	-0.80	0.80		-0.62	-0.46	0.94	2.45	1.50	0.76	0.73	1984-98
						(-1.6)	(1.6)		(-6.4)	(-6.5)						
1986-1991	-0.223															
	(-13.1)															
Social benefits	0.075						-1.93				0.84	2.19	2.77	0.82	0.87	1980-98
	(12.5)						(-9.4)									
Government investment	0.030	-0.171	-0.171	-0.171		-4.04	4.04			-0.52	0.55	2.37	1.57	0.89	0.40	1982-98
	(0.9)	(-2.2)	(-2.2)	(-2.2)		(-2.4)	(2.4)			(-2.9)						
Government net capital transfers*	-781	-3613	-3613	-3613	1991			0.098	-0.32		0.66	2.50	2.60	0.84	0.62	1982-98
	(-1.4)	(-2.1)	(-2.1)	(-2.1)				(2.5)	(-1.8)							

* Estimated in absolute changes instead of growth rate

** Including a third order MA term that was necessary to account for third order residual serial correlation.