Published as Working Paper No. 26, Oesterreichische Nationalbank, 1998

Structural Budget Deficits and Sustainability of Fiscal Positions in the European Union

Peter Brandner[*), #)], Leopold Diebalek[*)], Helene Schuberth[*)]

February 10, 1998

*) Oesterreichische Nationalbank, P.O. Box 61, A-1011 Wien, Austria.
Peter.Brandner@oenb.co.at, Leopold.Diebalek@oenb.co.at, Helene.Schuberth@oenb.co.at
The views expressed are those of the authors and do not necessarily represent those of the Oesterreichische Nationalbank.
#) Austrian Institute of Economic Research, P.O. Box 91, A-1103 Wien, Austria.

We acknowledge helpful comments from Eduard Hochreiter, an anonymous referee of the Working Paper Series and participants of workshops held at the Deutsche Bundesbank and the Sveriges Riksbank. We also thank Daniel T. Dickler for excellent assistance in compiling the data.

Abstract

According to the Pact for Stability and Growth (PSG), in the medium term the net deficit should be close to balance or in surplus. We question the use of the net deficit as the only medium-term budgetary objective and as the main indicator for the assessment of fiscal policy. Hence, for assessing the short-term fiscal stance, we propose to analyze cyclically adjusted budget balances, whereas an assessment of sustainability of fiscal positions in the medium-term should be based on structural primary gaps.

The OECD, the EU and the IMF calculate structural budget balances by subtracting the balance of several cyclical revenue components and only one cyclical expenditure component from the overall net deficit, under the assumption of constant output elasticities. By means of a bootstrapping simulation we demonstrate that the assumptions of these traditional methods are too restrictive. They do not even allow to determine the sign of the cyclical balances for the EU-countries. To estimate structural budget balances, we suggest an alternative approach which is based on a statistical concept and identifies structural balances as a smooth trend.

Medium term sustainability of fiscal policy is analysed within the concept of structural primary gaps. This indicator shows to what extent the current structural primary balance deviates from the primary surplus that stabilizes the debt to GDP ratio. Again, the meaning of structural is based on the same statistical concept of trend extraction. For the EU-countries structural primary gaps are calculated, referring to the net debt and gross debt concept. According to the gross debt concept and based on forecasts of the OECD Economic Outlook (December 1997), fiscal policy of all EU-countries can be considered as sustainable at least in 1999.

Even if fiscal policy is already deemed sustainable in the medium-term, in some of the EU-countries structural balances will have to be further improved in order to bring fiscal positions close to balance or in surplus. Only then, compliance with the provisions of the PSG is assured.

1 Introduction

The requirement to fulfill the fiscal convergence criteria of the Treaty of Maastricht (TM) and the Pact for Stability and Growth (PSG)[1] has heated the debate about methodological issues with regard to the cyclical adjustment of fiscal balances. According to the PSG, in the medium-term the net deficit (net borrowing) to GDP ratio should be "close to balance or in surplus". However, the net deficit may exceed 3% of GDP under exceptional and temporary circumstances. As a consequence, the PSG implicitly acknowledges the need to distinguish between cyclical and structural components of the budget balance. Therefore, in assessing the short-term fiscal stance, the medium-term target may be interpreted as a target for the structural balance. Hence, maintaining the structural position close to balance or in surplus should ensure that the European Union (EU) member states do not violate the 3% reference value during "normal" economic downturns.[2]

Considering the more important aspect of the sustainability of fiscal positions—an issue going beyond short-term business cylce fluctuations—even a fiscal position of close to balance in the medium-term may not be sufficient to exclude the risk of ever increasing debt levels. Consequently, we employ the structural primary gap as an indicator for assessing the medium-term fiscal stance. It is defined as the difference between the actual structural primary balance and the debt stabilizing one. If the structural primary gap is close to balance or in surplus, fiscal positions can be assessed as beeing sustainable in the medium-term.

1.1 Assessing the short-term fiscal stance

Favouring an interpretation as above, the short-term fiscal stance can be adequately assessed if the self-correcting cyclical component from the net

[1]The Stability and Growth Pact consists of three parts: 1. Resolution No. 97/C 236/01 of the European Council, Amsterdam, 17 June 1997. 2. Council Regulation (EC) No. 1466/97 of 7 July 1997, on the strengthening of the surveillance of budgetary positions and the surveillance and coordination of economic policies. 3. Council Regulation (EC) No. 1467/97 of 7 July 1997, on speeding up and clarifying the implementation of the excessive deficit procedure.

[2]Sanctions are imposed if a EU member state fails to meet the 3% ceiling. However, in the case of a "severe" or "exceptional" recession, an exceptionality clause is applicable. An economic downturn is considered "exceptional" if there is an annual fall of real GDP of at least 2%. In the 1961–1996 period such "exceptionally severe recessions" occurred only 7 times for all 15 EU member countries. For the same period and countries, 30 "severe recessions", defined as a downturn with a negative annual real GDP growth of 0.75% or more, are identified (see Buti, Franco and Ongena 1997).

deficit is eliminated. Though the assessment of fiscal policy is based on a variety of indicators, sanctions are imposed if a participating member state fails to reduce its net deficit to GDP ratio below a certain reference value. The uniform 3% threshold implies different structural fiscal balances due to different degrees of sensitivity of budget balances to the business cycle. Countries whose budgetary receipt and expenditure components react more strongly to variations in the output gap (defined as the difference between actual and potential output) require lower structural deficits or higher structural surpluses in order not to exceed the reference value than countries with a lower sensitivity of budget balances to cyclical fluctuations.

The scepticism towards explicitly setting reference thresholds for structural balances in fiscal policy coordination procedures within the EU is primarily based on methodological grounds. Due to distinctly diverging results of the different calculation methods, net deficits still play the dominant role in assessing the stance of fiscal policy.

The present paper challenges this view by discussing a calculation method introduced by Cano and Kanutin (1996) which is simple, transparent and less demanding with respect to the data. Moreover, following this smoothed-ratio approach avoids some of the methodological and data problems arising from applying more sophisticated methods such as structural time series models (Jaeger 1990, Url 1997) or the methods applied by the OECD (Giorno, Richardson, Roseveare and Paul van den Noord 1995), the EU (1995) or the IMF (1993, 1995). In these more traditional approaches cyclical budget balances are calculated and subtracted from the net deficit to derive the structural deficit as a residual. Therefore the cyclically adjusted balances include also irregular components.

When calculating cyclical budget balances, OECD, EU and IMF consider different revenue categories, but only one expenditure category. Moreover, constant output elasticities are assumed. By means of a bootstrapping simulation we demonstrate that the variation of elasticities over the business cycle is so high that not even the sign of the cyclical balance can be statistically determined. Since our focus is on the structural balance, we follow—with some modification—the smoothed-ratio approach suggested by Cano and Kanutin (1996) and apply a time series technique to extract the structural balances directly, thereby avoiding the problems associated with the use of constant elasticities. Proceeding this way, we calculate structural balances for all EU-countries (except Luxembourg) on a disaggregated level considering five different government receipt and expenditure components.

It is important to note that the meaning of structural, as used in the smoothed-ratio approach, is based on a well defined statistical concept and

hence, does not necessarily correspond to the meaning of structural in the language of actual policy making, which refers—apart from one-off measures—to any discretionary policy measure as opposed to the impact of automatic stabilizers on budget balances. The smoothed-ratio approach only reflects those structural fiscal (policy) measures which have a permanent effect on budget balances. Within this approach, fiscal reforms that do not have a permanent effect are not interpreted as structural.

Among the methods of calculating structural balances there are important differences in treating one-off measures or irregular factors. Within the smoothed-ratio approach any fiscal measure that has a permanent effect on the fiscal position shows up in the structural balance, regardless of whether it reflects one-off measures or fiscal reforms. Therefore, the structural component based on the smoothed-ratio approach measures long-lasting discretionary policy measures, whereas the implicitly, as a residual derived, cyclical component cannot be interpreted as purely endogenous relative to the business cycle, since it also contains irregular measures that do not have a permanent effect. Within the methods applied by international organisations such as OECD, EU and IMF, the cyclical component only reflects measures endogenous to the business cycle and hence, subsumes discretionary as well as irregular measures under the structural component of the budget balances. Structural balances derived from these indirect methods are therefore more volatile than structural balances based on the smoothed-ratio approach that calculate stuctural balances directly.

1.2 Assessing the medium-term fiscal stance

While for the short-term policy horizon it is important to analyze cyclically adjusted balances, aspects of sustainability are more relevant for assessing the medium-term stance of fiscal positions. Unfortunately, the PSG stipulates a uniform "close to balance" medium-term reference value of the net deficit to GDP ratio. It is set without considering the different fiscal stabilization paths of individual countries. Therefore, in a next step, structural primary balances (structural balances without interest payments) are estimated to analyze the medium-term sustainability of fiscal policy. Actual structural primary balances are calculated and set against those structural primary balances which are necessary to stabilize the debt to GDP ratio. This difference is called the structural primary gap. Sustainability in the medium-term is achieved if current fiscal policy is capable of stabilizing or reducing the debt to GDP ratio, e.g. of showing a structural primary gap which is "close to balance or in surplus". The results are sensitive as to

whether the calculations of the structural primary gap are based on the gross debt or the net debt to GDP ratio. If based on the economically more appropriate net debt to GDP ratio, in 1999, France is the only country that shows structural primary surpluses, defined as the difference between revenues and expenditures (without net interest payments) that are below those required to stabilize the net debt to GDP ratio. Calculations based on the gross debt concept yield more positive results: All countries manage show balanced or positive structural primary gaps and subsequently their fiscal positions can be considered sustainable in the medium-term.

1.3 Assessing the long-term fiscal stance

The concept of long-term sustainability takes into account the impact of future economic and demographic trends which are not reflected in current deficit and debt figures. Long-term sustainability is secured if the present fiscal policy can be maintained in the future, given expected economic and demographic trends. One approach to analyze long-term sustainability is "Generational Accounting" (Auerbach, Gokhale and Kotlikoff 1991). In order to be sustainable in the long run, the present value of the future government spending must equal the stock of current government net wealth plus the present value of all future net tax payments (taxes minus transfers) of all living and future generations. This intertemporal budget constraint implies that any increase in government consumption without a corresponding increase in net taxes of current generations has to be financed by net taxes of future generations. The difference between net taxes, paid by the current generation and net taxes imposed on future generations provides important information about the long-term stance of fiscal policy. Generational accounting models calculate an intergenerational burden ratio as the ratio of net taxes of future generations to net taxes of current generations. Under the assumption of no change in fiscal policy a ratio above unity indicates a redistribution, that burdens future generations. In this case, increasing the net tax burden of future generations can only be avoided by a change in fiscal policy. While this concept of long-term sustainability is quite important, it goes beyond the scope of this paper.

1.4 Outline of the paper

The paper proceeds as follows: Section 2 surveys different estimation methods applied by international organizations which have in common to derive structural balances indirectly. Section 3 demonstrates by means of simula-

tion that approaches based on constant elasticities as surveyed in section 2 do not allow to estimate cyclical balances with a precision required to adjust the overall deficit appropriately. In section 4 we present and discuss a direct method of calculating structural balances which is then applied to obtain the results for the EU-countries. In section 5 we switch from discussing and assessing the short-term fiscal stance to medium-term sustainability. Based on the same methododical approach as before, structural primary balances are estimated in order to compare them with those structural primary balances which are necessary to stabilize the debt to GDP ratio. Section 6 concludes.

2 Estimating Structural Budget Balances - An Overview

2.1 Interpretations of structural balances

In general, the budget deficit can be split up into a cyclical and a structural component (ignoring irregular factors for the moment). On a disaggregated level, revenue categories i ($R_{i,t}$) and expenditure categories j ($E_{j,t}$) at time t can be decomposed as:

$$R_{i;t} = R_{i;t}^{(c)} + R_{i;t}^{(s)} \qquad \text{and} \qquad E_{j;t} = E_{j;t}^{(c)} + E_{j;t}^{(s)} \tag{1}$$

where superscripts (c) denotes the cyclical and (s) the structural component of the individual category. The budget categories and hence, the decomposition into cyclical and structural component, can also expressed as ratios to GDP:

$$r_{i;t} = r_{i;t}^{(c)} + r_{i;t}^{(s)} \qquad \text{and} \qquad e_{j;t} = e_{j;t}^{(c)} + e_{j;t}^{(s)} \tag{2}$$

where $r_{i;t} = \left(\frac{R_i}{Y}\right)_t$ denotes the revenue to GDP ratio for the i-th revenue category and $e_{j;t} = \left(\frac{E_j}{Y}\right)_t$ the expenditure to GDP ratio for the j-th expenditure category.

In most of the studies, the structural component is indirectly calculated as a residual by subtracting the cyclical component, the latter mainly reflecting built-in stabilizers and anticyclical fiscal policy, from the respective budgetary variable. In this way, a component of the budget deficit is isolated which is unaffected by the business cycle. Structural balances may therefore not be interpreted as solely reflecting discretionary fiscal policy actions with permanent impact. When calculated as a residual, it may also mirror changes in the demographic composition of the population or factors such as persistent changes in potential output growth. Furthermore, irregular,

one-off factors will show up in the structural component. Since an exact treatment of such factors would require a detailed knowledge of fiscal institutions as well as a full understanding of how the economy works, and since each one-off measure has both a temporary and a permanent impact on the budget, they are not taken into account as a separate component. Depending on the approach chosen in decomposing fiscal balances, the impact of irregular factors will be distributed between the two components in (1). When interpreting indirectly estimated structural budget deficits these methodological shortcomings have to be taken into account.

Within the traditional approaches, the cyclical adjustments are made within a three-step procedure. The first step involves the estimation of the output gap—defined as the difference between actual and potential (trend) output—as a business cycle indicator. As a second step, the reaction of budgetary categories to output gap variations is captured by means of output elasticities. Finally, the overall deficit is adjusted according to the results obtained in the second step.

Barrell, Morgan, Sefton and in't Veld (1994) give a usefull and instructive discussion of the methods followed by OECD, IMF and EU. In their comparative study they focus on the sensitivity and importance of the way the output gap is calculated. Trend in output was extracted via the Hodrick-Prescott filter (following the EU approach), a linear trend model (following an earlier OECD approach), and a method they suggest, which is based on the Beverage-Nelson decomposition in a multivariate setting. One of their conclusions is that there is a considerable amount of uncertainty surrounding trend output, and the difference between the OECD's and EU's estimated structural balances are due to the different methods of estimating trend output and adjusting budget components.

The simulation exercise we perform in section 3 is somewhat orthogonal to Barell et al. (1994), since we focus on the influence of the uncertainty surrounding the output elasticities of the various budget catagories, given a series for the output gap. We show that the calculation of structural balances is not only sensitive to the technique of estimating potential output, but also to the non-constancy of the output elasticities over the business cycle.

2.2 OECD

2.2.1 Potential output

The OECD estimates a two-factor Cobb-Douglas production function for the business sector to derive potential output (Giorno et al. 1995):

$$y_t^{(B)} = \alpha n_t^{(B)} + (1-\alpha) k_t^{(B)} + a_t \tag{3}$$

where $y_t^{(B)}$ denotes the logarithms of business sector value added. $n_t^{(B)}$ and $k_t^{(B)}$ are the logarithm of labor input and capital stock of the business sector. α is defined as the elasticity of output with respect to labor input, which—under the usual assumptions—corresponds to the average labor share in production. The error term a_t is interpreted as the total factor productivity. The trend rate of total factor productivity (a_t^*) is derived by smoothing the total factor productivity with the Hodrick-Prescott (HP-) filter (Hodrick and Prescott 1981). Potential output of the business sector ($y_t^{(B)*}$) is then estimated as a function of the trend rate of total factor productivity (a_t^*), the capital stock (k_t) and "potential" labor supply (n_t^*), e.g. labor supply which is consistent with the "non-accelerating wage rate of unemployment" (NAWRU).

$$y_t^{(B)*} = \alpha n_t^{(B)*} + (1-\alpha) k_t^{(B)} + a_t^* \tag{4}$$

Potential output for the whole economy is obtained by adding actual value added of the government sector (which is taken to be equal to potential output in that sector) to business sector potential output.

2.2.2 Structural balances

Structural budget balances ($B_t^{(s)}$) are then calculated as the difference between the sum of p structural revenue components ($R_{i;t}^{(s)}$) and structural government expenditures ($E_t^{(s)}$), where capital spending is excluded. Capital spending is regarded as a non-cyclical expenditure category and is therefore subtracted separately. On the revenue side, the OECD disaggregates into four revenue categories: personal and corporate taxes, social security contributions and indirect taxes.

$$B_t^{(s)} = \sum_{i=1}^{p} R_{i;t}^{(s)} - E_t^{(s)} - \text{capital spending} \tag{5}$$

Structural revenue and expenditure categories are estimated by adjusting the observed budgetary categories by their cyclical components:

$$R_{i;t}^{(s)} = R_{i;t} \left(\frac{Y_t^*}{Y_t} \right)^{\gamma_i} \qquad \text{and} \qquad E_t^{(s)} = E_t \left(\frac{Y_t^*}{Y_t} \right)^{\beta} \tag{6}$$

where Y_t denotes output and Y_t^* denotes potential output. The revenue elasticities (γ_i) for i budgetary categories and the expenditure elasticity (β) with respect to output are assumed to be constant over time and represent the automatic response to cyclical variations.

For each of the budgetary categories, different elasticity estimates are used. The ratio of marginal to average tax rates, converted to a GDP elasticity basis, is regarded as a proxy for the elasticity of personal taxes and social security contributions. For all countries, a unit elasticity with respect to output is assumed for indirect taxes. The elasticities of corporate taxes average 3.0 on a GDP-weighted basis across countries.

The elasticity of primary government expenditures with respect to output (β) are estimated by multiplying the elasticity of the unemployment rate to output (inverse Okun coefficient) with the elasticity of unemployment benefits to unemployment. Thereby, an estimate of the elasticity of unemployment related expenditures with respect to output is obtained. This elasticity is then applied according to the unemployment expenditures' share of all government expenditures. Even with an increase in unemployment, the share of the unemployment expenditures on all goverment expenditures remain in general below 10%.

The OECD calculates—according to (5)—structural balances in levels. In their publications (e.g. the Economic Outlook), however, the OECD expresses structural balances as percentage of potential output.

2.3 IMF

2.3.1 Potential output

The method of estimating potential output is not the same for all countries. For a number of countries, potential output is related to equilibrium in the labor market as given by the NAIRU and estimated within the framework of a Cobb-Douglas production function (IMF 1993). Contrary to the OECD, the production elasticity with respect to labor (the labor share) is not estimated, but approximately set at the level of the wage to GDP ratio. In other cases, estimates of potential output are based on statistical estimates of trend output. There are also countries where the IMF staff adjusts the estimates obtained by one of their methods (IMF 1995).

2.3.2 Structural balances

Whereas the OECD calculates structural balances in levels, the IMF bases its calculations of structural balances on direct estimates of cyclical revenue

and expenditure categories as ratios to GDP. The structural deficit to GDP ratio $b_t^{(s)} = \left(\frac{B^{(s)}}{Y}\right)_t$ is then defined as the difference between the sum of p structural revenue and a structural expenditure component:

$$b_t^{(s)} = \sum_{i=1}^{p} r_{i;t}^{(s)} - e_t^{(s)} \tag{7}$$

where the structural revenue GDP and expenditure GDP ratios are derived by subtracting the actual from the cyclical components:

$$r_{i;t}^{(s)} = r_{i;t} - \theta_{i;R} \cdot \left(\frac{Y_t - Y_t^*}{Y_t^*}\right) \qquad \text{and} \qquad e_t^{(s)} = e_t - \theta_E \cdot \left(\frac{Y_t - Y_t^*}{Y_t^*}\right) \tag{8}$$

The cyclical response parameters $\theta_{i;R}$ and θ_E denote the cyclical response of the revenue and expenditure ratios to an increase of 1 percentage point in the output gap and are related to the elasticities in the following way (IMF 1993):

$$\theta_{i;R} = r_{i;t} \cdot (\gamma_i - 1) \qquad \text{and} \qquad \theta_E = e_t \cdot (\beta - 1)$$

For some countries, the IMF (1995) approximates the relation between the elasticities and the response parameters slightly different as above by

$$\theta_{i;R} = r_{i;t} \cdot \gamma_i \qquad \text{and} \qquad \theta_E = e_t \cdot \beta$$

instead.

One advantage of expressing the estimates as ratios to GDP is that the cyclical response parameters are internationally comparable, whereas the elasticities—as calculated by the OECD—have to be weighted by the country specific revenue and expenditure to GDP ratios in order to be comparable.

The IMF bases its estimations on five different revenue categories (personal income taxes, corporate income taxes, indirect taxes, social security contributions and other revenues), the elasticities being partly drawn from OECD estimates. A weighted average of the five elasticities is then calculated, using the average share of the revenue component in total revenue during the 1980s as weights. On the expenditure side, responsiveness to cyclical output reflects the responsiveness of unemployment insurance to cyclical variations of unemployment around the NAIRU. The IMF staff uses OECD estimates of revenue elasticities and its own estimates of the responsiveness of unemployment rates to cyclical variations in output.

2.4 European Union

2.4.1 Potential output

Contrary to the production function approach followed by the OECD and (for some countries) by the IMF, the European Union (EU) applies the Hodrick-Prescott filter to estimate potential output. The idea of this filter is to decompose a (possibly) nonstationary time series such as actual output into a stationary cyclical component and a smooth trend component (y_t and y_t^* denote the logarithms of actual and trend/potential output, respectively) by minimizing the variance of the cyclical component subject to a penalty for the variation in the second difference of the trend component (Hodrick and Prescott 1981). This results in the following constraint least squares problem

$$\text{Min} \sum_{t=1}^{T} (y_t - y_t^*)^2 + \lambda \sum_{t=2}^{T-1} \left[(y_{t+1}^* - y_t^*) - (y_t^* - y_{t-1}^*) \right]^2 \tag{9}$$

The first term in (9) is a measure of fit. The second term is a measure of smoothness. The Lagrange multiplier λ is associated with the smoothness constraint and must be set a priori. As a weighting factor it determines how smooth the resulting output series is. The lower λ, the closer potential output follows actual output. When working with quarterly data, Hodrick and Prescott (1981) suggested to choose λ =1600. This corresponds to a value of 7 for annual data. The EU bases the estimation of potential output on λ=100.

One weakness of this two-sided filter is the endpoint problem. At the beginning or the end of a time series the filter behaves more like a one-sided filter. Since the main focus in analyzing potential output and structural balances lies in the present and the near future, the asymmetric effects of the filter can be reduced by using projections, an approach also followed by the EU in estimating potential output.

2.4.2 Structural balances

Structural deficits $b_t^{(s)} = \left(\frac{B^{(s)}}{Y}\right)_t$ which are expressed as ratios to GDP are derived by substracting the cyclical budget balances to GDP ratio $(r_{i;t}^{(c)} - e_t^{(c)})$ from the actual budget balances $(r_{i;t} - e_t)$.

$$b_t^{(s)} = (r_{i;t} - e_t) - (r_{i;t}^{(c)} - e_t^{(c)}) \tag{10}$$

The cyclical revenue component ratio is the output-gap multiplied with the revenue elasticities (γ_i) with respect to output times the average revenue component to GDP ratio ($r_{i;t}$):

$$r_{i;t}^{(c)} = r_{i;t} \cdot \gamma_{i;R} \cdot (\frac{Y_t - Y_t^*}{Y_t^*}) \qquad \text{and} \qquad e_t^{(c)} = e_t \cdot \beta \cdot (\frac{Y_t - Y_t^*}{Y_t^*}) \tag{11}$$

The EU partly draws on the OECD estimates of revenue and expenditure elasticities with respect to output. A weighted average revenue elasticity from the elasticities of the four revenue categories (personal and corporate taxes, social security contributions and indirect taxes) is derived. Herewith, structural balances can be calculated, even if data for the different revenue categories are not yet available.

The EU considers all expenditure categories except unemployment benefits as not being affected by the business cycle. To derive an estimate of the elasticities of unemployment-related expenditures with respect to output (β) the elasticity of the unemployment rate to output (inverse Okun coefficient) is multiplied with the elasticity of umemployment benefits with respect to the unemployment rate.

2.5 Structural time series approach

One drawback of the approaches applied by international organizations is that the elasticities of budgetary categories with respect to output are assumed to be constant over time. This might be a too restrictive assumption, since consolidation programs and tax reforms will change the cyclical sensitivity of budgetary categories in a distinctive way. If estimations of structural balances are based on constant averages of elasticities estimated for specific years, the extracted cyclical component might be biased.

An alternative approach allowing for time-varying elasticities was proposed by Jaeger (1990).

$$\ln B_{i;t} = \mu_{i;t} + \delta_{i;t} \ln Y_t^* + \varepsilon_{i;t} \ln \left(\frac{Y_t}{Y_t^*} \right) + v_{i;t} \tag{12}$$

Each observed budgetary category ($B_{i;t}$) is decomposed into a structural component, modelled as a linear function of nominal potential output (Y_t^*) with time varying fiscal policy parameters ($\mu_{i;t}$ and $\delta_{i;t}$), and a cyclical component. The latter depends on the output gap $\left(\ln \frac{Y_t}{Y_t^*}\right)$, measured as percentage deviation of actual from potential output. The elasticity of the budgetary category with respect to the output gap ($\varepsilon_{i;t}$) is also changing

over time. The regression error $v_{i;t}$ is white noise. The time-varying parameters are specified as independent random walks. Since the variances of the parameters are not well defined under that specification, Jaeger bases the Maximum Likelihood estimation on the prediction error decomposition method, which is calculated via the Kalman filter.

Unfortunately, the asymptotic properties of this time varying parameter model are not well defined. When estimating this kind of model, above all, the exogenous variables must be bounded from above and non-stochastic (Harvey 1989). As Url (1997) pointed out, regardless of its stochastic characteristics, nominal potential output cannot be regarded as bounded from above. As an alternative, he suggested to estimate the model, including the same exogenous variables as in Jaeger (1990), but to allow in (12) only for a variation in the trend component $\mu_{i;t}$, which is supposed to capture discretionary fiscal policy measures. The difference to Jaeger's model is that the long run elasticity with respect to potential output (δ_i) as well as the short run elasticity with respect to the output gap (ε_i) are assumed to be constant.

$$\ln B_{i;t} = \mu_{i;t} + \delta_i \ln Y_t^* + \varepsilon_i \ln \left(\frac{Y_t}{Y_t^*} \right) + v_{i;t} \tag{13}$$

When specifying the model in this way, it is assumed that fiscal policy shifts have no effect on the degree of cyclical sensitivity of budgetary categories, but result in a variation in the trend component. To allow for a flexible interpretation of the stochastic trend component, it is furthermore decomposed into level and slope components:

$$\mu_{i;t} = \mu_{i;t-1} + \beta_{i;t-1} + \eta_{i;t} \tag{14}$$

$$\beta_{i;t} = \beta_{i;t-1} + \zeta_{i;t} \tag{15}$$

The slope component ($\beta_{i;t}$) is modelled as a random walk process, the white noise disturbances $\eta_{i;t}$ und $\zeta_{i;t}$ are mutually uncorrelated. Depending on the variances of the slope component and the level component, various interpretations of the stochastic trend are possible. If the variances are zero, equation (13) becomes a standard regression model.

2.6 Cyclical fiscal balances: results of the EU's and the OECD's method compared[3]

The graphs in annex 1 give an impression of the differences in cyclical balances between the EU's and OECD's estimation method. The differences do not follow a systematic pattern, they mainly seem to reflect different output-gap calculation methods. The most striking feature is that for some periods cyclical balances differ by an amount that is not distinctively lower than the cyclical balance itself.

The graphs in annex 2 highlight the weaknesses associated with deriving structural balances indirectly by substracting the cyclical fiscal balances from the net deficit. The graphs compare cyclical balances calculated with both the EU's and the OECD's method to the cyclical balances according to the smoothed-ratio approach. Since within the smoothed-ratio approach cyclical/irregular fiscal balances are derived as a residual by substracting the structural component from the net deficit, they are not only more volatile than the directly derived cyclical balances of the EU's and the OECD's method; for some periods they even show the opposite sign. The quite different pattern of the cyclical/irregular fiscal balances of the smoothed-ratio approach is due to the fact that in addition to the impact of automatic stabilizers (and fiscal policy measures endogenous to the business cycle) they also contain the impact of discretionary measures with no long-lasting effect on fiscal balances, such as one-off measures. Within the EU's and OECD's method, such irregular events, which sometimes are of considerable magnitude, are included in the structural component, though they can hardly be interpreted as structural.

3 Bootstrapping output elasticities

In this section, we evaluate the effect of the non-constancy of elasticities on the calculation of the cyclical budget balances. For the empirical work, data are taken from the OECD database and correspond to the OECD Economic Outlook No 62, December 1997.

[3]Figures of the cyclical balances are taken from the EU's and OECD's latest economic forecasts: European Commission. Economic Forecasts, Autum 1997, and OECD Economic Outlook, December 1997.

3.1 Design of the simulations

In a first step, we calculate point elasticities of the following budget categories with respect to GDP. On the revenue side, we distinguish direct taxes of households, direct taxes of the business sector, indirect taxes, social security contributions, and the difference of these four categories to the current receipts. On the expenditure side we distinguish government consumption, subsidies, social security benefits, and the difference to the current disbursements. While most of the categories show point elasticities with a more or less stable mean, which can be interpreted as a long run elasticity, the amount of variation around the mean is substantial.[4] This observation holds across all countries.

In the next step, we map the observed variation in the short-term point elasticities as cyclical budget components, given the country specific business cycle. The design of the simulation exercise basically resembles the approach adopted by the OECD to calculate the cyclical budget deficits:

$$R_{i;t}^{(c)} = R_{i;t} \cdot (1 - (\frac{Y_t^*}{Y_t})^{\gamma_i^{(l)}}) \qquad \text{and} \qquad E_{i;t}^{(c)} = E_{i;t} \cdot (1 - (\frac{Y_t^*}{Y_t})^{\beta_i^{(l)}}) \tag{16}$$

where the superscript (l) refers to l-th simulation, $l = 1, \ldots, 1000$. The elasticities γ_i and β_j are drawn from the empirical distribution. The extremes (minimum and maximum elasticities of each component) are deleted to prevent any influence of outliers on the results. The output gap is obtained as the cyclical component of HP-filtered GDP ($\lambda = 7$). The l-th cyclical budget balance for each country is obtained by aggregating over the various budget components:

$$B_t^{(c)} = \sum R_{i;t}^{(c)} - \sum E_{i;t}^{(c)} \tag{17}$$

This method of calculating cyclical balances differs from the OECD's method in two respects: First, the calculation is based on a more disaggregated level (especially on the expenditure side); second, the business cycle is not derived from a production function approach, but calculated with the HP-filter. The first difference has an influence on the results, whereas they are not sensitive to the second difference.

[4] We are aware that point elasticities comprise systematic as well as erratic effects and hence, may show more variation than elasticities estimated from a model. However, we are facing the following trade-off: On the one hand, the use of point elasticities which are easily derived but may also contain residual effects, and on the other hand, the risk of deriving elasticities from a probably misspecified model. Since we often failed to find econometrically correct specified models, we decided to use point elasticities.

3.2 Results

The distribution of cyclical budget balances, expressed as ratios to GDP, is shown in annex 3. To be on the safe side and recognizing that the use of simple point elasticities may overstate the variation of the "true" elasticities, only the 90% confidence interval is considered. The mean and the median of the 1000 simulated cyclical balances are also plotted.

Two main results arise. First, with only a few exceptions, not even the sign of the cyclical balances can be determined. This is due to the fact that the variation of elasticities over the business cycle is so high. Second, in most of the years and across countries, the mean and the median of the simulated cyclical budget balances are close to zero. This result is obtained because we also consider various budget categories on the expenditure side as sensitive to the business cycle. In simulations, when only social security benefits are assumed to react to the business cycle, the means of the simulated cyclical balances are much closer to the figures of cyclical balances estimated by the OECD, EU and the IMF.

In order to examine whether the results are sensitive to the way the business cycle is calculated, the same simulations were performed with an HP-filtered output gap, where λ was set to 100. The charts look quite similiar, but the size of the cyclical deficits increases by a factor of around three, because a higher value of λ has the effect that the amplitude of the corresponding output gap increases. While this variation in the simulation points to the importance of the business cycle series for the actual figures of the cyclical balances, the conclusion, that for most of the countries even the sign of the cyclical balances may not be determined, remains unaltered.

4 Direct approach of estimating structural balances

4.1 Smoothed-Ratio Approach

One weakness of the indirect methods applied by international organizations is the assumption of constant elasticities of budgetary catageories with respect to output. Apart from the effects of fiscal policy measures on the variance of elasticities, it is not reasonable to assume that elasticities do not vary in the course of the business cycle.

To circumvent these problems we follow Cano and Kanutin (1996) and choose a direct approach of estimating structural balances by means of a time series technique. However, we modified their approach in two respects:

First, instead of looking only at the aggregate expenditure- and revenue to GDP ratio we performed the analysis on a disaggregated level with five expenditure and five revenue budget components. Second, we did not follow their argument to use a different λ parameter for the HP-filter for smoothing ratios.[5]

In a first step, the budgetary categories, expressed as ratios to GDP, are decomposed into a trend and a cyclical component by the Hodrick-Prescott filter[6]:

$$r_{i;t} = r_{i;t}^{(c)} + r_{i;t}^{(s)} \qquad \text{and} \qquad e_{j;t} = e_{j;t}^{(c)} + e_{j;t}^{(s)} \tag{18}$$

The revenue to GDP ratio for each budgetary category i is expressed by $r_{i;t} = \left(\frac{R_j}{Y}\right)_t$, the expenditure to GDP ratio by $e_{j;t} = \left(\frac{E_j}{Y}\right)_t$. Again, superscript (c) denotes the cyclical, and (s) the trend component of each variable.

The structural deficit to GDP ratio $b_t^{(s)} = \left(\frac{B^{(s)}}{Y}\right)_t$ is derived as the difference between the sum of p structural (trend-)revenue to GDP categories and q structural (trend-)expenditure to GDP categories:

$$b_t^{(s)} = \sum_{i=1}^{p} r_{i;t}^{(s)} - \sum_{j=1}^{q} e_{j;t}^{(s)} \tag{19}$$

The application of this easily implemented detrending technique for estimating structural balances directly exhibits several advantages compared to the methods applied by international organisations.

The HP-filter is relatively judgment free since only one parameter, namely the imposed length of the business cycle, has to be fixed. However, there is also the possibility to estimate the parameter λ, which is then optimal in a statistical sense. This could be appropriate for actual policy making purposes if no agreement on a uniform λ is obtained.

Since the indirect methods of the OECD, EU and IMF measure the non-cyclical component when estimating structural balances, this not only includes the effects of persistent changes in output growth on budget balances but also temporary, irregular events. While a permanent change in potential output growth would also be attributed to the structural budget balance,

[5]Cano and Kanutin argued that, since the GDP ratios are smoother than the original revenue and expenditure series in levels, a different (smaller) λ would be more appropriate. However, because the focus and hence, the trend/cycle decomposition given by the choice of λ (which region in the frequency range will be eliminated) is on the GDP ratios, we did not set λ to 1.

[6]In our estimates with annual data, the Lagrange multiplier λ was set at 7. This corresponds to a value of 1600 for quarterly data, where the cycle is assumed to last about 32 quarters.

any transitory non-cyclical events are not included in the structural balance when applying the direct estimation method.

Another advantage is the linearity of the HP-filter: the trend or structural components of the budget catagories at the disaggregated level sum up to the structural component of the HP-filtered overall deficit. Since this approach is not very demanding with respect to data (only the budget balances and GDP are required), a detailed analysis of revenues and expenditures at a disaggregated level is possible. It should be emphasized that the OECD, IMF and EU assume that only expenditures related to unemployment are sensitive to cyclical output movements. It can be easily argued that other elements of government expenditures also vary with the business cycle.

A drawback of the method is associated with the specific smoothing properties of the HP-filter: Abrupt changes in fiscal policy, especially at the end of the time series are not visible as such; depending on the value of λ they are smoothed over a longer time period. Another problem are the above mentioned asymmetric effects of the filter due to the endpoint problem. To give the estimates of the current period more robustness, the time series of the individual budgetary categories are extended by projections. Since the PSG stipulates that Stability respective Convergence Programs[7] shall be submitted to the Council and the Commission, which contain information about paths for the general government surplus/deficit to GDP ratio, the endpoint problem of the HP-filter can be reduced. The projections shall cover at least the following three years.

4.2 Results

4.2.1 Stylized facts on cyclical components

The standard deviation of the cyclical component of a budget category may be used as a rough indicator of how sensitive it reacts to the business cycle (see annex 4).

Interestingly, both aggregate current revenues and expenditures show less marked deviations than the business cycle as a whole (defined by the output gap). Except for Denmark, the standard deviations of current expenditures are in general larger than those of current revenues. Comparing social security contributions with benefits, in most countries the benefits show a

[7]Member states which participate in Stage III shall submit Stability Programs, whereas non-participating member states shall submit Convergence Programs. These programs are intended to give information necessary for the purpose of multilateral surveillance at regular intervals under Article 103 of the TM (see Council Regulation (EC) No 1466/97, Section 2 and 3).

significant higher cyclical variation than contributions. The opposite can be observed in the Netherlands, Portugal and Sweden, while in Austria and Spain the standard deviation of both categories are of the same size.

It is striking that also interest payments are subject to a noticeable cyclical variability in some countries (Greece and Portugal in particular, but also Sweden, Italy and Denmark). Whereas the traditional approaches of estimating structural balances only consider unemployment-related payments as sensitive to the business cycle, annex 4 shows the cyclical sensitivity of the other expenditure categories.

4.2.2 Structural balances on a disaggregated level

For the countries under review structural balances on a disaggregated level are calculated, considering five revenue and expenditure components. The graphs in the annex 5a–l cover the period 1970–1999 (1997–1999: forecasts by OECD, Economic Outlook No. 62, December 1997). They show that in the second half of the 1990s, in France, Great Britain, Greece, Sweden, Italy and Portugal, the structural current revenue to GDP ratio (annex 5a) is still rising. A declining trend can be observed in Austria, Belgium, Denmark, the Netherlands, Germany, Ireland and Spain.

With the exception of Germany, the structural ratio of direct taxes paid by corporations (annex 5c) has increased or stayed at recent levels in all countries.

Direct tax revenues raised from private households (annex 5b) show a quite different pattern across countries: their structural component shrank in Germany, Spain, Denmark, Ireland and considerably so in the Netherlands; it more or less remained unchanged in Great Britain, Finland, Belgium, Italy and Sweden. It rose in Austria, France, Greece and Portugal. Apart from the trends, also the levels of the ratios are remarkabley different.

Except for Austria, Finland, Germany, Greece and Ireland, indirect taxes (annex 5d) are of growing importance in all countries under review. Countries starting from a high ratio could find it difficult to raise additional revenues from indirect taxes in the long run.

In the second half of the 1990s, the current expenditure to GDP ratio (annex 5g) in nearly all EU-countries has been reduced. With regard to the expenditure components, interest payments (annex 5k) are of particular interest, because an increase in that component could indicate—disregarding one-off corrections of the stock of debt ("stock-flow adjustments")—that ceteris paribus the public debt will further increase in absolute terms. In Germany, Finland and Sweden, an upward trend in the structural interest

payments to GDP ratio is observed. The significant downward trend in Portugal, Ireland, Greece, Belgium and Italy is remarkable.

In countries, where the "deficit weight" of the social security system is high, the gap between structural social insurance contributions and benefits point to the need for further consolidation efforts. In the last few years, the gap was narrowed in Sweden, Denmark and Finland. In Sweden, the growth rate of the structural benefits to GDP ratio (annex 5j) is now declining faster than the corresponding growth rate of the structural contributions to GDP ratio (annex 5e) is increasing.

5 Structural budget balances and sustainability

Sustainability in the medium-term may be defined as a situation where current fiscal policy is capable of stabilizing the debt to GDP ratio, the intuition behind being that rising debt to GDP ratios will increase the financial burden in the future.

5.1 Estimating structural primary balances

One medium-term fiscal indicator of particular importance is the primary gap, which shows to what extent current primary balances—defined as budget balances minus interest payments for the public debt—deviate from those primary balances necessary to stabilize the debt to GDP ratio (Winckler, Hochreiter and Brandner, 1997). According to the TM, the debt criterion is based on gross debt figures of the general government. However, though difficult to apply for statistical reasons, from an economic point of view the net debt is a more appropriate indicator of government debt, since gross financial assets have to be netted out against gross financial liabilities (Buiter, Corsetti and Roubini 1993). Therefore, the structural primary gap is calculated according to the net- as well as to the gross concept. The structural primary gap based on the net concept is the difference between actual structural primary balances (structural revenues minus structural expenditures minus net interest payments) and the primary balances that stabilize the net debt to GDP ratio. According to the gross concept the structural primary gap is calculated by substracting primary balances (structural revenues minus structural expenditures minus gross interest payments) from gross debt to GDP ratio stabilizing primary balances (see graphs in annex 6).

The starting point of the analysis is the well-known book-keeping relation of debt dynamics.

$$b_t - b_{t-1} = (r_t - g_t)b_{t-1} + pd_t - h_t \tag{20}$$

The change in the debt to GDP ratio ($b_t - b_{t-1}$) is the sum of three components. In equation (20) the first term is the debt to GDP ratio of the last period (b_{t-1}) multiplied by the growth adjusted interest rate, e.g. difference between the interest rate and the growth rate of GDP ($r_t - g_t$). The second term denotes the primary deficit ratio (pd_t), the third term refers to seigniorage, defined as the change of high powered money, and again expressed as a ratio to GDP. As long as the interest rate exceeds the growth rate, primary surpluses $\overline{pd_t}$ are necessary to stabilize a given debt to GDP ratio b_{t-1}:

$$\overline{pd_t} = -(r_t - g_t)b_{t-1} + h_t \tag{21}$$

Structural primary balances are derived within the same methodological framework, namely by interpreting the trend component of the variables as structural. For the calculations, implicit interest rates[8], GDP growth and seigniorage[9] in (21) are substituted by the trend component of the respective variables (as calculated with the HP-filter with $\lambda = 7$) :

$$\overline{pd_t^{(s)}} = -(r_t^{(s)} - g_t^{(s)})b_{t-1} + h_t^{(s)} \tag{22}$$

We apply this general method of assessing medium-term sustainability to structural budget balances by calculating primary structural gaps defined as the difference between $pd_t^{(s)}$ and $\overline{pd_t^{(s)}}$: At any point in time, structural primary balances are compared to hypothetical, debt to GDP stabilizing structural primary budget balances in order to make an assessment in which periods of time fiscal policy was sustainable in the medium-term.

5.2 Results

Overall, in the second half of the 1990s all EU-countries have undertaken considerable consolidation efforts[10] and by 1997 almost all of them managed to turn the structural primary gap from negative to positive (see annex 6).

[8]Implicit interest rates are used instead of a market long term interest rates, because the former mirrors different maturities of the countries' debt. They are calculated in the following way: Net (gross) interest payments are related to the average of net (gross) debt levels of the current and the last year, because debt figures refer to end-of-the-year levels.

[9]Using the simplest version of the quantity theory of money $M = \alpha PY$, h_t becomes α times the growth rate of nominell GDP. In the calculations, α was set to 0.15 (see Winckler et al., 1997).

[10]With the exception of Italy and the Netherlands all countries showed a sustainable fiscal position in the late 1980s with decreasing debt to GDP ratios, that started, with a

The gross debt is the relevant debt indicator according to the TM. In 1997, all countries except Germany and France have primary surpluses sufficiently high to stabilize the gross debt to GDP ratio. However, the calculations based on the latest OECD forecasts (December 1997) show that the fiscal stance of both countries can be assessed as sustainable in 1999.

In addition, we also consider whether structural primary surpluses are sufficiently high to stabilize the net debt to GDP ratio (for Greece, Ireland, and Portugal net debt figures are not available). Measured in this way, structural primary gaps in 1997 are still negative in Austria, Germany and France. However, in 1999, structural primary surpluses will roughly balance the net stabilizing primary balances in Austria and Germany. The Netherlands, Belgium, Denmark, Spain, Finland, Great Britain and Sweden will yield a positive structural primary gap. The structural primary gap in France will be still negative, indicating a rising net debt to GDP ratio in 1999. Since the net debt to GDP ratio of France is projected to be only 45%, the stance of the fiscal policy can be considered as sustainable in all EU-countries in 1999, even within the net debt concept.

However, the PSG does not set a reference value for the structural primary gap, but sets a medium-term reference value for the net deficit to GDP ratio. As a consequence, for some of the countries fiscal policy has to be tougher than the positive structural primary gaps in almost all EU-countries would suggest. Depending on the business cycle sensitivity of budgetary categories, in some countries structural balances have to be further reduced in order to comply with the provisions of the PSG.

6 Summary and conclusions

According to the PSG, member states "commit themselves to respect the medium-term budgetary objective of positions close to balance or in surplus". We question the use of the net deficit as the only medium-term budgetary objective. Note that following the PSG[11], the Commission will

few exceptions, to become unsustainable in the first half of the 1990s. The exceptions are Belgium and Denmark, whose structural primary gaps for the net debt to GDP ratio as well as for the gross debt to GDP ratio stayed, for the most part, positive throughout the 1990s. Positive structural primary gaps can be observed for Greece, Ireland and Portugal. The fiscal positions of Italy and the Netherlands show a different pattern: Fiscal policy of Italy and the Netherlands became already unsustainble in the early 1980s respective late 1970s. According to the net debt concept, both countries managed to stabilize its net debt to GDP ratio in 1996.

[11]See the Council Regulation (EC) No. 1467/97 on speeding up and clarifying the implementation of the excessive deficit procedure.

also take into account "other relevant factors" when preparing the report in accordance with Art. 104c (3). Hence, for assessing the short-term fiscal stance, we propose to analyze cyclically adjusted budget balances, whereas an assessment of sustainability of fiscal positions in the medium-term should be based on structural primary gaps.

With regard to short-term sustainability, the paper reviews the traditional methods of calculating structural budget balances, as applied by international organizations such as the OECD, the EU and the IMF. These organisations derive structural budget deficits as a residual by subtracting the cyclical component from the net deficit. Thereby, one-off measures and irregular events show up in the structural component. When calculating the cyclical budget components, the OECD, the EU and the IMF assume constant elasticities of the budgetary components with regard to output. Moreover, only expenditures related to unemployment are considered as sensitive to the business cycle.

We show that the constant elasticity assumption and the use of only one expenditure category are too restrictive. By means of a bootstrapping simulation we demonstrate that when assuming time-varying elasticities over the business cycle, not even the sign of the cyclical balance for the EU-countries can be determined. Next, an alternative approach for estimating structural budget balances is discussed. This approach is based on a statistical concept and identifies the structural balance as a smooth trend component. Though less sophisticated methodologically, the smoothed-ratio approach seems to be more appropriate than the traditional approaches for mainly two reasons: It circumvents the methodological problems associated with the use of constant elasticities and treats irregular events or one-off measures as non-structural, if they do not have a permanent effect on budget balances. The results are obtained from calculations on a disaggregated level, considering various revenue and expenditure components.

Medium-term sustainability of fiscal policy is analyzed within the concept of structural primary gaps. This indicator shows to what extent the current structural primary balance deviates from the primary surplus that stabilizes the debt to GDP ratio. The results differ as to whether the structural primary gap refers to net debt or gross debt ratio stabilizing primary surpluses. Calculations based on forecasts until 1999 show that in all countries except France, in 1999 structural primary surpluses balance or exceed the primary surpluses necessary to stabilize the net debt to GDP ratio. The negative structural primary gap in France indicates an increasing net debt ratio; but the net debt to GDP ratio is projected to amount to only 45% in 1999. According to the gross debt concept, also the fiscal position of France

will be considered as sustainable in the medium-term. Hence, the calculations based on projections indicate that fiscal policy of all EU-countries can be considered as sustainable, at least in 1999.

Even if fiscal policy is already deemed sustainable in the medium-term, in some of the EU-countries structural balances will have to be further improved in order to bring fiscal positions close to balance or in surplus. Only then, compliance with the provisions of the PSG is assured.

7 References

Auerbach, J. Gokhale, A.J., Kotlikoff, L.J., *General Accounts - A Meaningful Alternative to Deficit Accounting.* In: D. Bradford (ed.), Tax Policy and the Economy, Vol. 5, Cambridge, Mass.: MIT Press, 55–110.

Barrell, R., Morgan, J., Sefton, J. and in't Veld, J., *The Cyclical Adjustment of Budget Balances.* National Institute of Economic and Social Research, Report Series No. 8, 1994.

Blanchard, O., Chouraqui, J-C., Hagemann, R.P. and Sartor, N., *The Sustainability of Fiscal Policy: New Answers to an Old Question.* OECD Economic Studies No. 15, Autumn 1990.

Buiter, W, Corsetti, G. and Roubini, N., *Excessive Deficits: Sense and Nonsense in the Treaty of Maastricht.* Economic Policy 16/1993, 58-100.

Buti, M., Franco, D. and Ongena, H., *Budgetary Policies during Recessions - Retrospective Application of the "Stability and Growth Pact" to the Post-War Period*, Paper presented at the 59th International Conference of the Applied Econometrics Association "Public Deficits and Monetary Union", 27/28 Nov. 1997, Rome.

Cano, L. and Kanutin, A., *Estimation of Structural Deficits in EU-Countries*, mimeo. LSE, 1996.

European Commission, *Technical Note: The Commissions Services' Method for the Cyclical Adjustment of Government Budget Balances.* European Economy No. 60, 1995.

Giorno, C., Richardson, P., Roseveare, D. und van den Noord, P., *Potential Output, Output Gaps and Structural Budget Balances.* OECD Economic Studies No. 24, 1995, 167–208.

Harvey, A. *Forecasting, Structural Time Series Models and the Kalman Filter.* Cambridge 1989.

Hodrick, R. und Prescott, E., *Post-War U.S. Business Cycles: An Empirical Investigation.* Carnegie-Mellon University, Discussion Paper No. 451. Pittsburgh 1981.

IMF, *Structural Budget Indicators for the Major Industrial Countries* . World Economic Outlook, October 1993.

IMF, *Structural Fiscal Balances in Smaller Industrial Countries.* World Economic Outlook, May 1995.

Jaeger, A., *The Measurement and Interpretation of Structural Budget Balances.* Empirica No. 2, Vol. 17, 1990, 155–169.

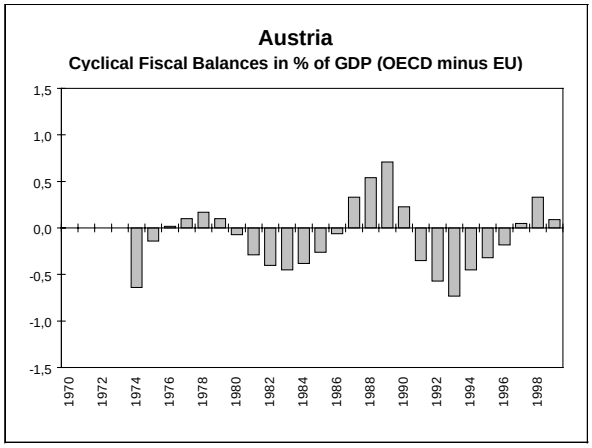
Uctum, M. and Wickens, M. *Debt and Deficit Ceilings, and Sustainability of Fiscal Policies: An Intertemporal Analysis.* CEPR Discussion Paper Series, No. 1612, 1997.

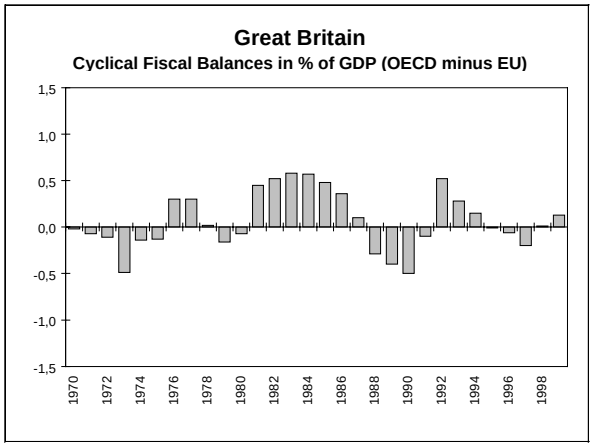
Url, Th. *How Serious is the Pact on Stability and Growth?* Austrian Institute of Economic Research, Working Paper No. 92, 1997.

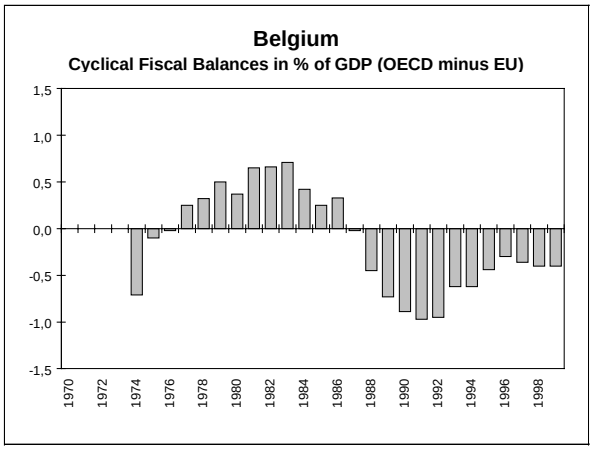
Winckler, G., Hochreiter, E. und Brandner, P. *Deficits, Debt and European Monetary Union: Some Unpleasant Fiscal Arithmetic.* In: Calvo, G. und King, M. (eds). The Debt Burden and its Consequences for Monetary Policy, 1997 (in press).

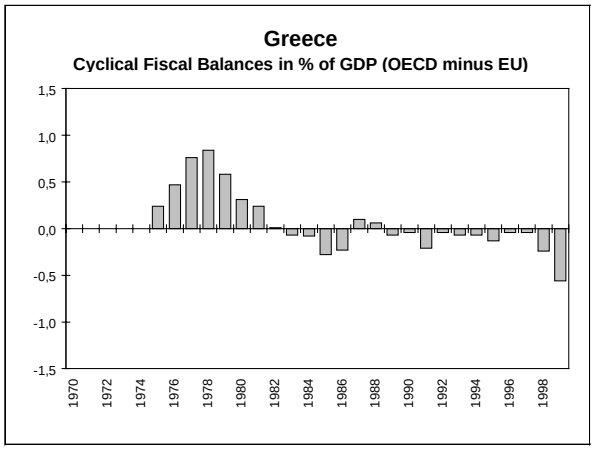
Ziebarth, G. *Methodik und Technik der Bestimmung struktureller Budgetdefizite.* Diskussionspapier Nr. 2, Deutsche Bundesbank, 1995.

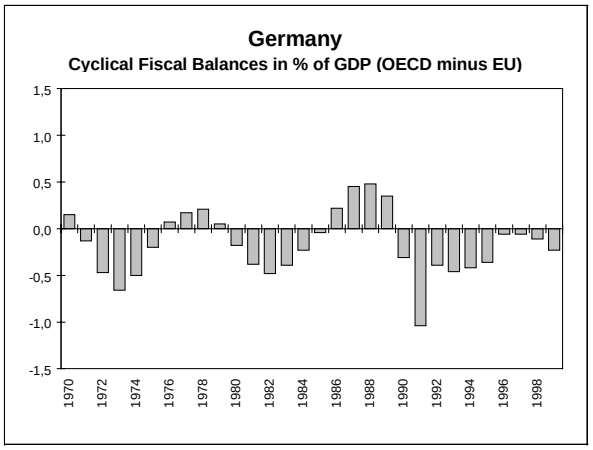
Annex 1

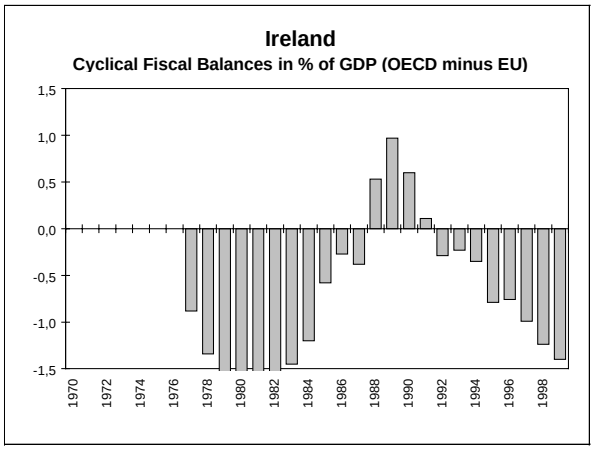

Austria
Cyclical Fiscal Balances in % of GDP (OECD minus EU)
1,5
1,0
0,5
0,0
-0,5
-1,0
-1,5
1970 1972 1974 1976 1978 1980 1982 1984 1986 1988 1990 1992 1994 1996 1998

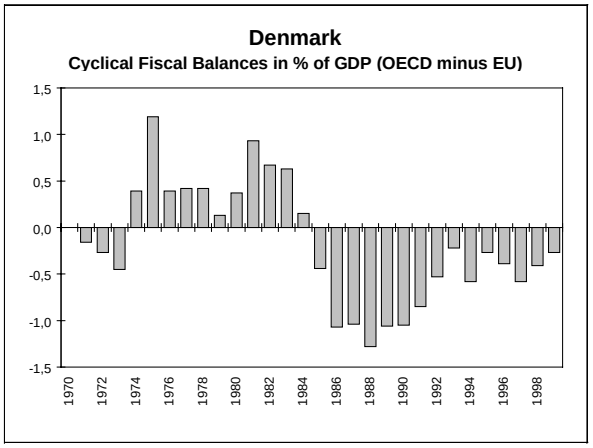

Great Britain
Cyclical Fiscal Balances in % of GDP (OECD minus EU)
1,5
1,0
0,5
0,0
-0,5
-1,0
-1,5
1970 1972 1974 1976 1978 1980 1982 1984 1986 1988 1990 1992 1994 1996 1998

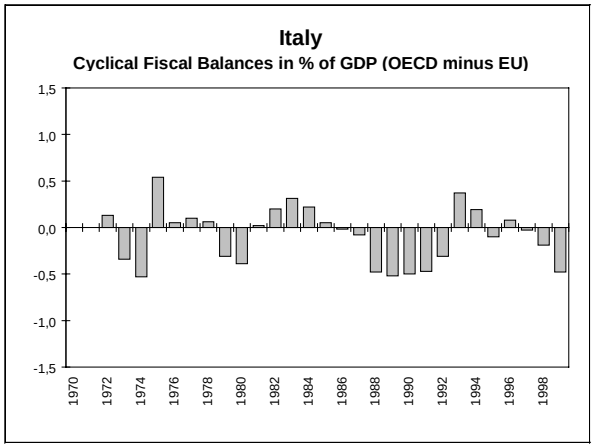

Belgium
Cyclical Fiscal Balances in % of GDP (OECD minus EU)
1,5
1,0
0,5
0,0
-0,5
-1,0
-1,5
1970 1972 1974 1976 1978 1980 1982 1984 1986 1988 1990 1992 1994 1996 1998


Greece
Cyclical Fiscal Balances in % of GDP (OECD minus EU)
1,5
1,0
0,5
0,0
-0,5
-1,0
-1,5
1970 1972 1974 1976 1978 1980 1982 1984 1986 1988 1990 1992 1994 1996 1998

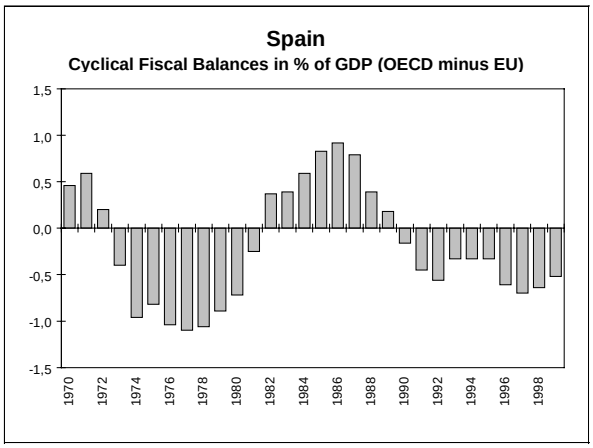

Germany
Cyclical Fiscal Balances in % of GDP (OECD minus EU)
1,5
1,0
0,5
0,0
-0,5
-1,0
-1,5
1970 1972 1974 1976 1978 1980 1982 1984 1986 1988 1990 1992 1994 1996 1998

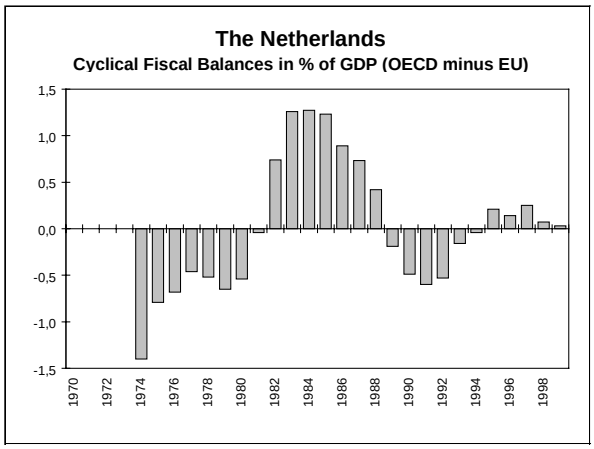

Ireland
Cyclical Fiscal Balances in % of GDP (OECD minus EU)
1,5
1,0
0,5
0,0
-0,5
-1,0
-1,5
1970 1972 1974 1976 1978 1980 1982 1984 1986 1988 1990 1992 1994 1996 1998

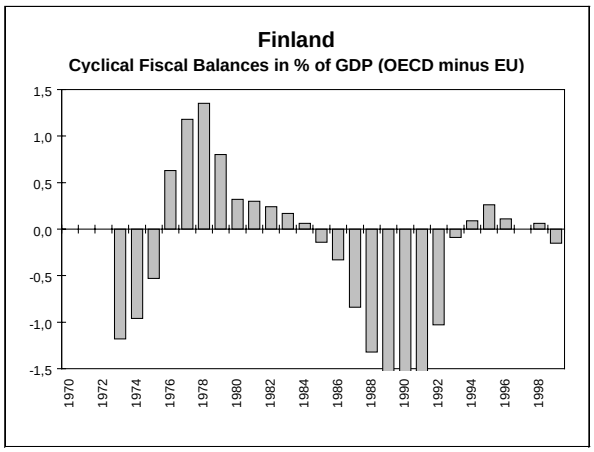

Denmark
Cyclical Fiscal Balances in % of GDP (OECD minus EU)
1,5
1,0
0,5
0,0
-0,5
-1,0
-1,5
1970 1972 1974 1976 1978 1980 1982 1984 1986 1988 1990 1992 1994 1996 1998

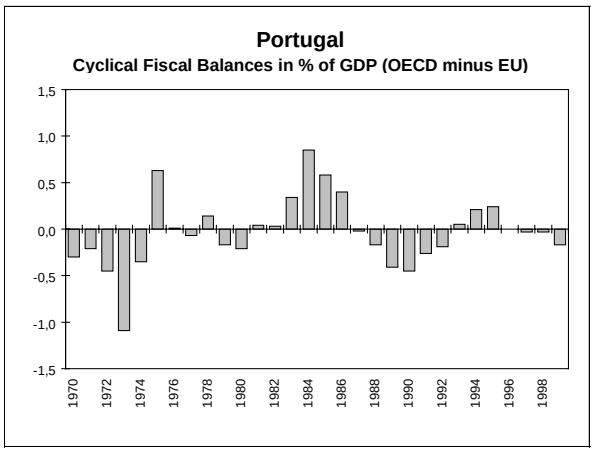

Italy
Cyclical Fiscal Balances in % of GDP (OECD minus EU)
1,5
1,0
0,5
0,0
-0,5
-1,0
-1,5
1970 1972 1974 1976 1978 1980 1982 1984 1986 1988 1990 1992 1994 1996 1998

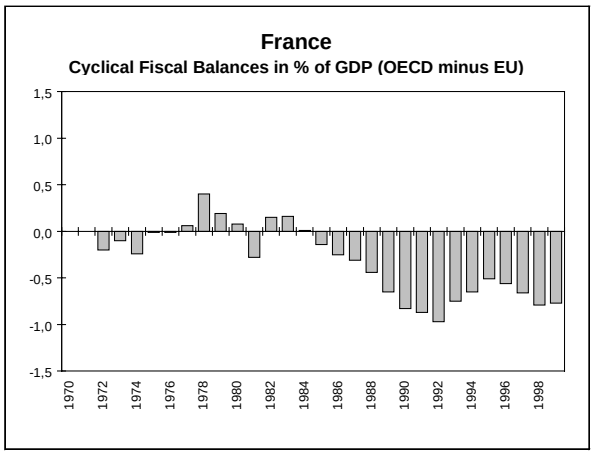
Annex 1 (continued)

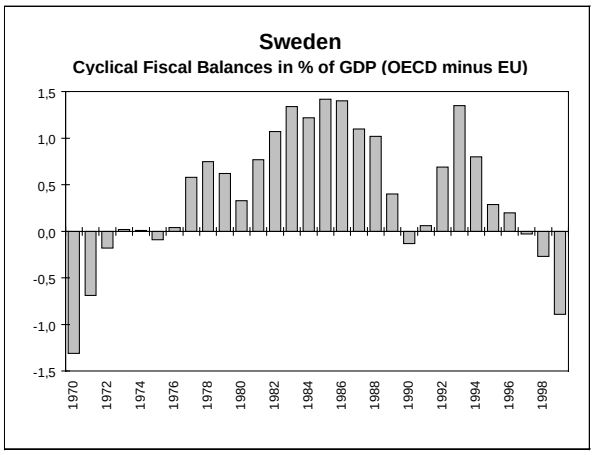




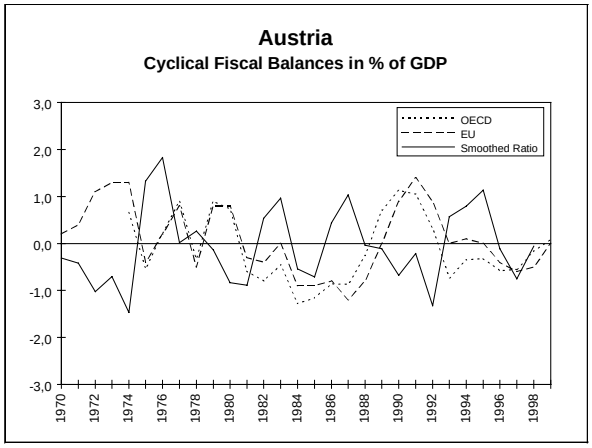


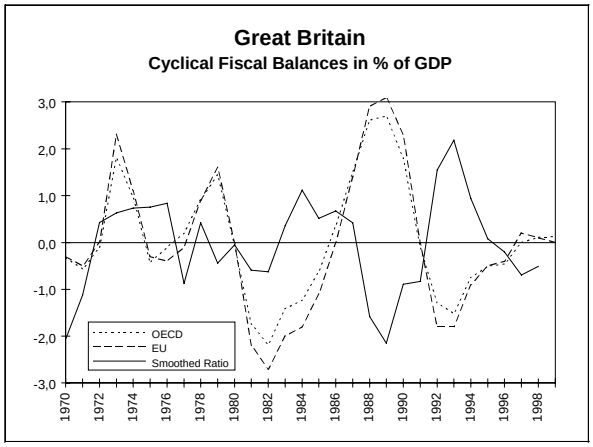


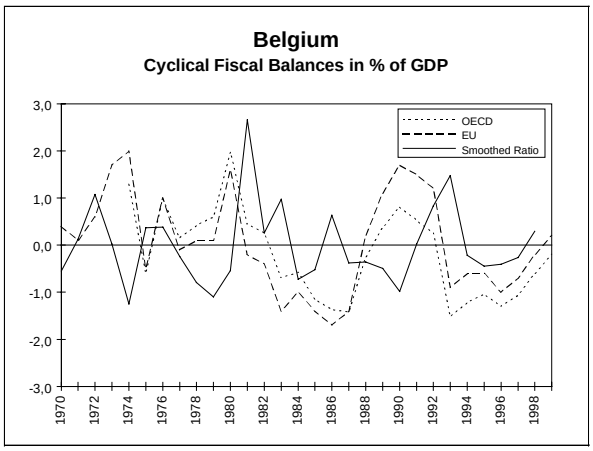


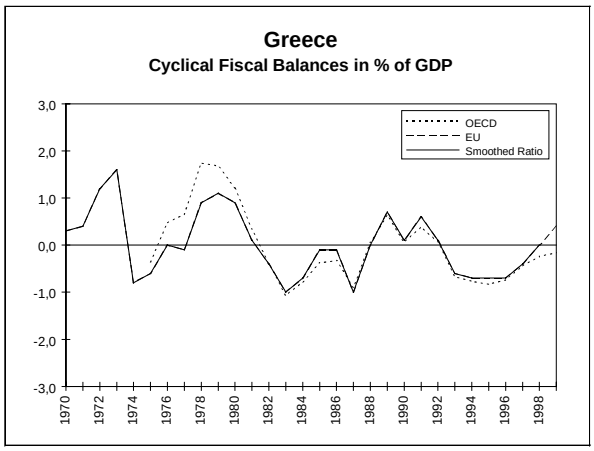


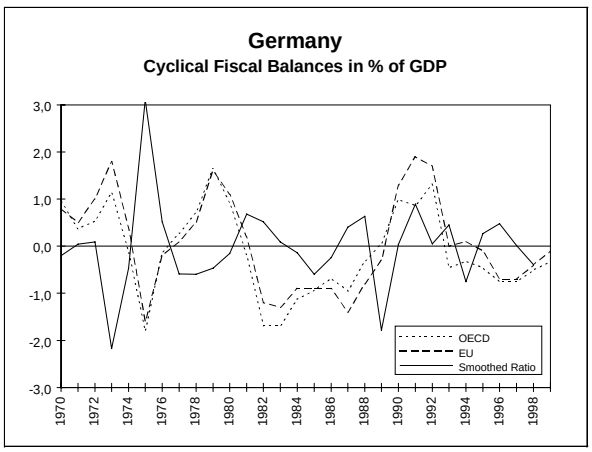
Annex 2

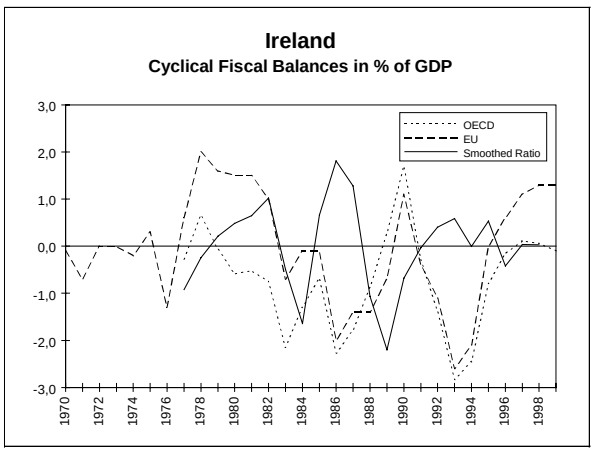

Austria
Cyclical Fiscal Balances in % of GDP
OECD
EU
Smoothed Ratio

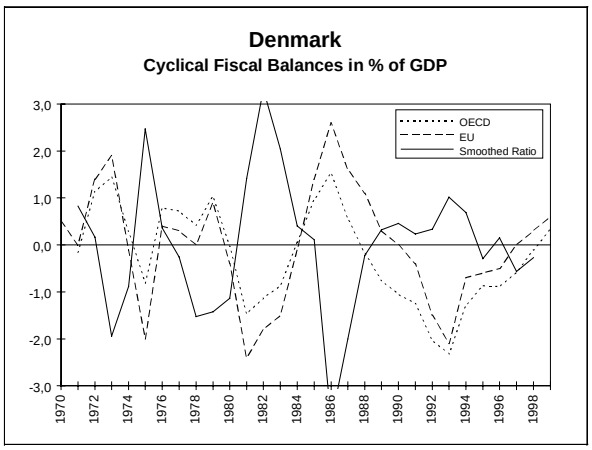

Great Britain
Cyclical Fiscal Balances in % of GDP
OECD
EU
Smoothed Ratio

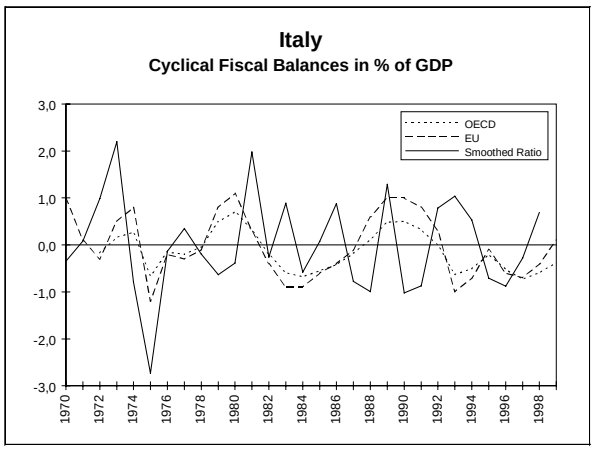

Belgium
Cyclical Fiscal Balances in % of GDP
OECD
EU
Smoothed Ratio


Greece
Cyclical Fiscal Balances in % of GDP
OECD
EU
Smoothed Ratio

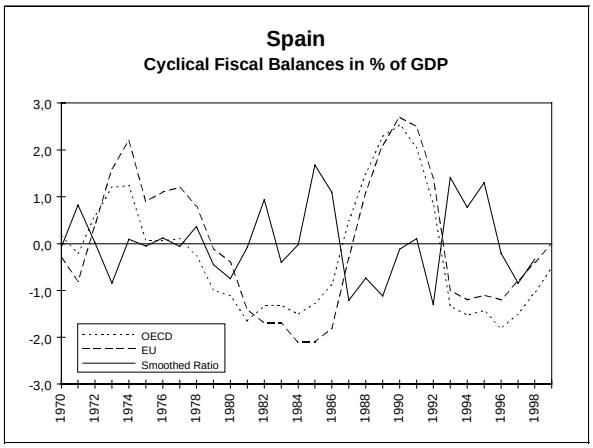

Germany
Cyclical Fiscal Balances in % of GDP
OECD
EU
Smoothed Ratio

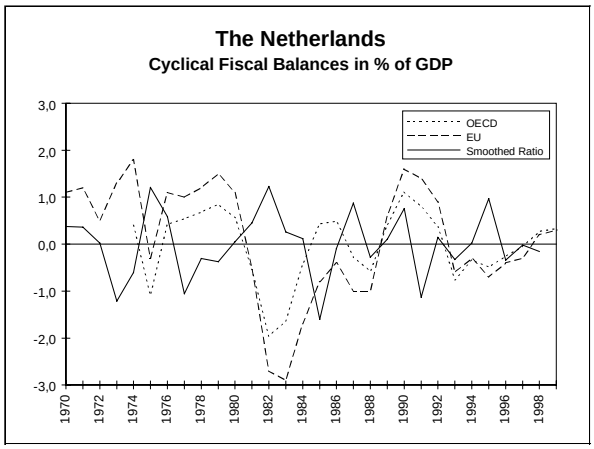

Ireland
Cyclical Fiscal Balances in % of GDP
OECD
EU
Smoothed Ratio

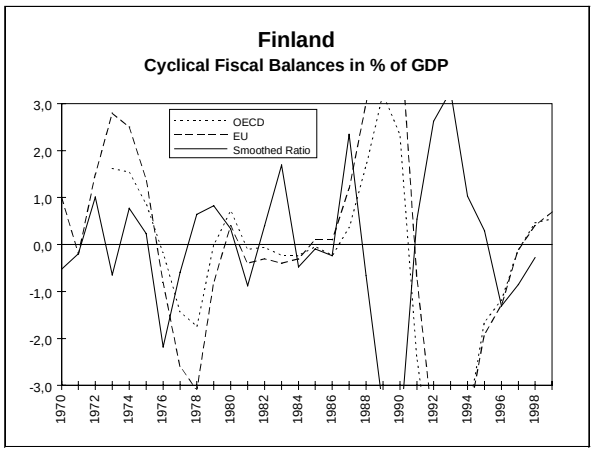

Denmark
Cyclical Fiscal Balances in % of GDP
OECD
EU
Smoothed Ratio

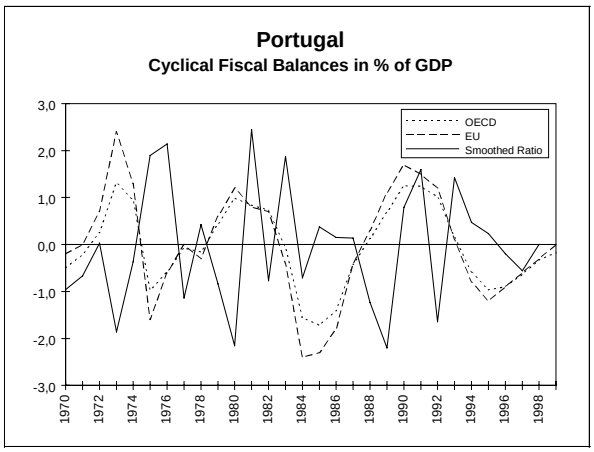

Italy
Cyclical Fiscal Balances in % of GDP
OECD
EU
Smoothed Ratio

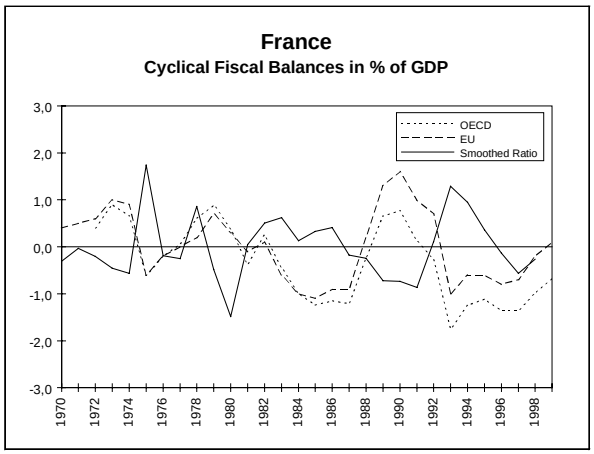
Annex 2 (continued)

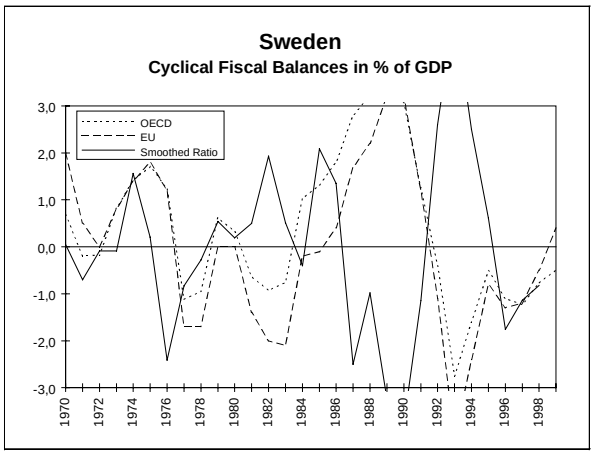




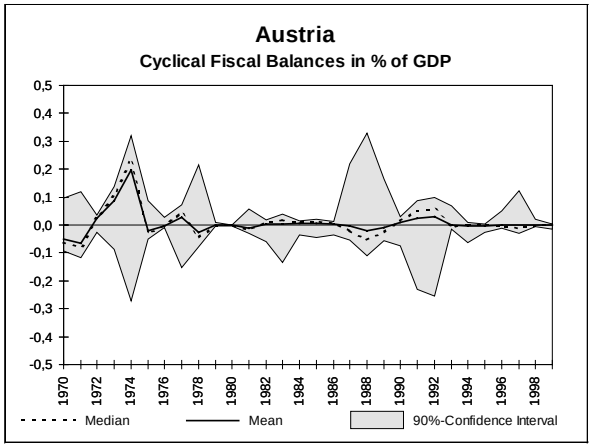


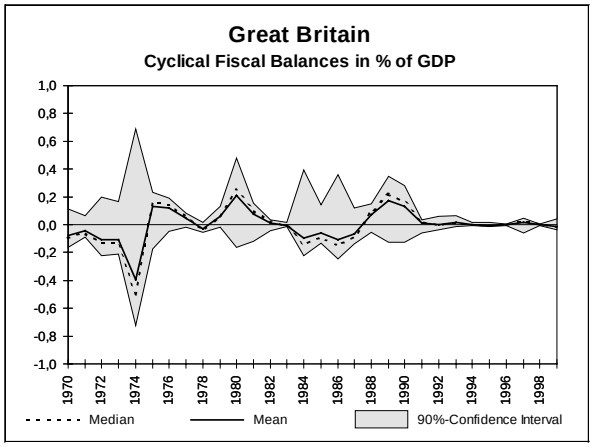


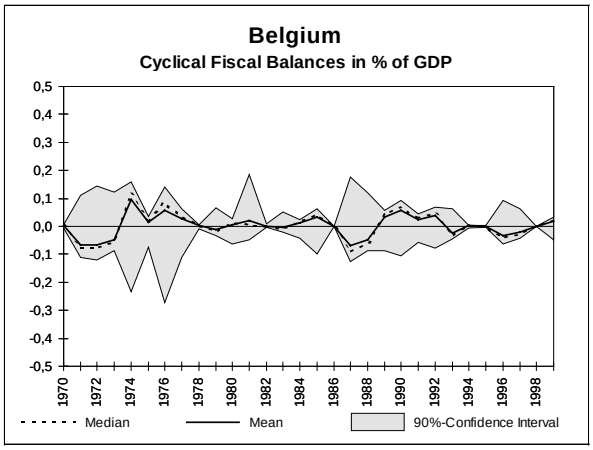


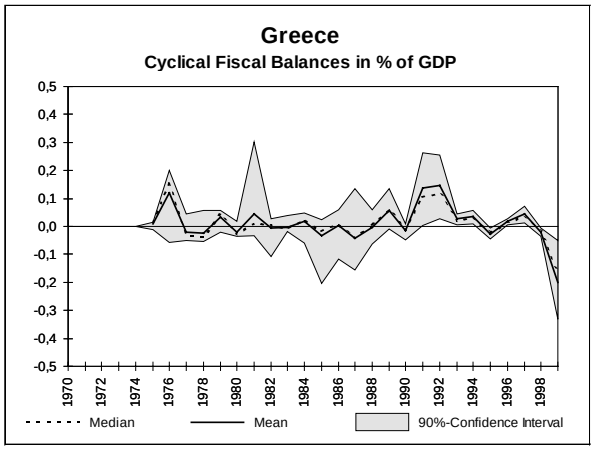


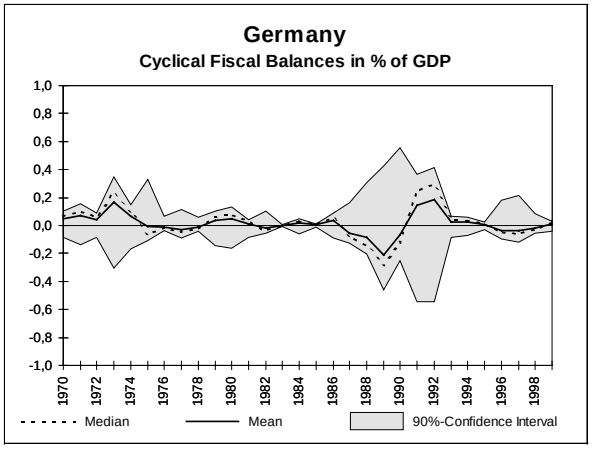
Annex 3

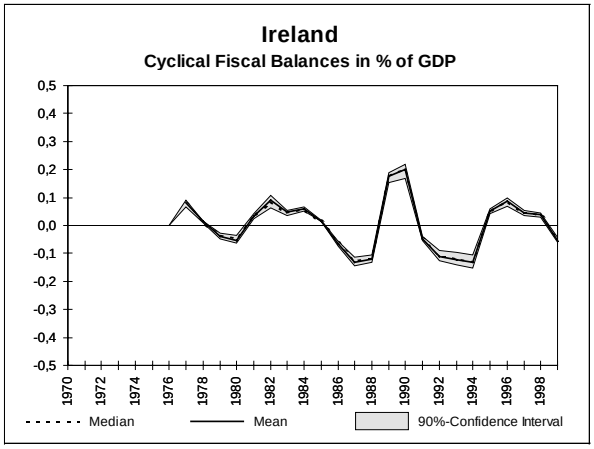

Austria
Cyclical Fiscal Balances in % of GDP
Median
Mean
90%-Confidence Interval

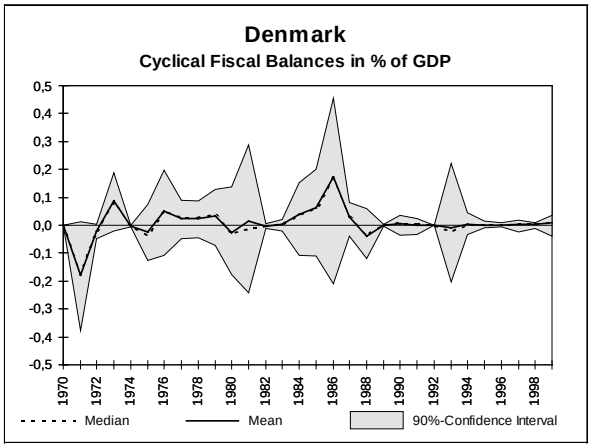

Great Britain
Cyclical Fiscal Balances in % of GDP
Median
Mean
90%-Confidence Interval

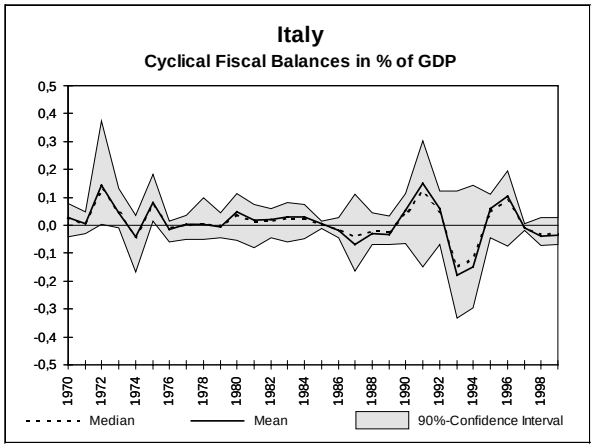

Belgium
Cyclical Fiscal Balances in % of GDP
Median
Mean
90%-Confidence Interval


Greece
Cyclical Fiscal Balances in % of GDP
Median
Mean
90%-Confidence Interval

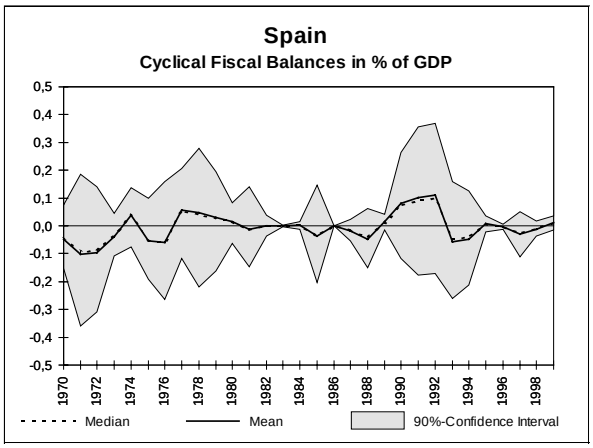

Germany
Cyclical Fiscal Balances in % of GDP
Median
Mean
90%-Confidence Interval

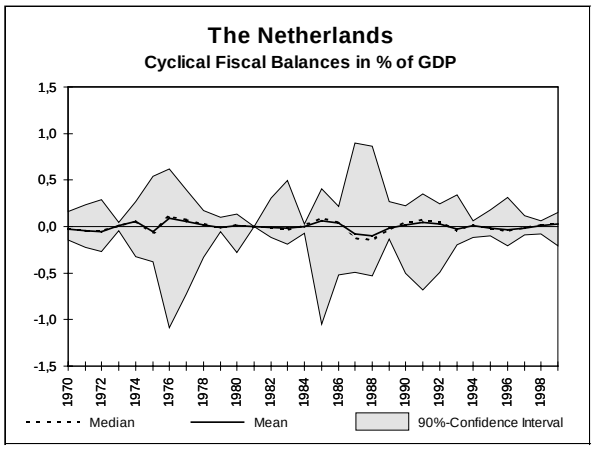

Ireland
Cyclical Fiscal Balances in % of GDP
Median
Mean
90%-Confidence Interval

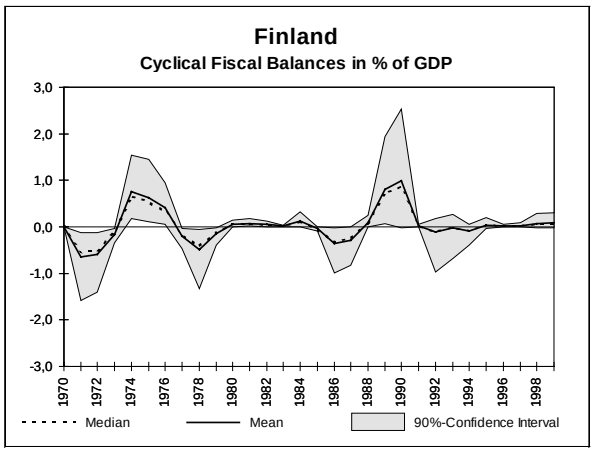

Denmark
Cyclical Fiscal Balances in % of GDP
Median
Mean
90%-Confidence Interval

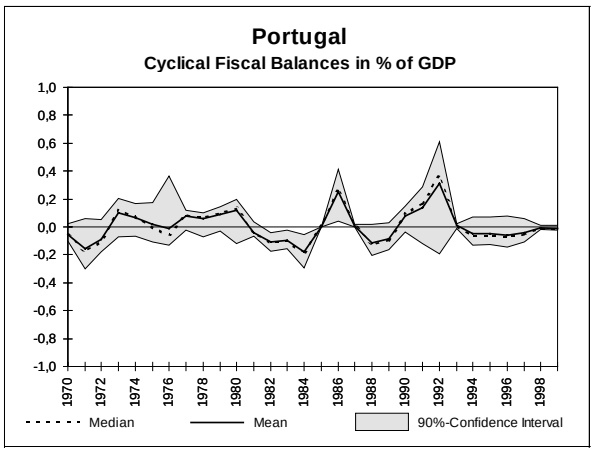

Italy
Cyclical Fiscal Balances in % of GDP
Median
Mean
90%-Confidence Interval

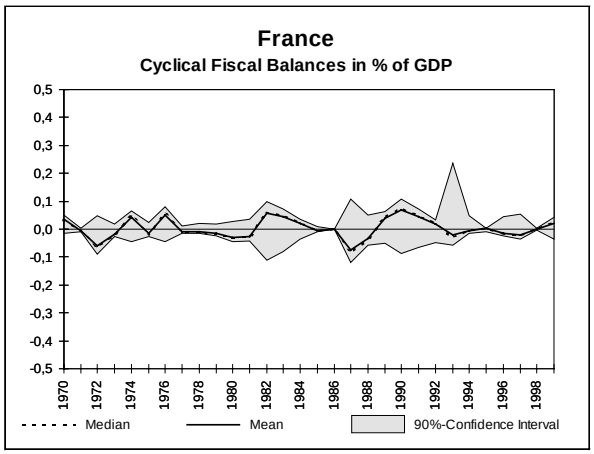
Annex 3 (continued)

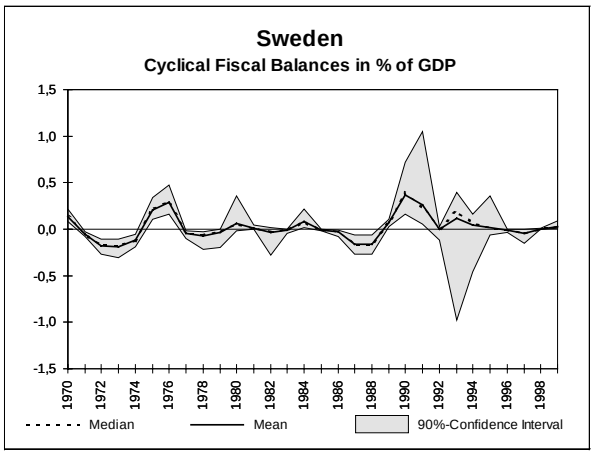










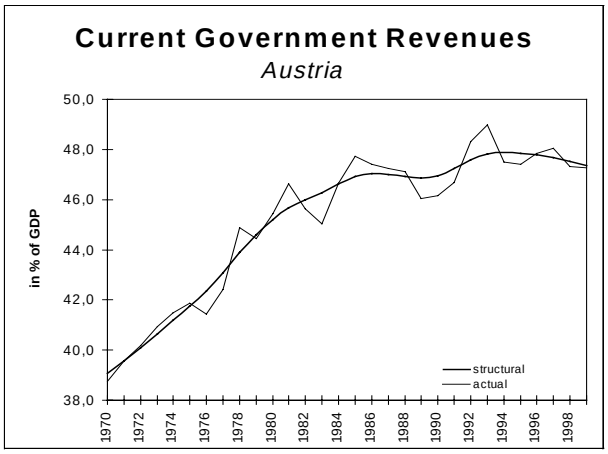


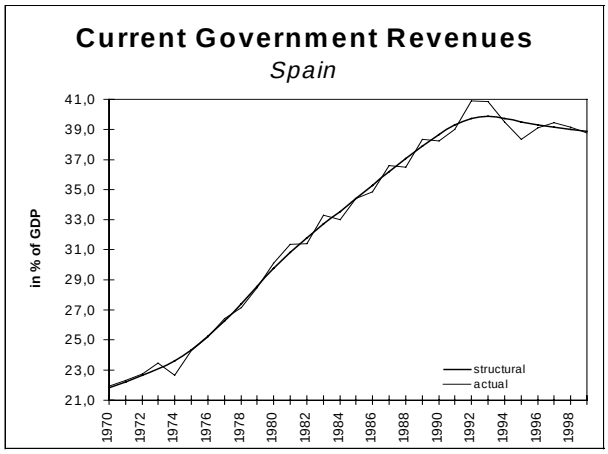
Annex 4

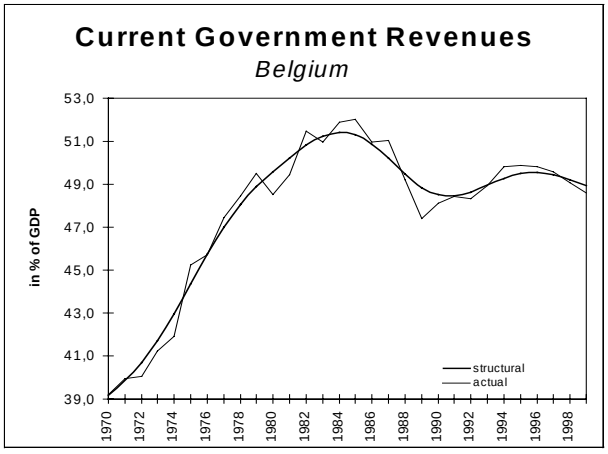
Stylized Facts of Budget Categories across Countries
1970-1999

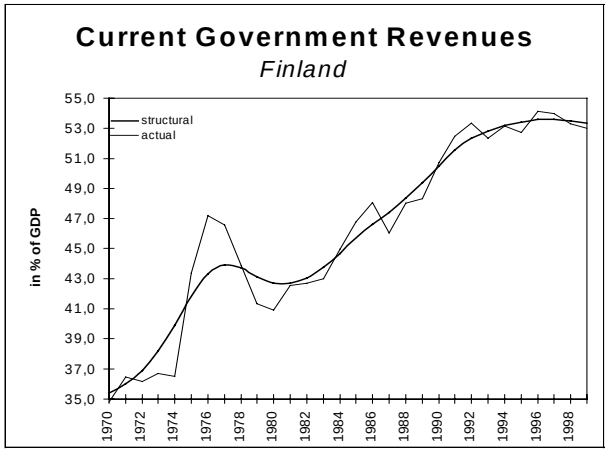
	Standard deviations of cyclical components, in percentage points													
	AT	***BE***	***DE***	***DK***	***ES***	***FI***	***FR***	***GB***	***GR***	***IE***	***IT***	***NL***	***PT***	***SE***
Current government revenues	0.59	0.58	0.48	1.12	0.51	1.39	0.47	0.95	0.76	0.88	0.67	0.74	0.95	1.16
Direct taxes (householdes)	0.34	0.34	0.26	0.68	0.25	0.65	0.30	0.55	0.20	0.48	0.34	0.49	0.38	0.62
Direct taxes (business sector)	0.15	0.16	0.24	0.32	0.17	0.33	0.17	0.29	0.27	0.14	0.17	0.22	0.20	0.30
Indirect taxes	0.26	0.19	0.17	0.46	0.23	0.25	0.20	0.35	0.52	0.42	0.26	0.27	0.45	0.53
Social security contributions	0.21	0.24	0.25	0.14	0.26	0.71	0.32	0.18	0.27	0.14	0.23	0.55	0.37	0.49
Residual revenues	0.13	0.16	0.14	0.30	0.21	0.31	0.15	0.23	0.24	0.30	0.16	0.45	0.37	0.24
Current government expenditures	0.75	0.83	0.78	1.00	0.64	1.73	0.74	1.02	0.89	1.24	0.97	0.78	1.10	1.23
Government consumption	0.29	0.27	0.37	0.57	0.23	0.66	0.26	0.57	0.38	0.55	0.38	0.23	0.36	0.44
Subsidies	0.15	0.16	0.10	0.21	0.13	0.21	0.11	0.28	0.40	0.34	0.17	0.21	0.27	0.21
Social security benefits	0.19	0.39	0.45	0.48	0.31	0.99	0.32	0.42	0.36	0.52	0.39	0.37	0.27	0.42
Interest payments	0.09	0.30	0.12	0.38	0.26	0.26	0.11	0.17	0.53	0.28	0.34	0.13	0.52	0.36
Residual expenditures	0.20	0.11	0.24	0.13	0.08	0.08	0.10	0.14	0.25	0.00	0.09	0.32	0.49	0.38
Deficit	0.78	0.81	0.88	1.35	0.78	1.53	0.69	1.02	1.27	0.92	0.99	0.68	1.26	1.88
	Standard deviation of the business cyle, in %													
Output-gap, real	0.98	1.10	1.75	1.22	1.12	2.24	0.93	1.60	1.61	1.44	1.24	0.91	2.02	1.20
Output-gap, nominal	1.07	1.15	1.80	1.04	1.59	3.02	0.81	1.58	1.91	1.85	1.82	0.94	2.07	1.74

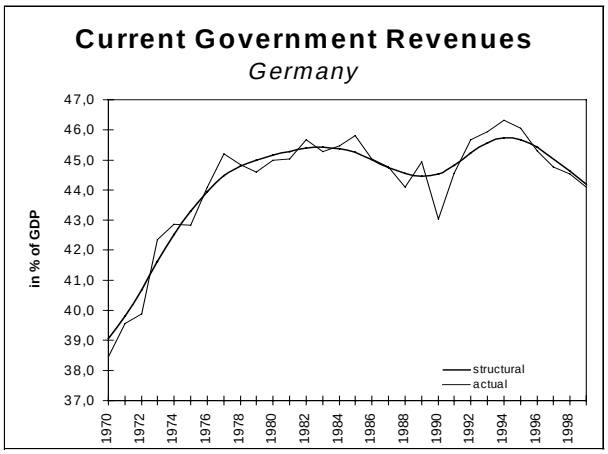
Annex 5a

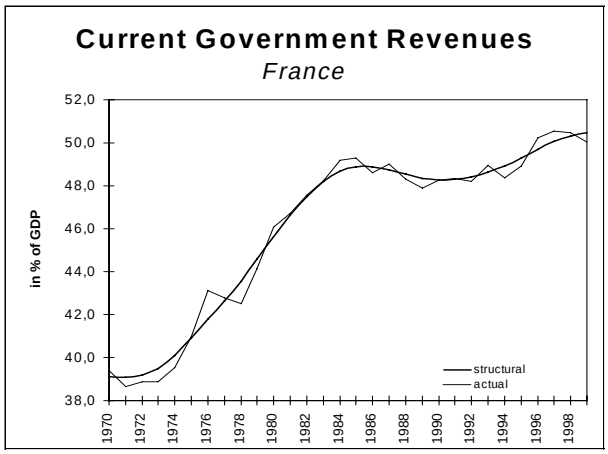

Current Government Revenues
Austria
in % of GDP
structural
actual

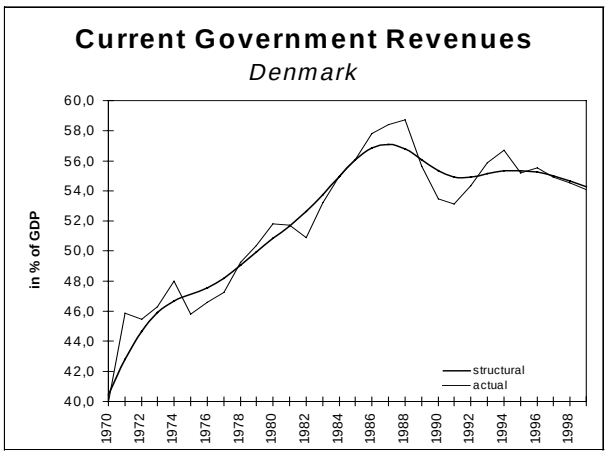

Current Government Revenues
Spain
in % of GDP
structural
actual

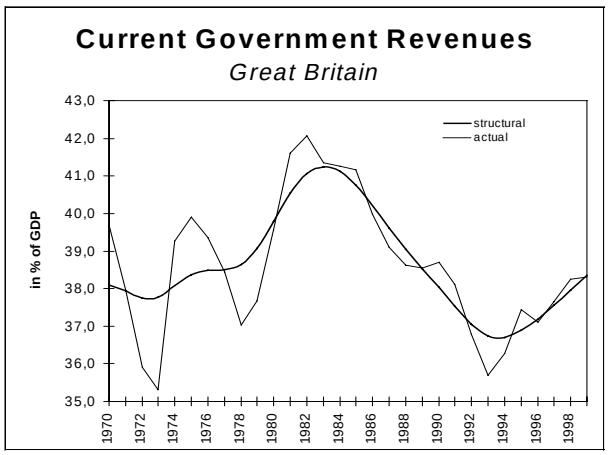

Current Government Revenues
Belgium
in % of GDP
structural
actual


Current Government Revenues
Finland
in % of GDP
structural
actual

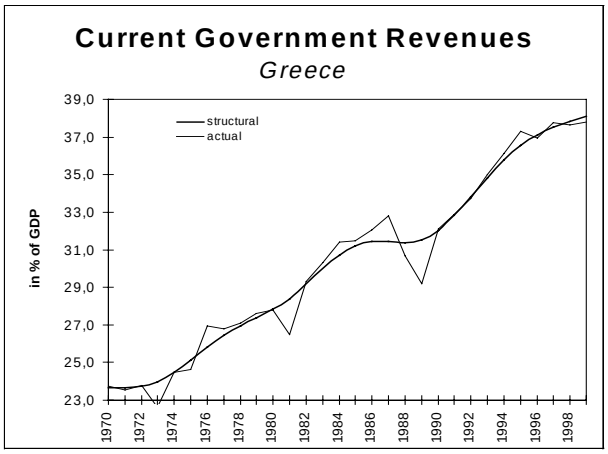

Current Government Revenues
Germany
in % of GDP
structural
actual

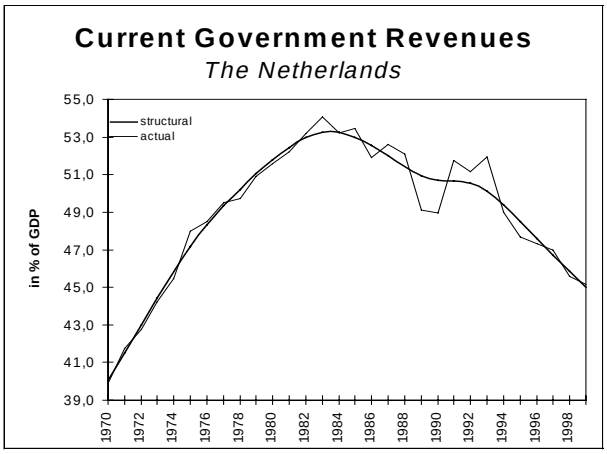

Current Government Revenues
France
in % of GDP
structural
actual

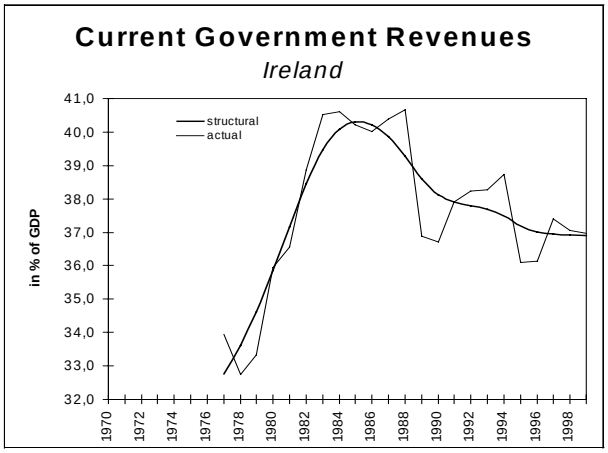

Current Government Revenues
Denmark
in % of GDP
structural
actual

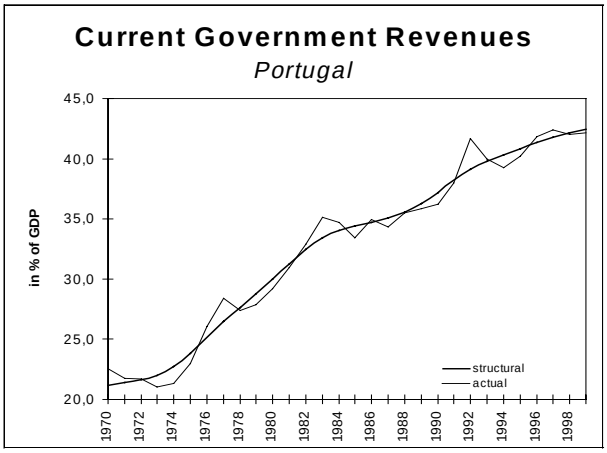

Current Government Revenues
Great Britain
in % of GDP
structural
actual

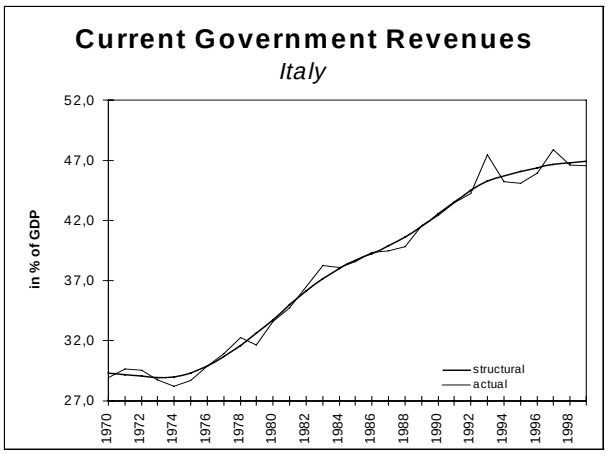
Annex 5a (continued)

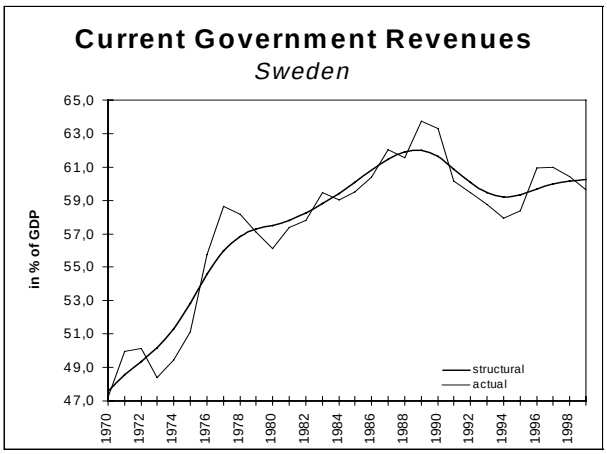




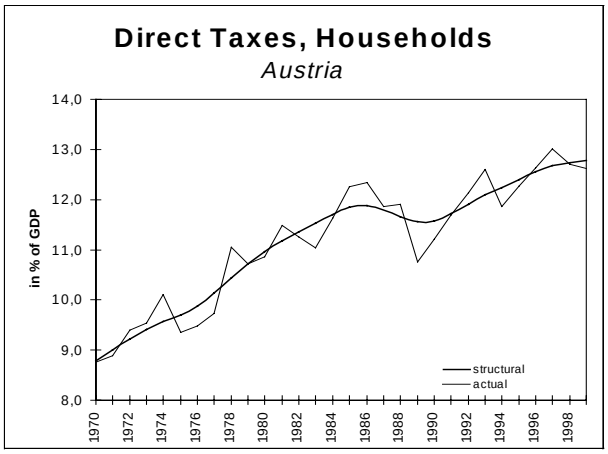


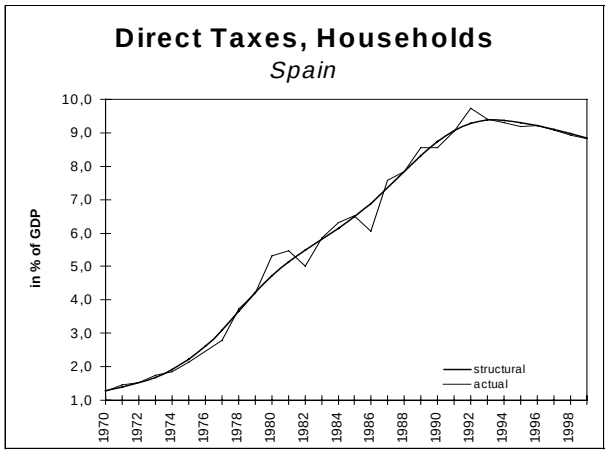


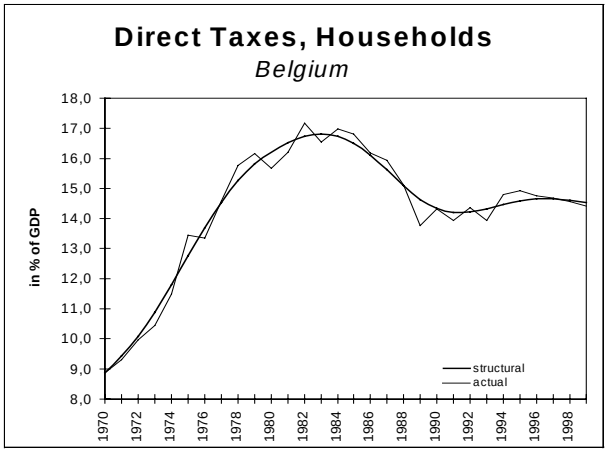




Annex 5b

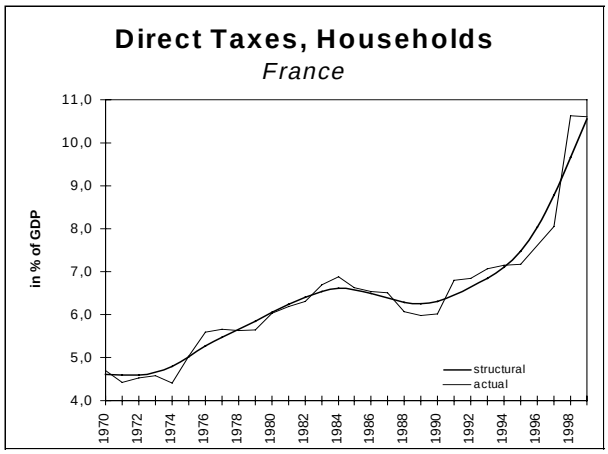

Direct Taxes, Households
Austria
in % of GDP
structural
actual

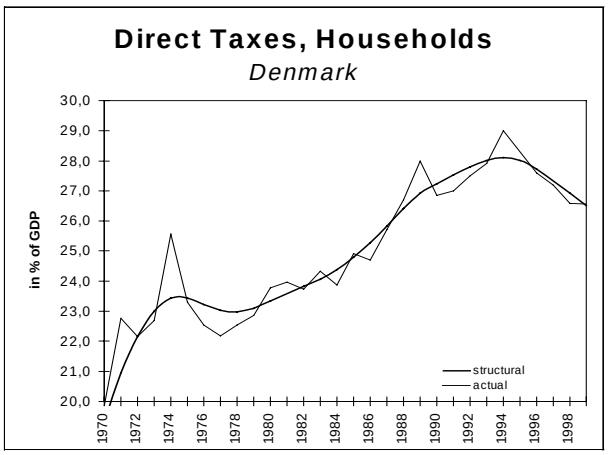

Direct Taxes, Households
Spain
in % of GDP
structural
actual

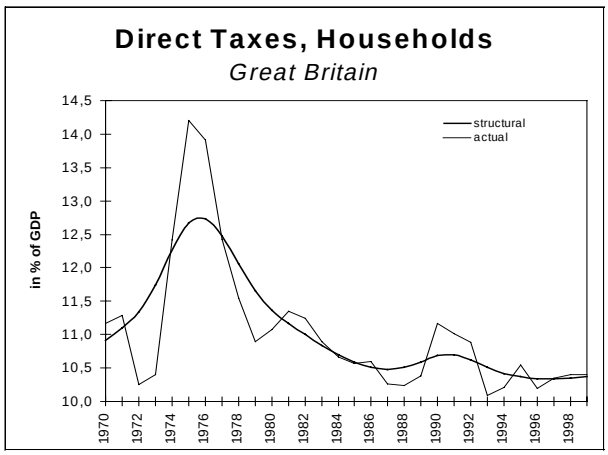

Direct Taxes, Households
Belgium
in % of GDP
structural
actual


Direct Taxes, Households
Finland
in % of GDP
structural
actual

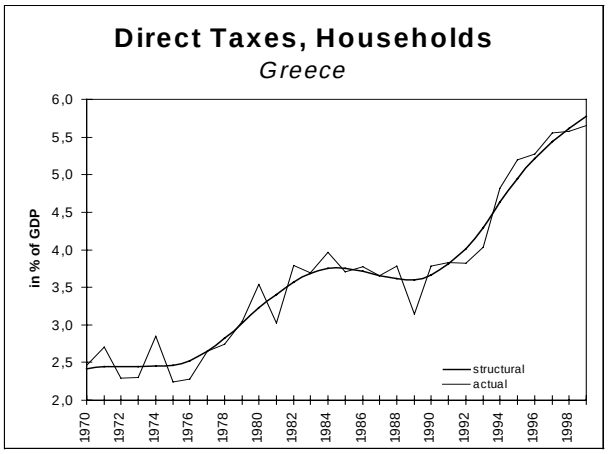

Direct Taxes, Households
Germany
in % of GDP
structural
actual

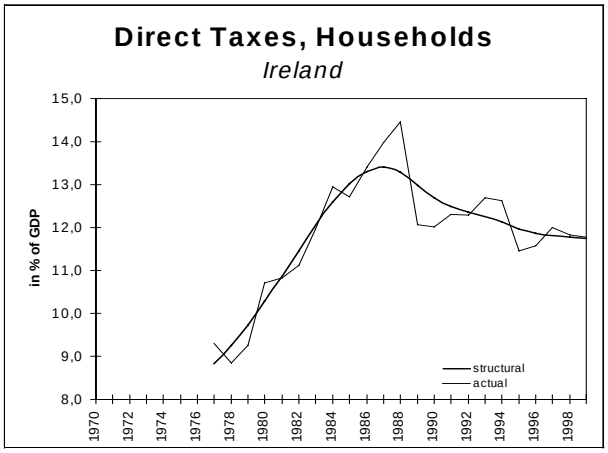

Direct Taxes, Households
France
in % of GDP
structural
actual

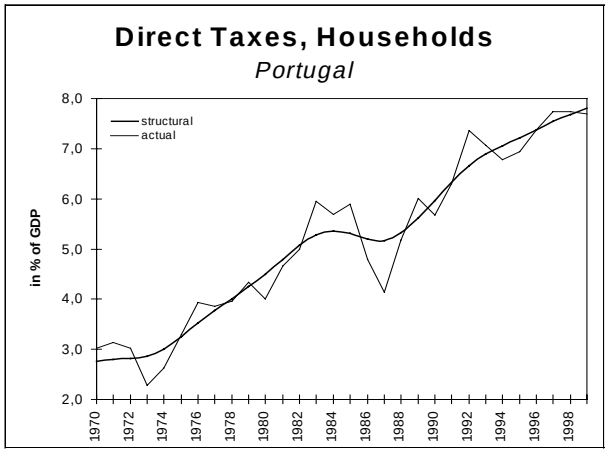

Direct Taxes, Households
Denmark
in % of GDP
structural
actual

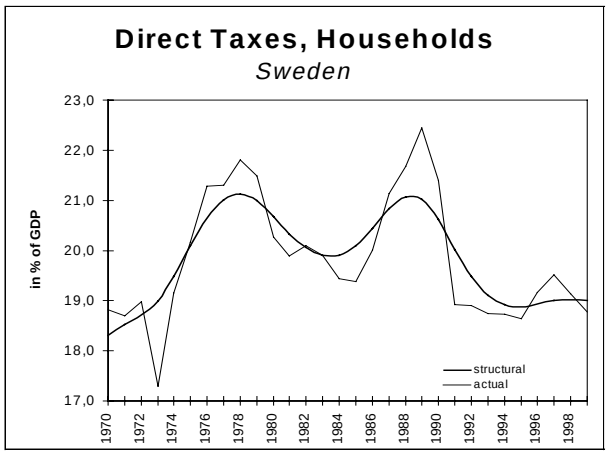

Direct Taxes, Households
Great Britain
in % of GDP
structural
actual

Annex 5b (continued)

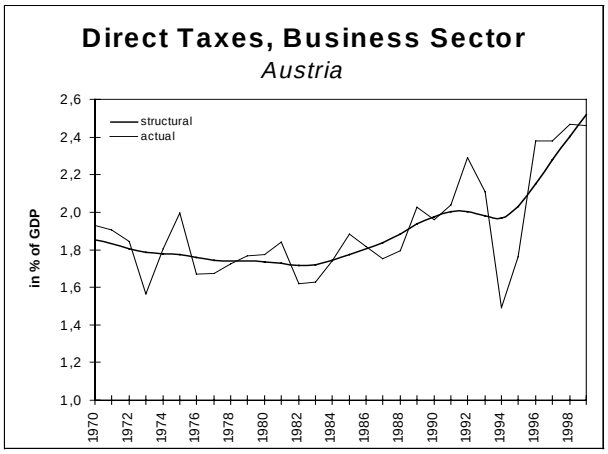


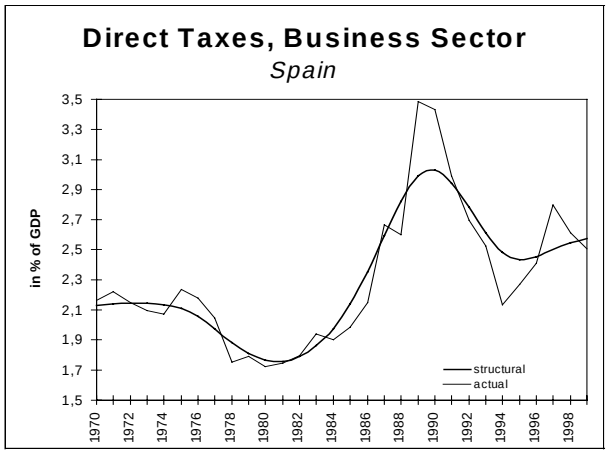


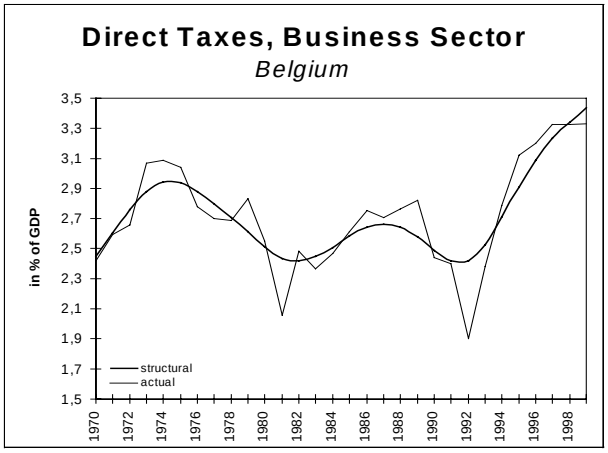




Annex 5c

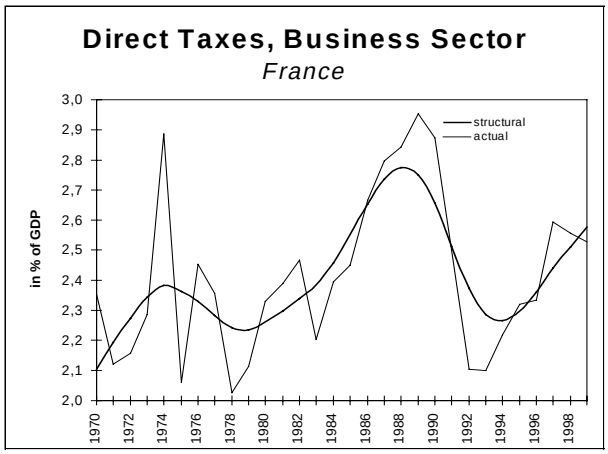

Direct Taxes, Business Sector
Austria
in % of GDP
structural
actual

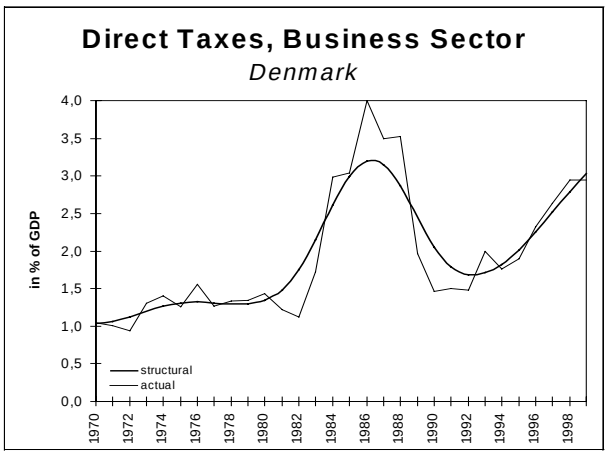

Direct Taxes, Business Sector
Spain
in % of GDP
structural
actual

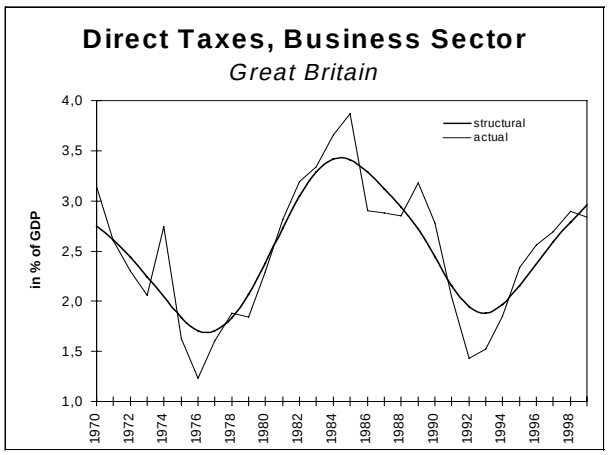

Direct Taxes, Business Sector
Belgium
in % of GDP
structural
actual


Direct Taxes, Business Sector
Finland
in % of GDP
structural
actual

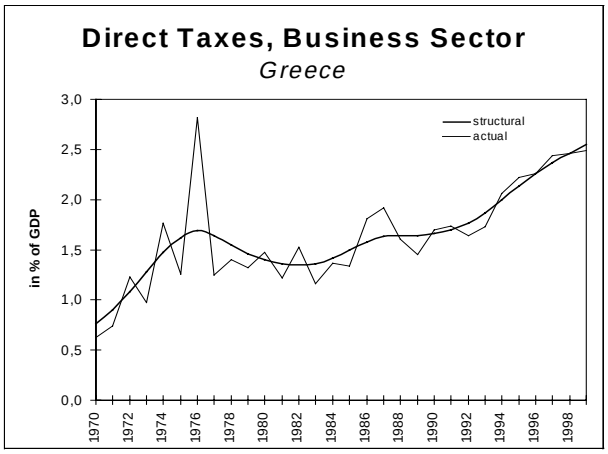

Direct Taxes, Business Sector
Germany
in % of GDP
structural
actual

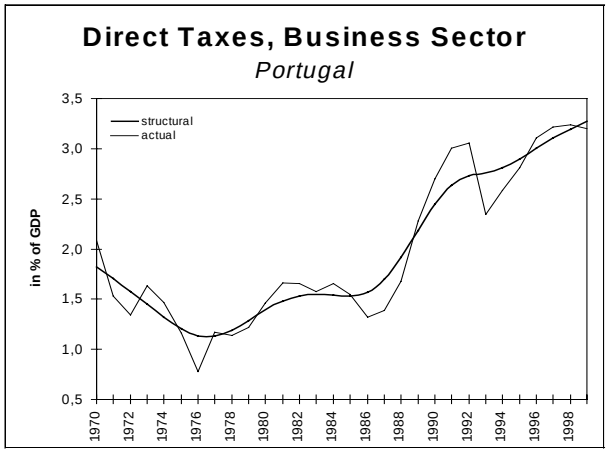

Direct Taxes, Business Sector
France
in % of GDP
structural
actual


Direct Taxes, Business Sector
Denmark
in % of GDP
structural
actual

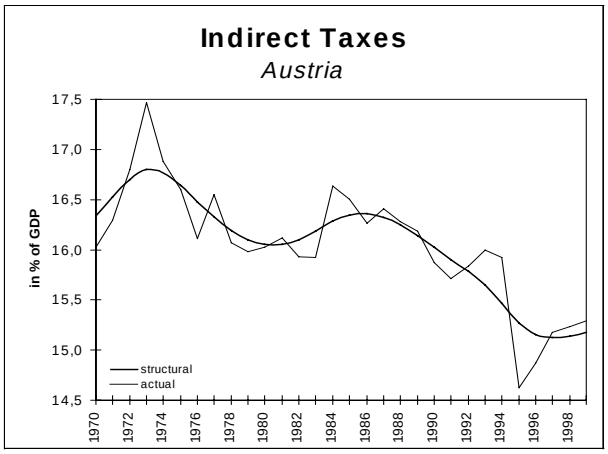

Direct Taxes, Business Sector
Great Britain
in % of GDP
structural
actual

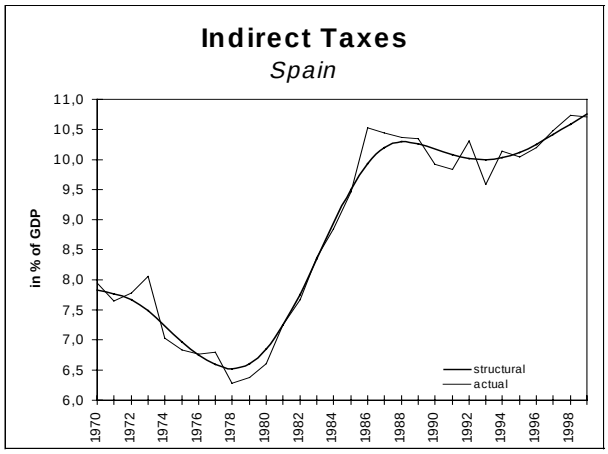
Annex 5c (continued)

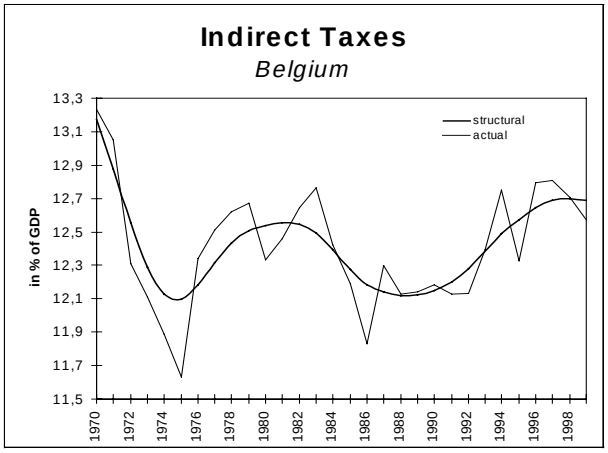


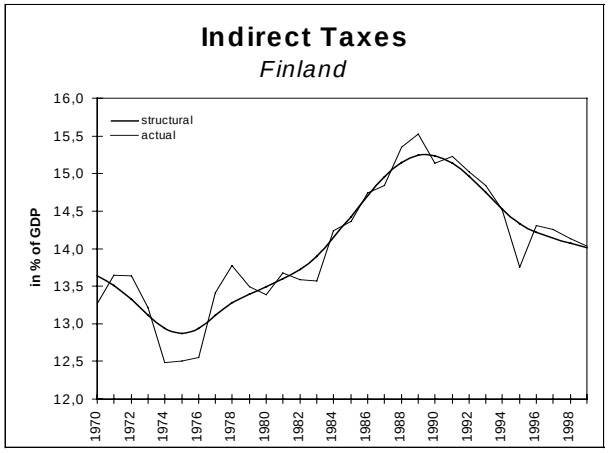


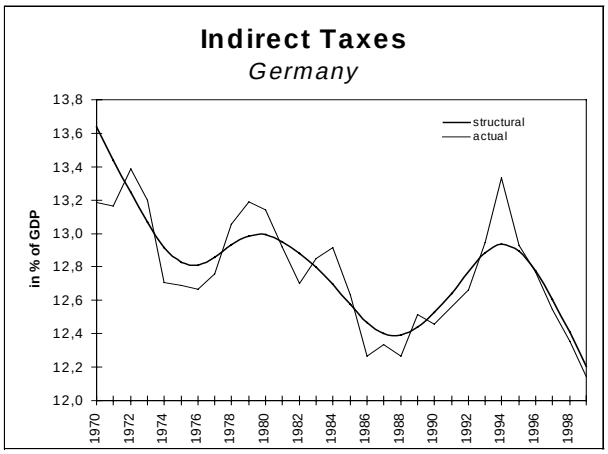
Annex 5d

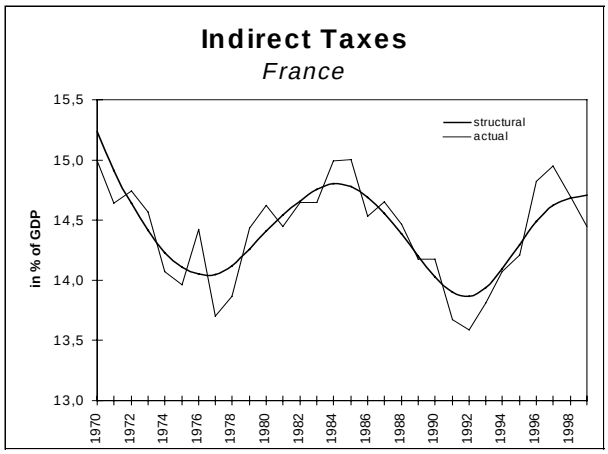

Indirect Taxes
Austria
in % of GDP
structural
actual

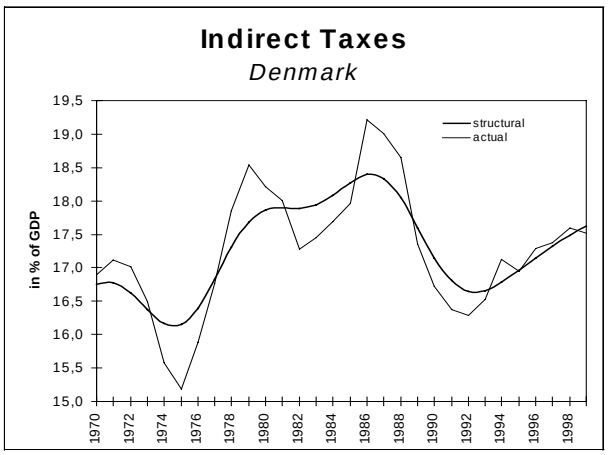

Indirect Taxes
Spain
in % of GDP
structural
actual

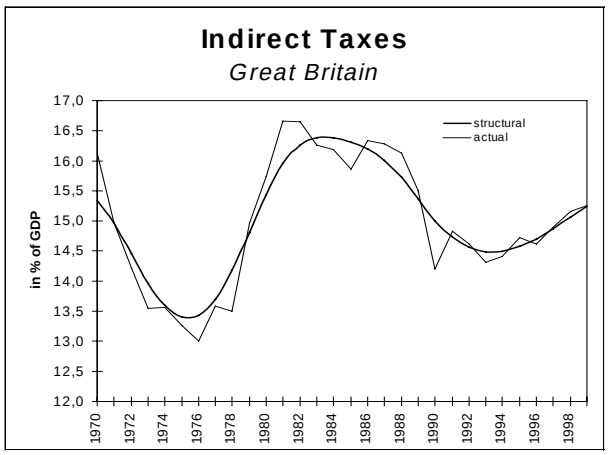

Indirect Taxes
Belgium
in % of GDP
structural
actual


Indirect Taxes
Finland
in % of GDP
structural
actual

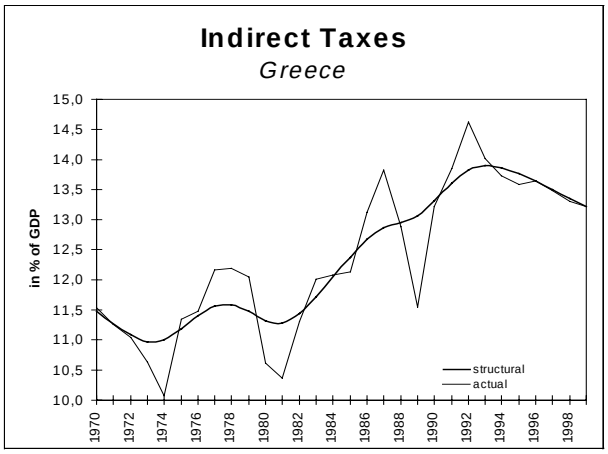

Indirect Taxes
Germany
in % of GDP
structural
actual

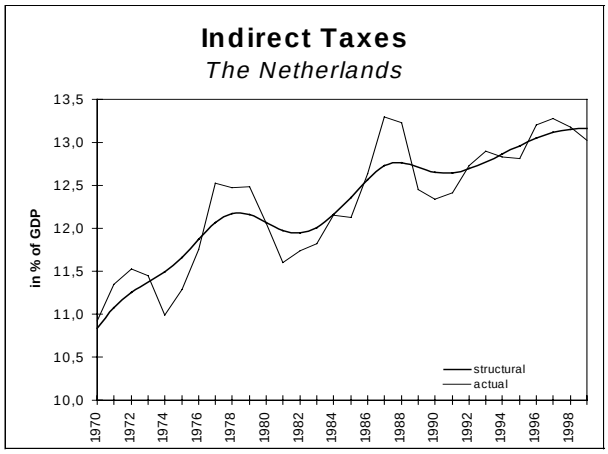

Indirect Taxes
France
in % of GDP
structural
actual

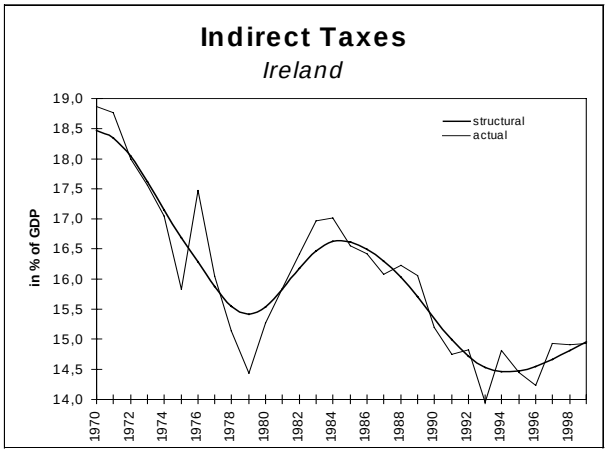

Indirect Taxes
Denmark
in % of GDP
structural
actual

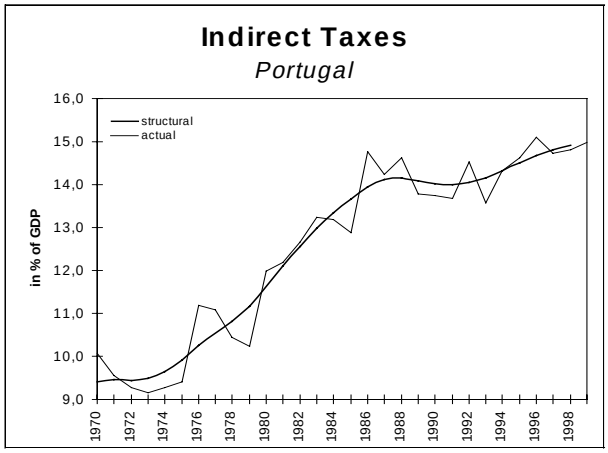

Indirect Taxes
Great Britain
in % of GDP
structural
actual

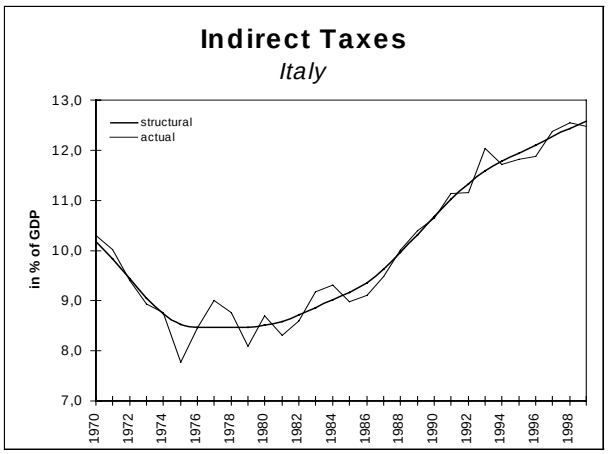
Annex 5d (continued)

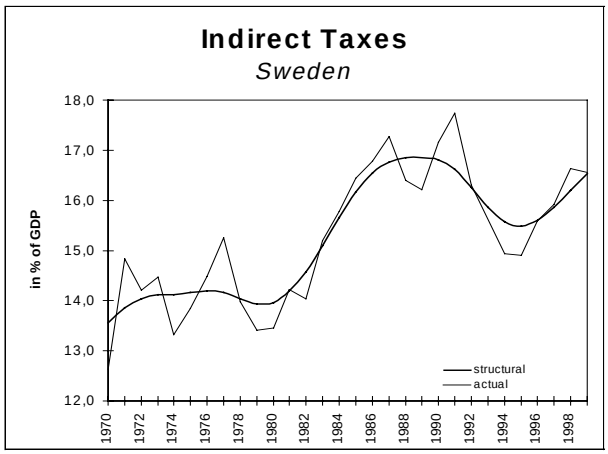




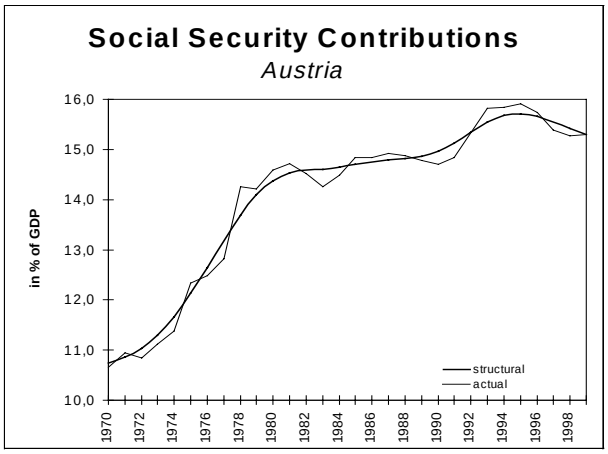


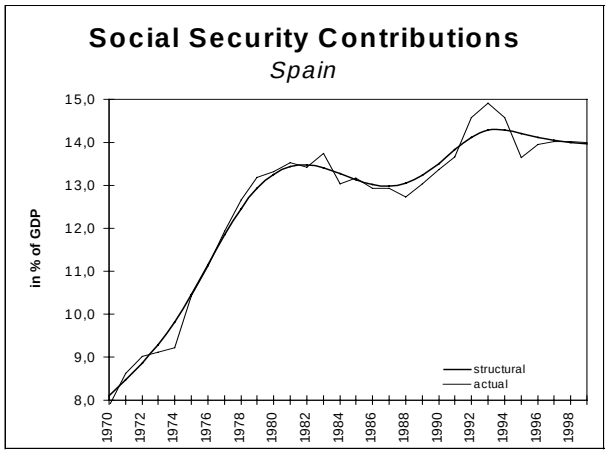


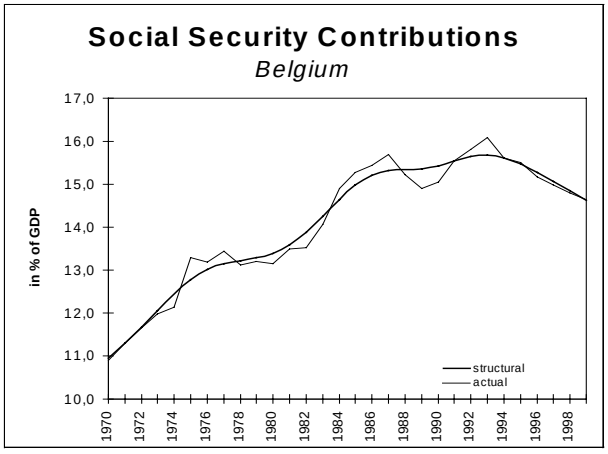


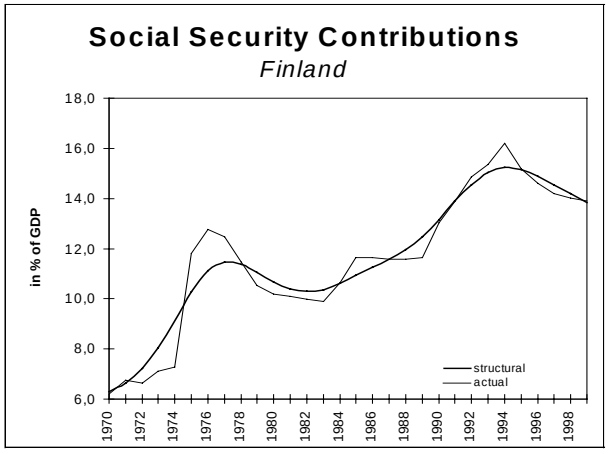


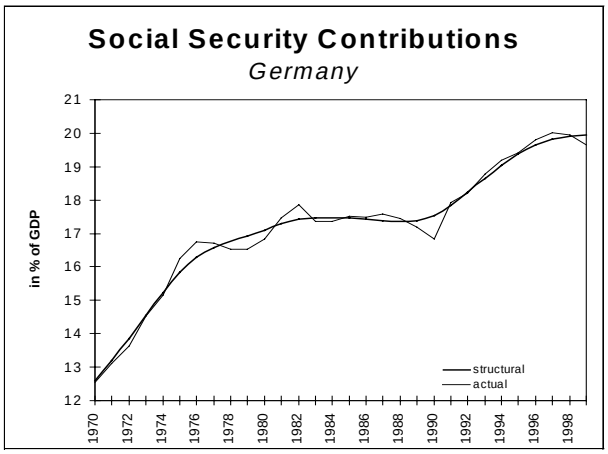
Annex 5e

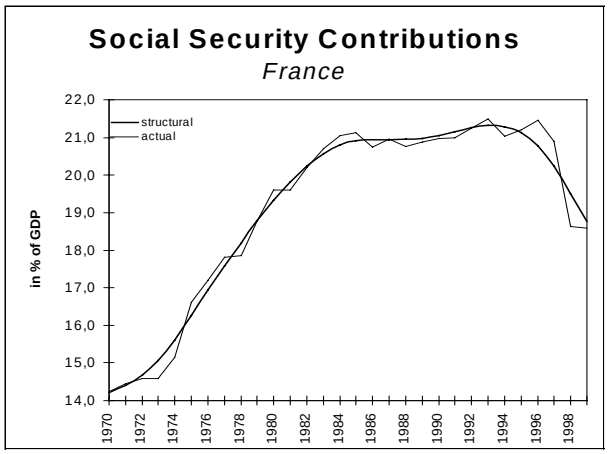

Social Security Contributions
Austria
in % of GDP
structural
actual

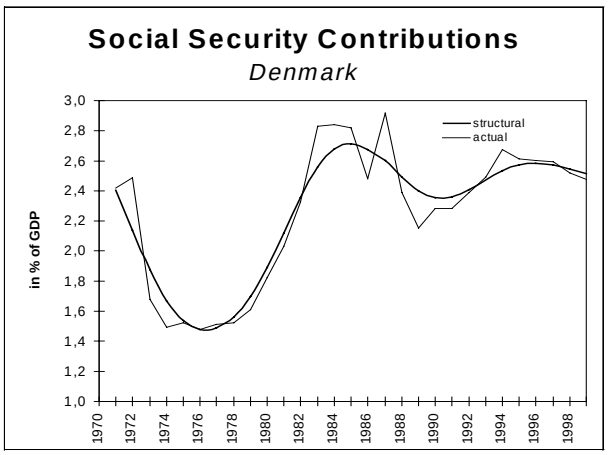

Social Security Contributions
Spain
in % of GDP
structural
actual

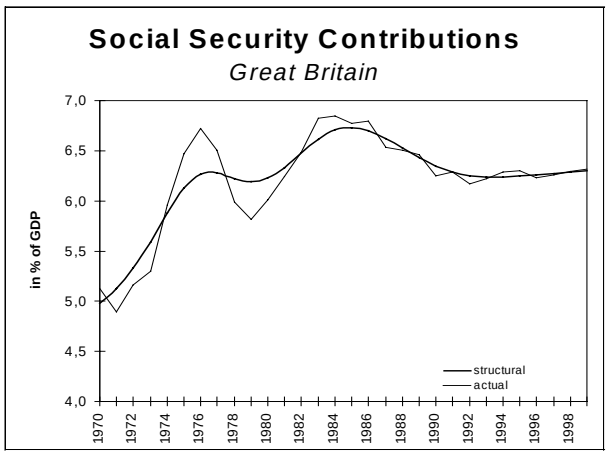

Social Security Contributions
Belgium
in % of GDP
structural
actual


Social Security Contributions
Finland
in % of GDP
structural
actual

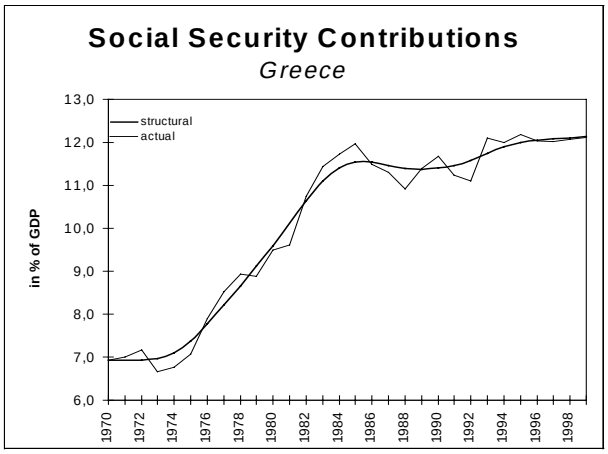

Social Security Contributions
Germany
in % of GDP
structural
actual

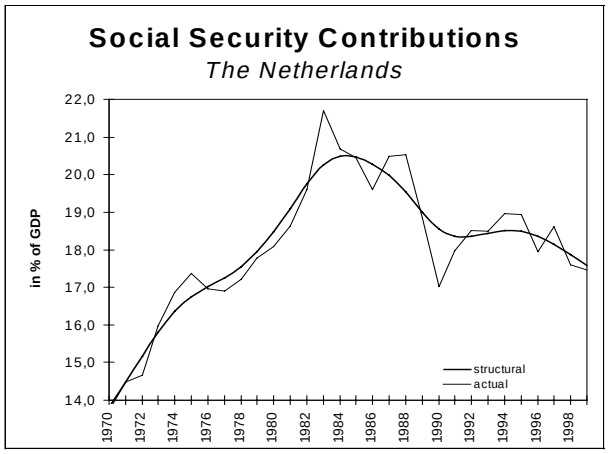

Social Security Contributions
France
in % of GDP
structural
actual

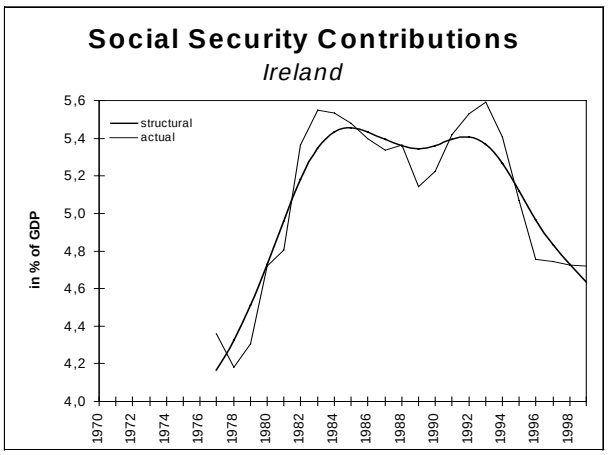

Social Security Contributions
Denmark
in % of GDP
structural
actual

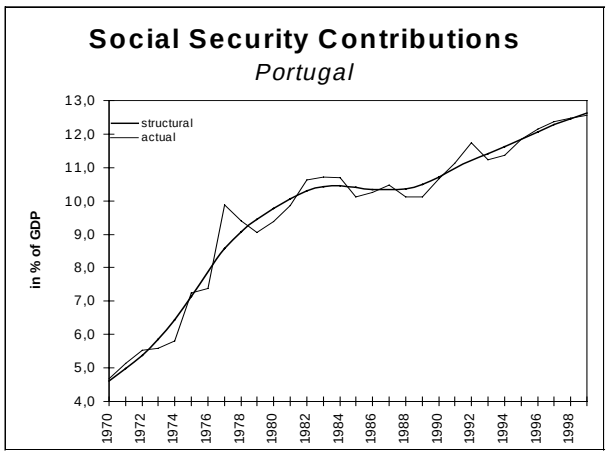

Social Security Contributions
Great Britain
in % of GDP
structural
actual

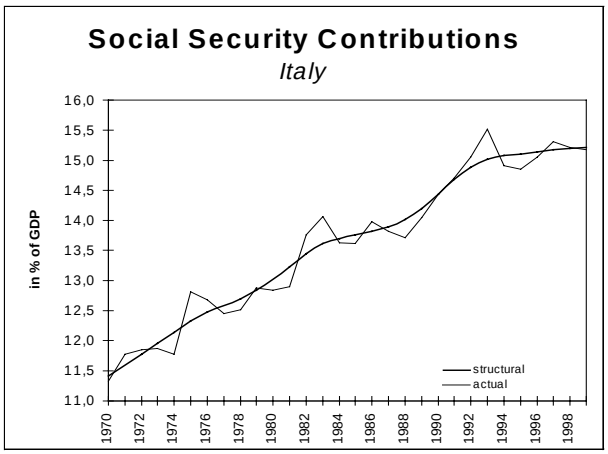
Annex 5e (continued)

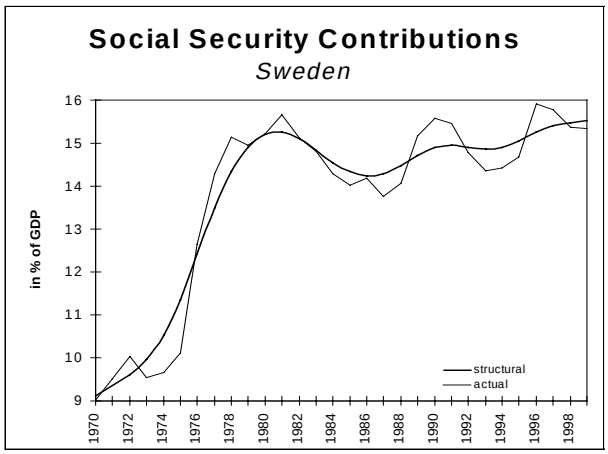




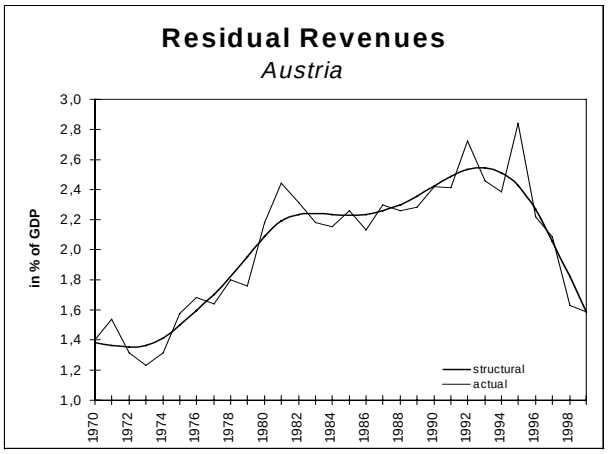


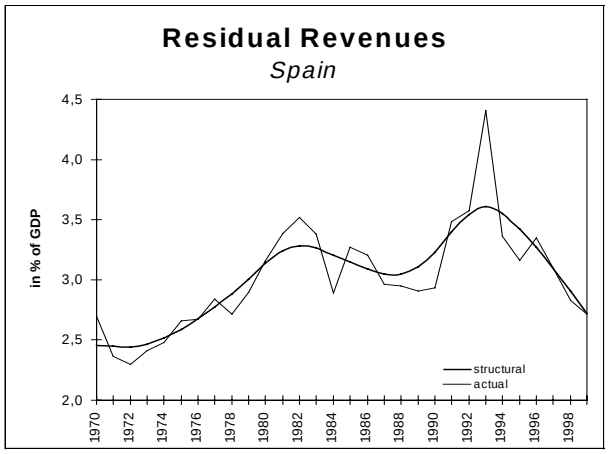


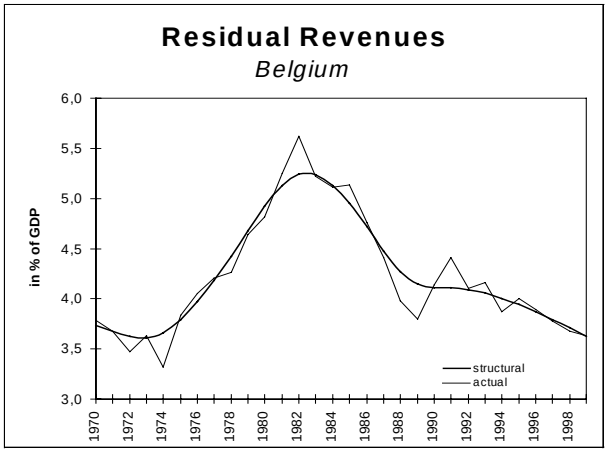




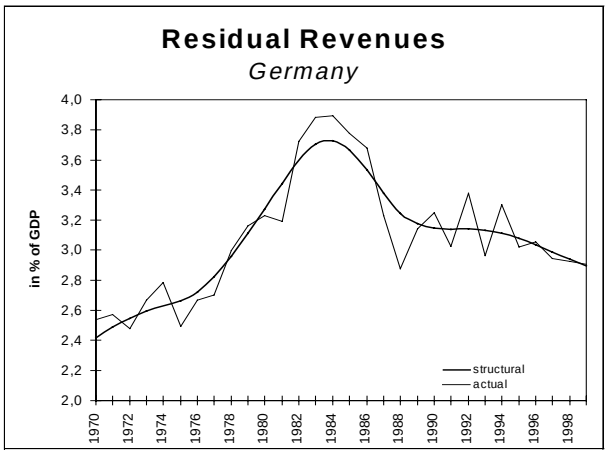
Annex 5f

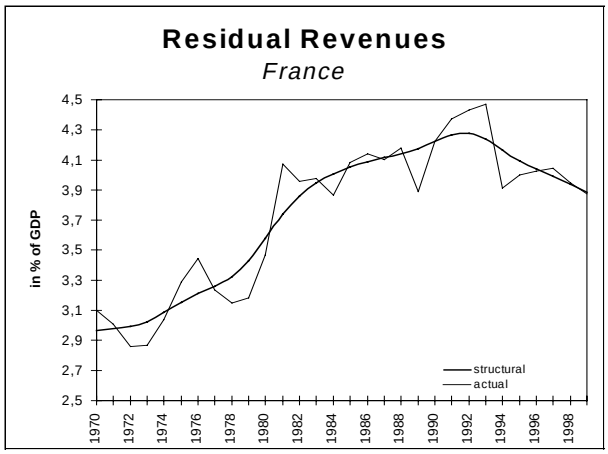

Residual Revenues
Austria
in % of GDP
structural
actual

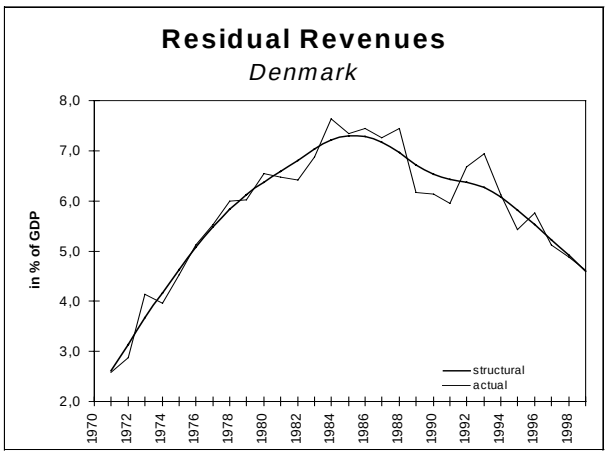

Residual Revenues
Spain
in % of GDP
structural
actual

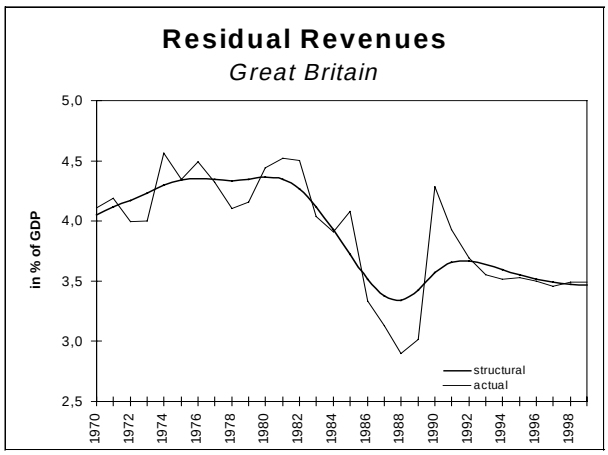

Residual Revenues
Belgium
in % of GDP
structural
actual


Residual Revenues
Finland
in % of GDP
structural
actual

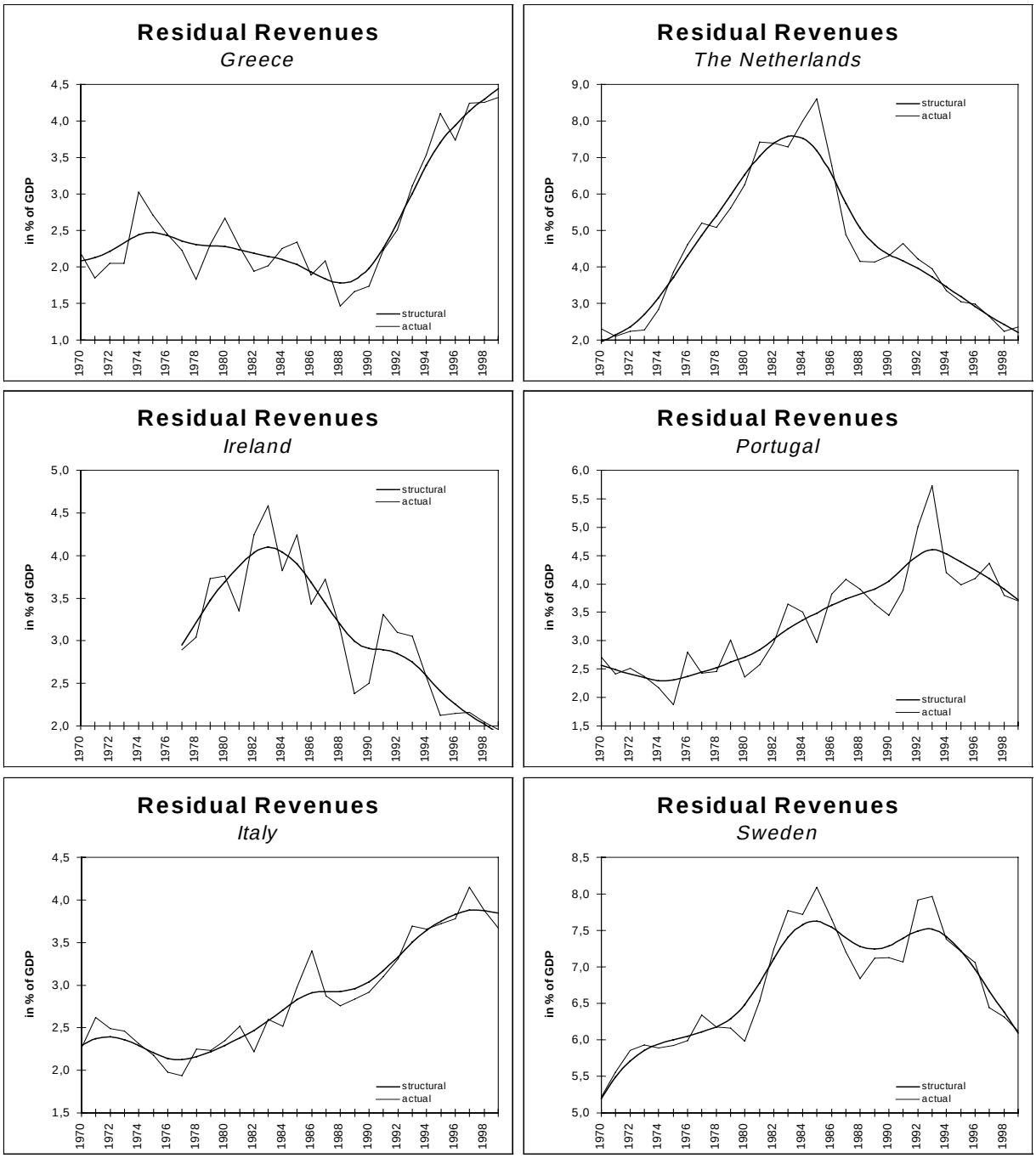

Residual Revenues
Germany
in % of GDP
structural
actual


Residual Revenues
France
in % of GDP
structural
actual

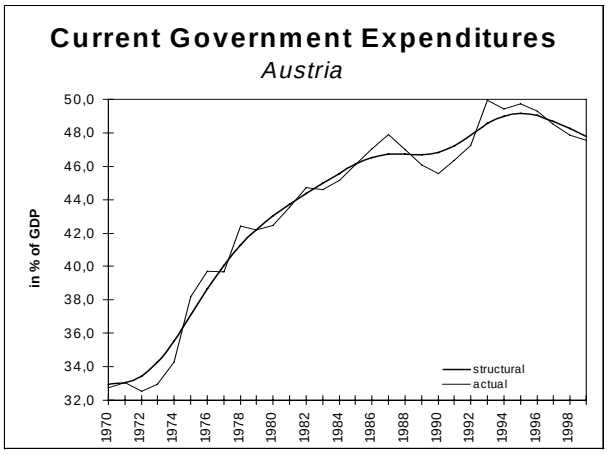

Residual Revenues
Denmark
in % of GDP
structural
actual

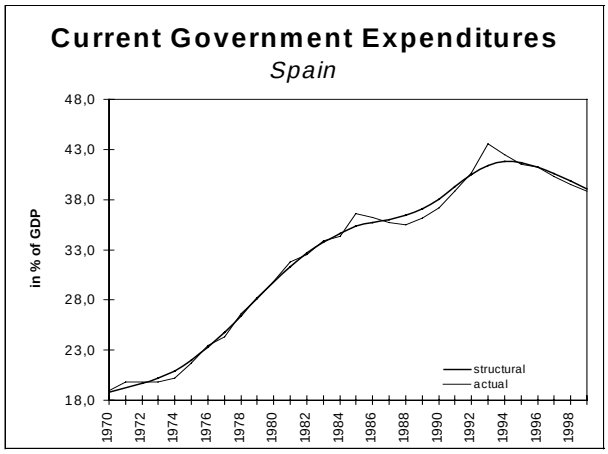

Residual Revenues
Great Britain
in % of GDP
structural
actual

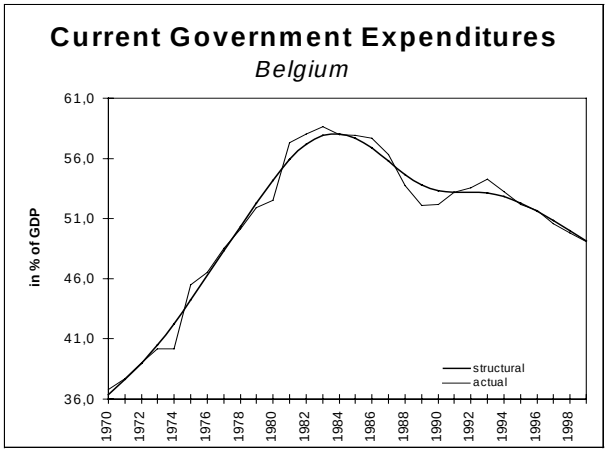
Annex 5f (continued)

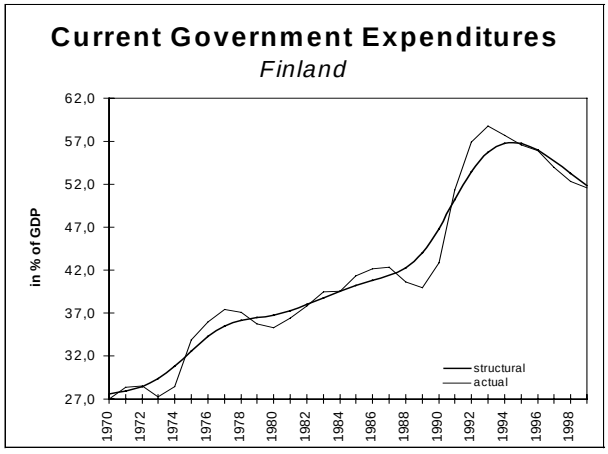


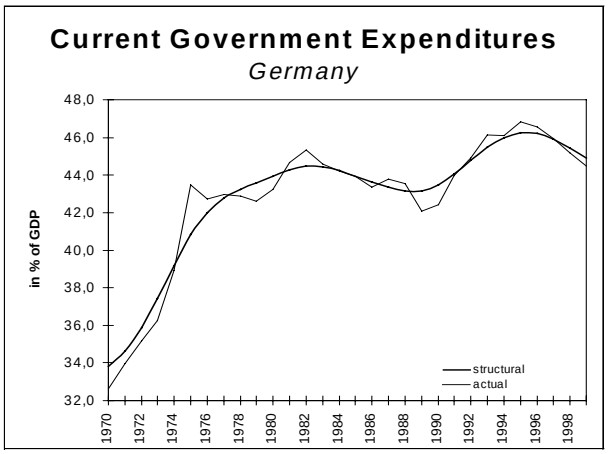
Annex 5g

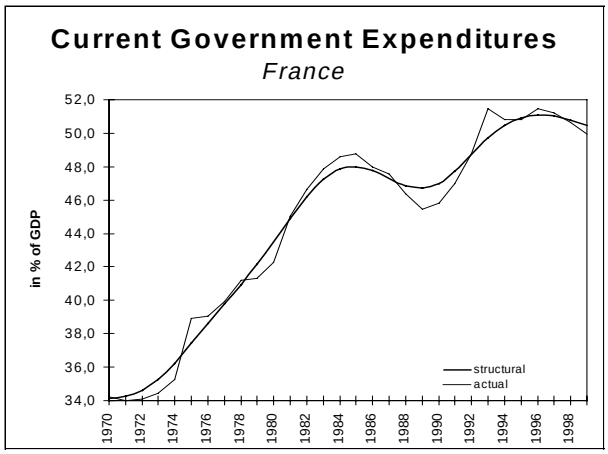

Current Government Expenditures
Austria
in % of GDP
structural
actual

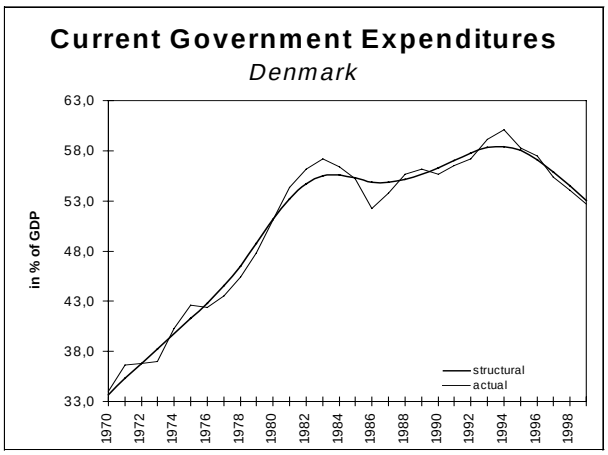

Current Government Expenditures
Spain
in % of GDP
structural
actual

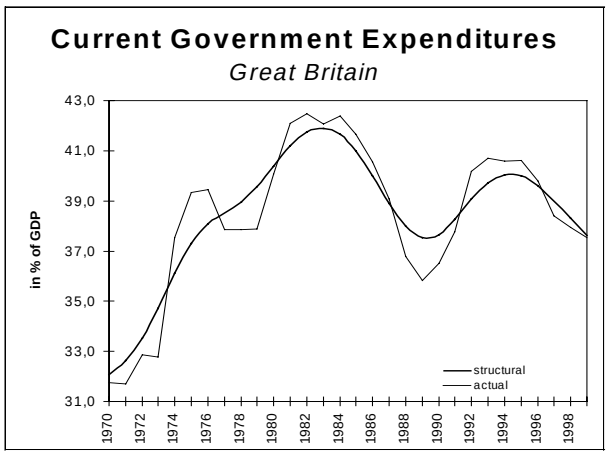

Current Government Expenditures
Belgium
in % of GDP
structural
actual


Current Government Expenditures
Finland
in % of GDP
structural
actual

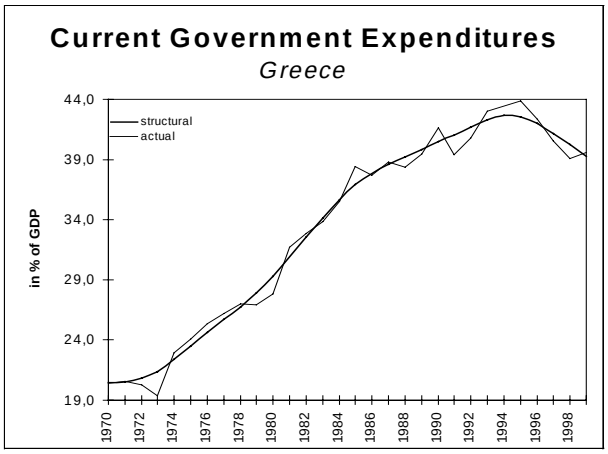

Current Government Expenditures
Germany
in % of GDP
structural
actual

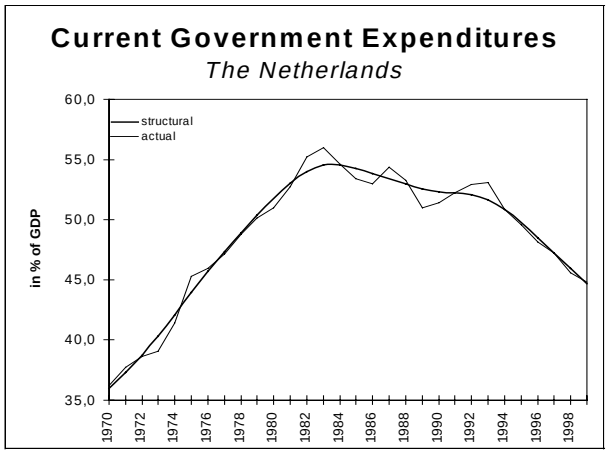

Current Government Expenditures
France
in % of GDP
structural
actual

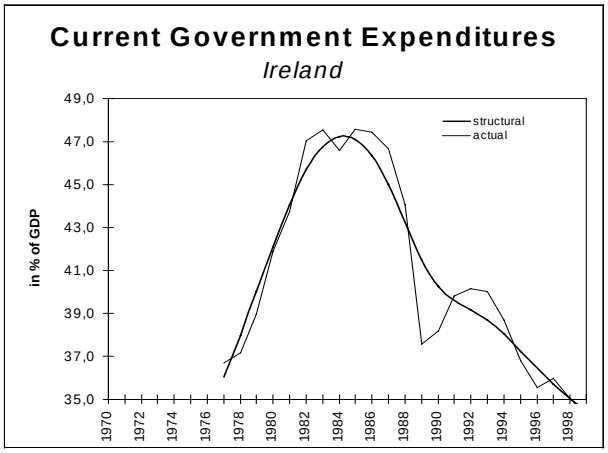

Current Government Expenditures
Denmark
in % of GDP
structural
actual

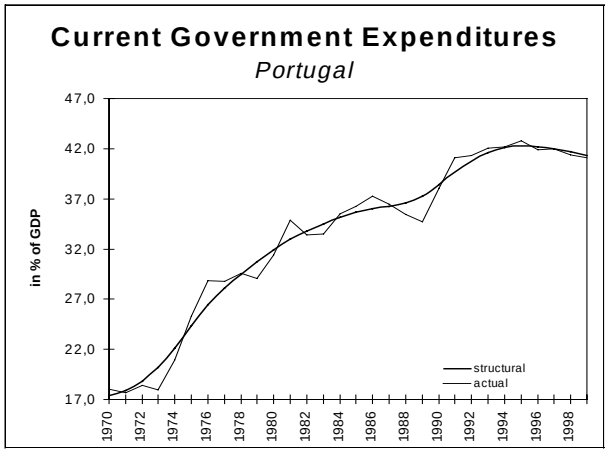

Current Government Expenditures
Great Britain
in % of GDP
structural
actual

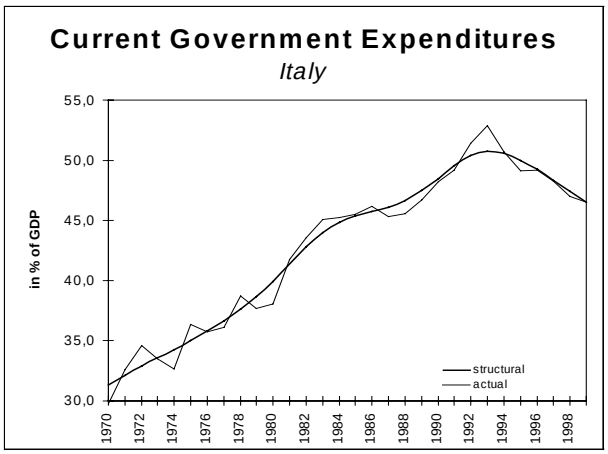
Annex 5g (continued)

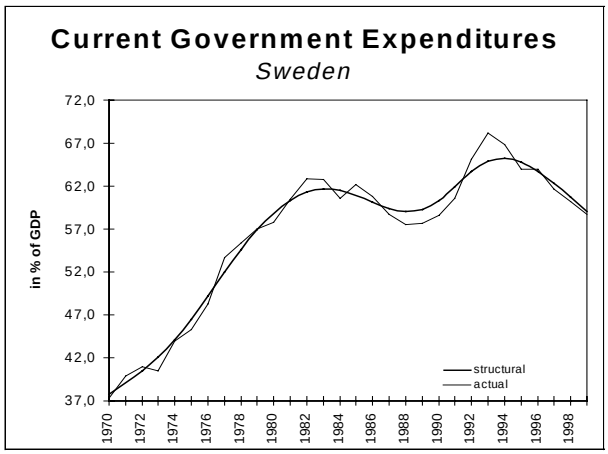




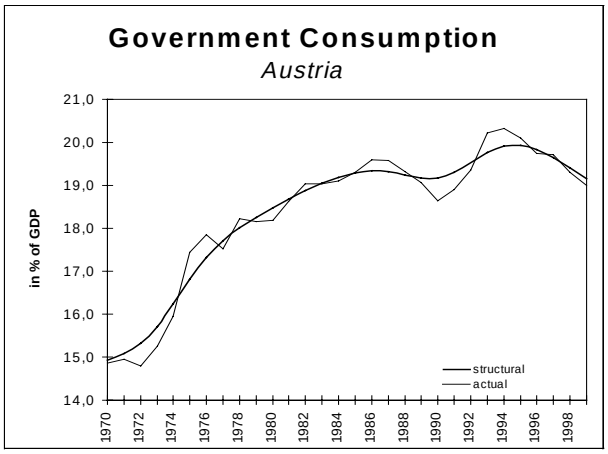


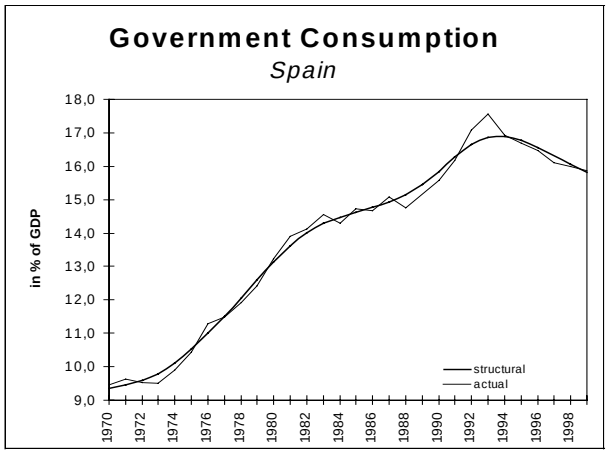


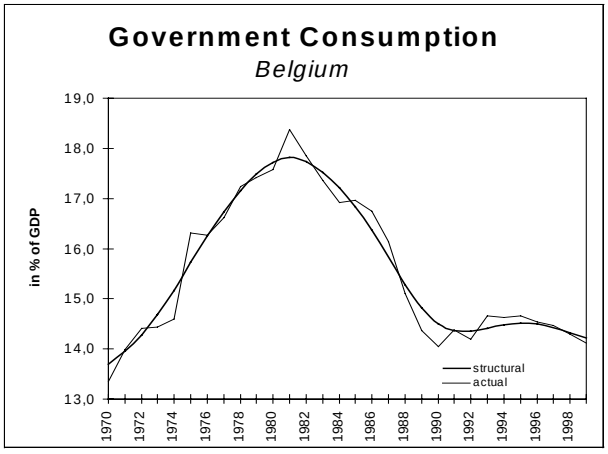


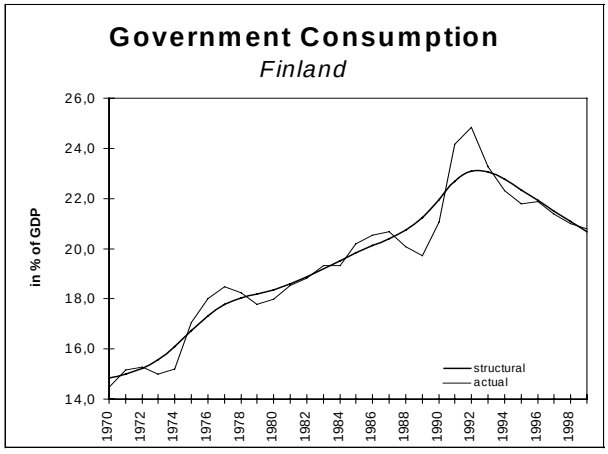


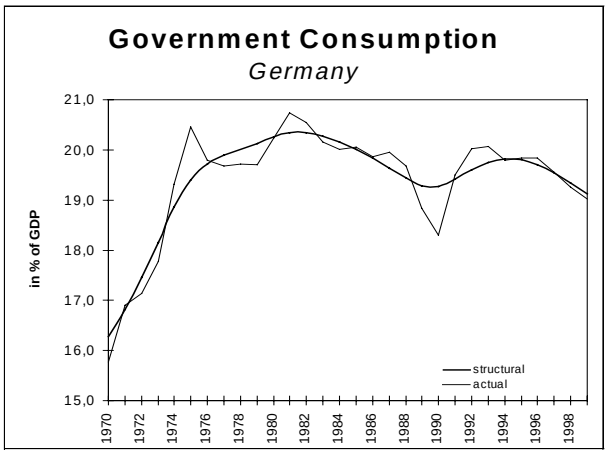
Annex 5h

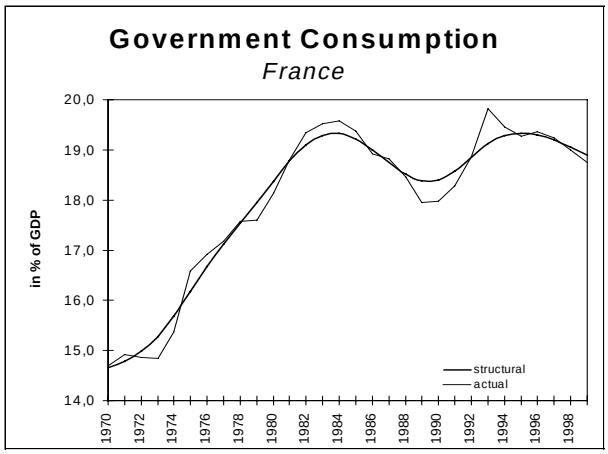

Government Consumption
Austria
in % of GDP
structural
actual

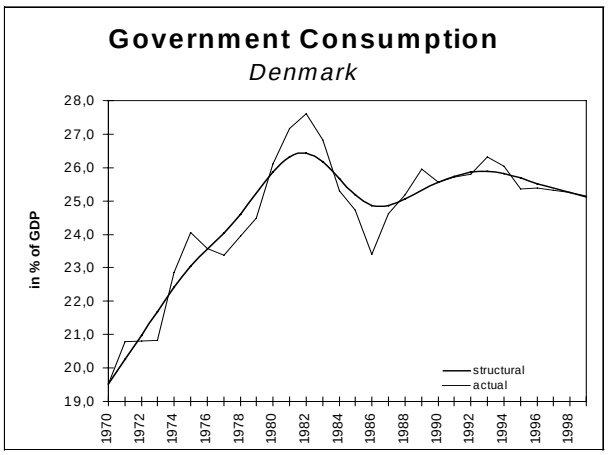

Government Consumption
Spain
in % of GDP
structural
actual

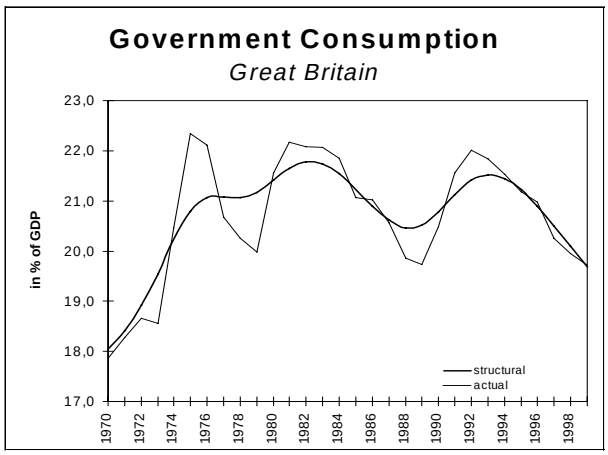

Government Consumption
Belgium
in % of GDP
structural
actual


Government Consumption
Finland
in % of GDP
structural
actual

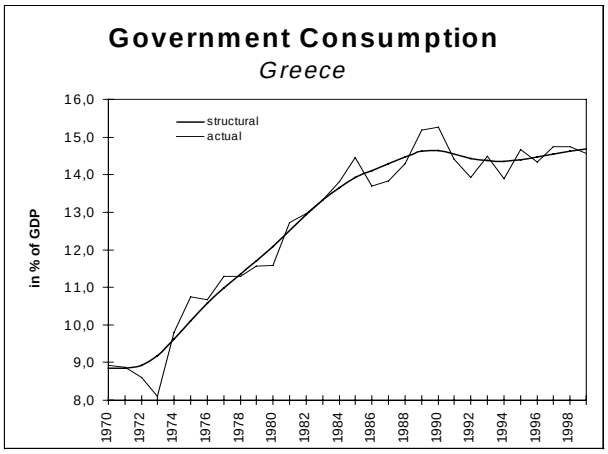

Government Consumption
Germany
in % of GDP
structural
actual

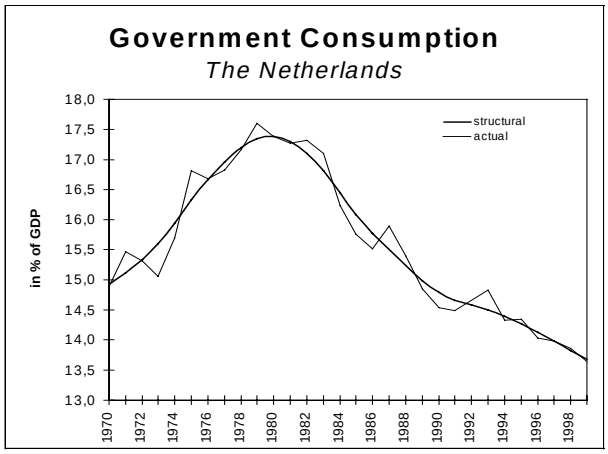

Government Consumption
France
in % of GDP
structural
actual

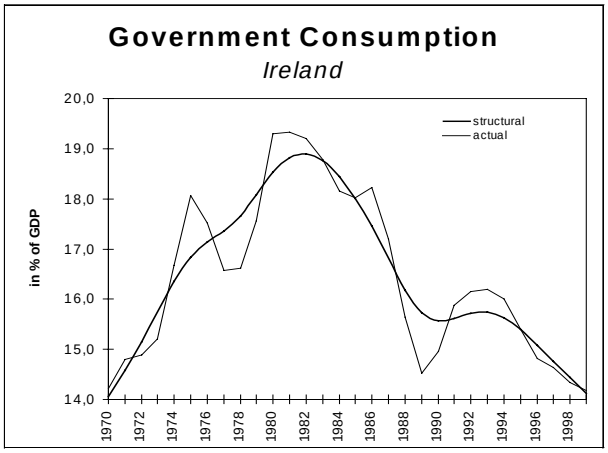

Government Consumption
Denmark
in % of GDP
structural
actual

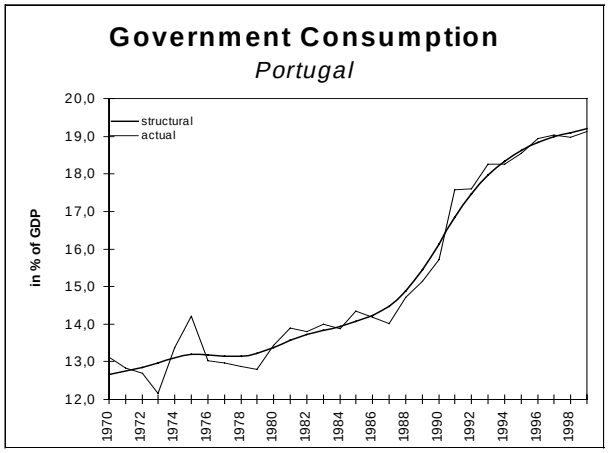

Government Consumption
Great Britain
in % of GDP
structural
actual

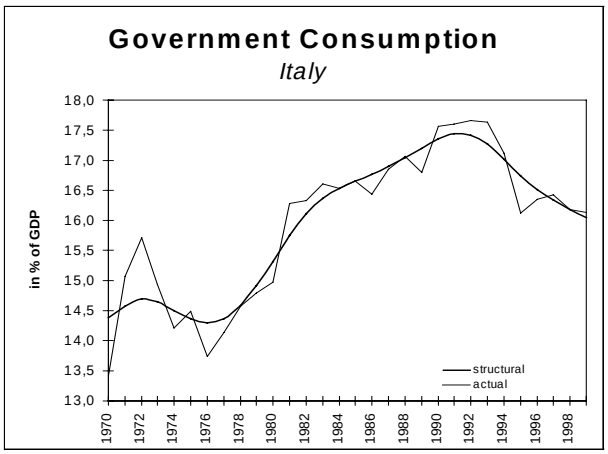
Annex 5h (continued)

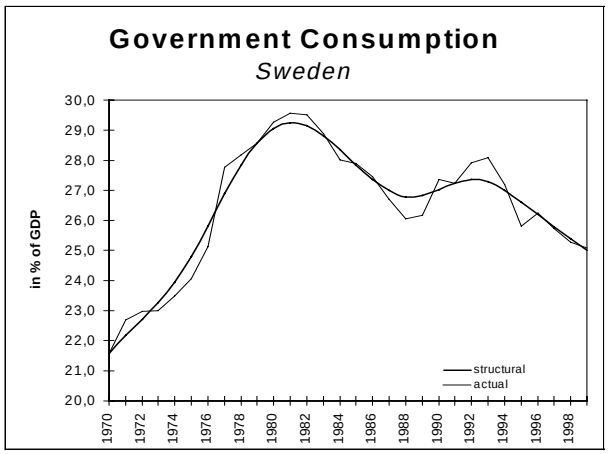




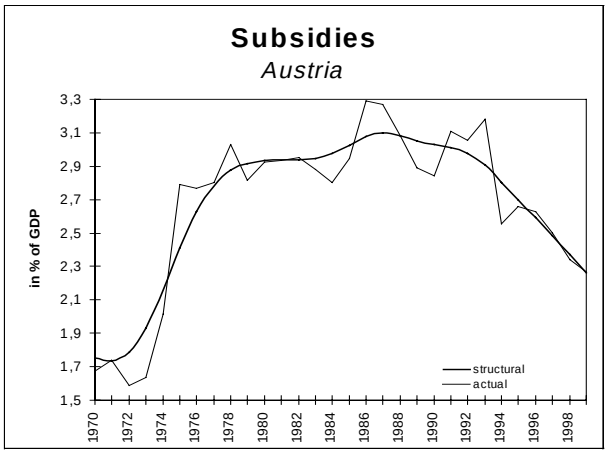


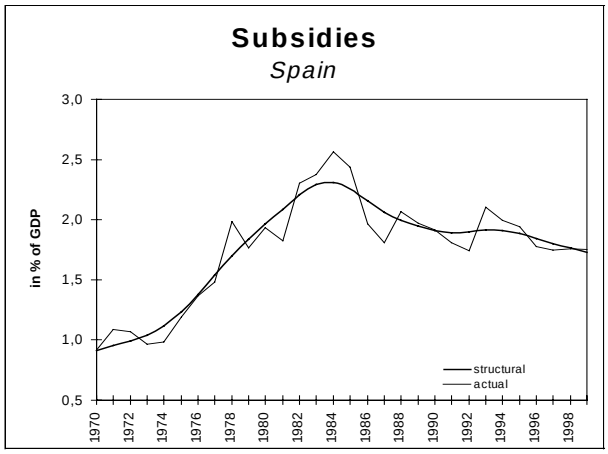


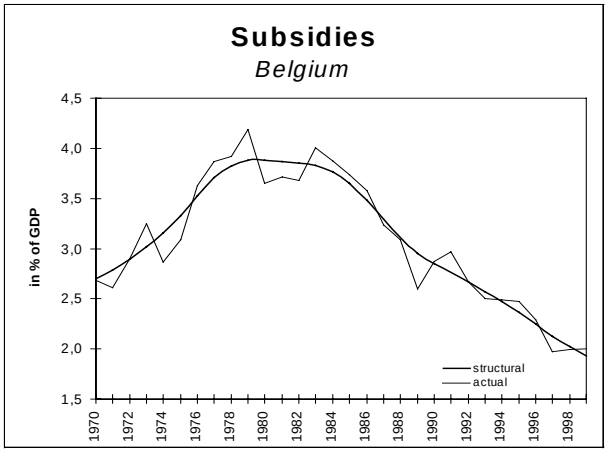


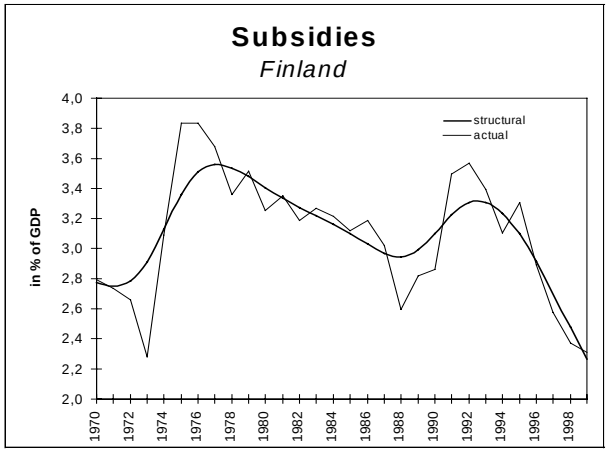


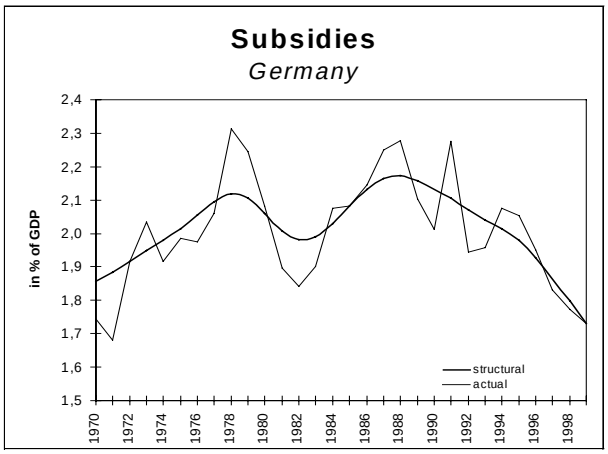
Annex 5i

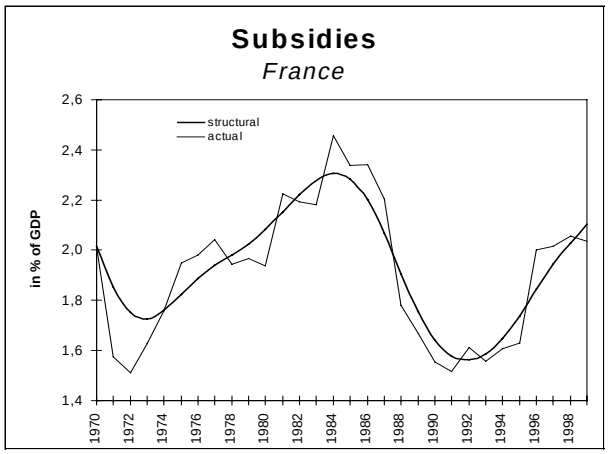

Subsidies
Austria
in % of GDP
structural
actual

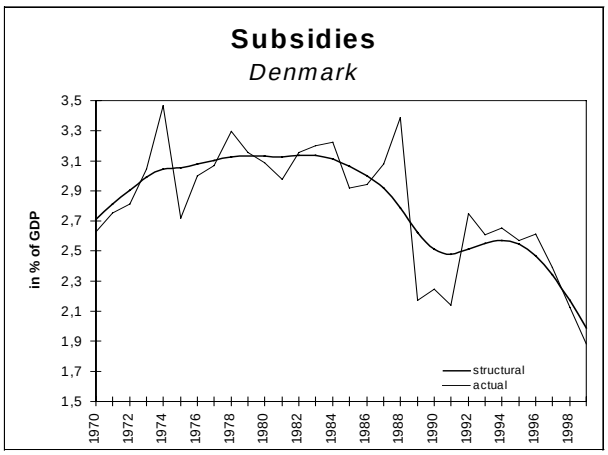

Subsidies
Spain
in % of GDP
structural
actual

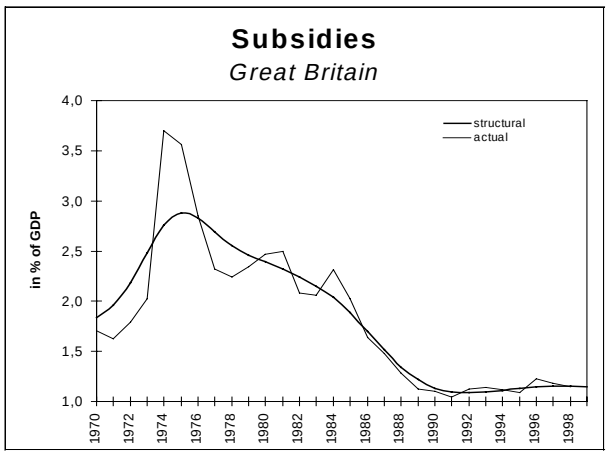

Subsidies
Belgium
in % of GDP
structural
actual


Subsidies
Finland
in % of GDP
structural
actual

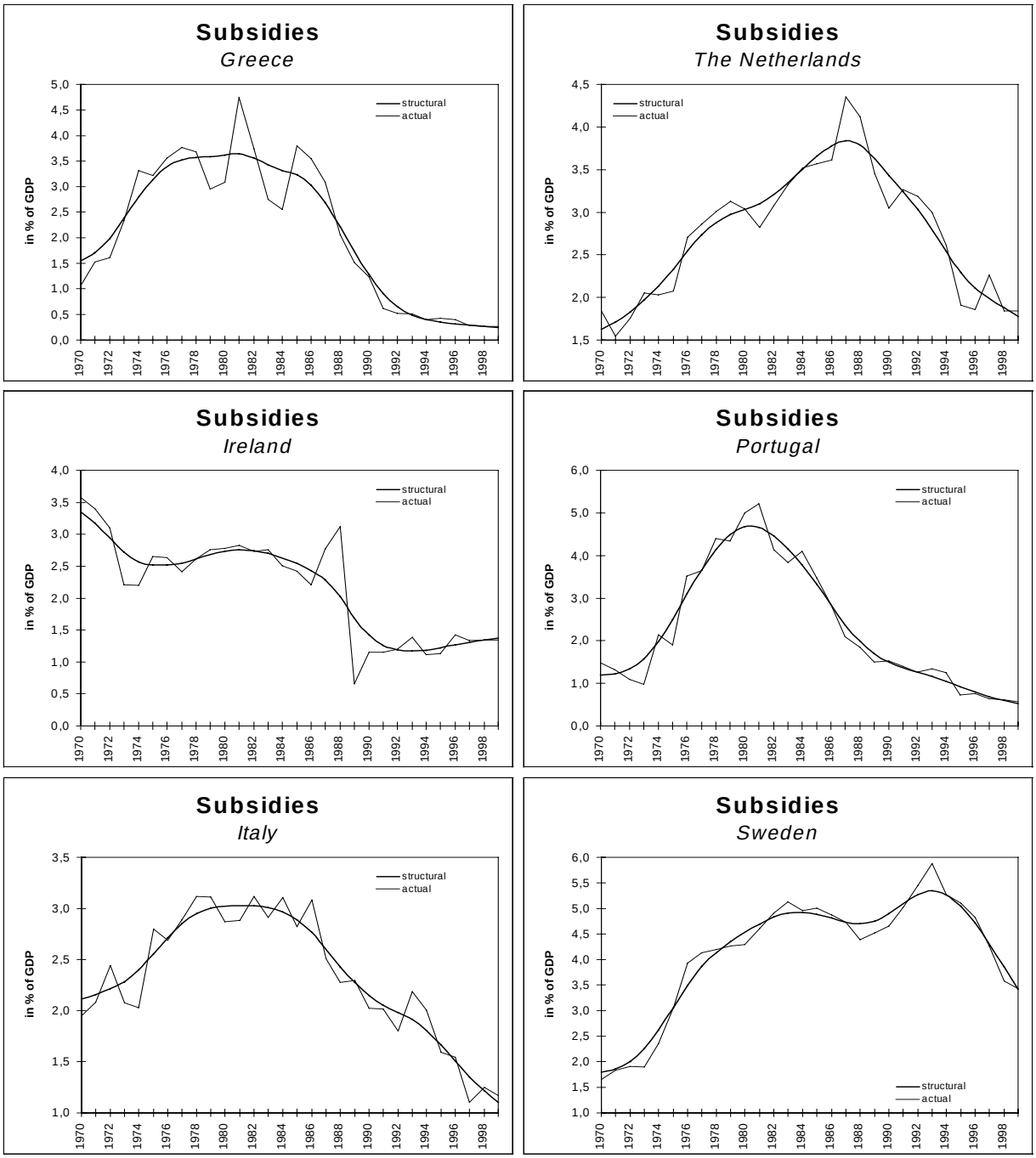

Subsidies
Germany
in % of GDP
structural
actual


Subsidies
France
in % of GDP
structural
actual

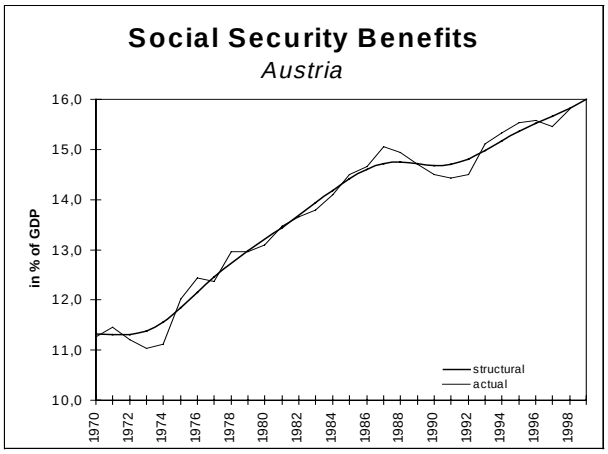

Subsidies
Denmark
in % of GDP
structural
actual

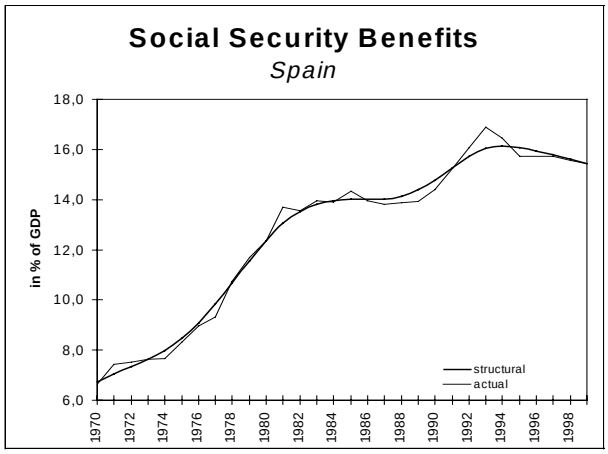

Subsidies
Great Britain
in % of GDP
structural
actual

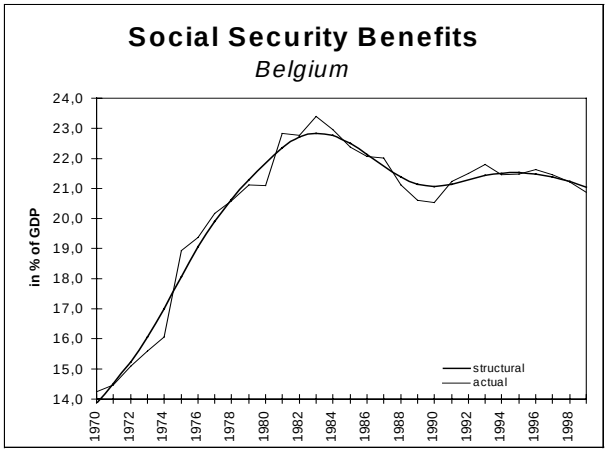
Annex 5i (continued)

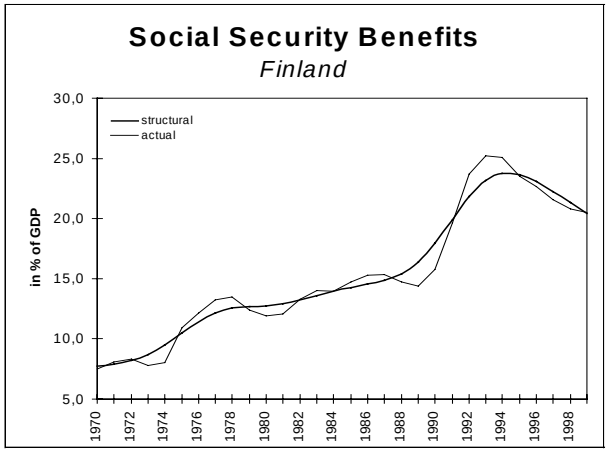


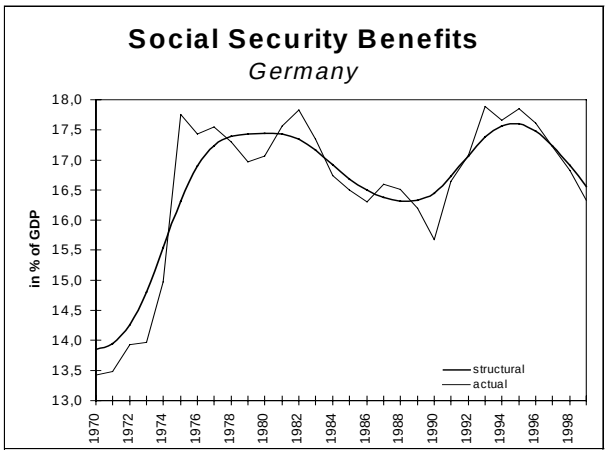
Annex 5j

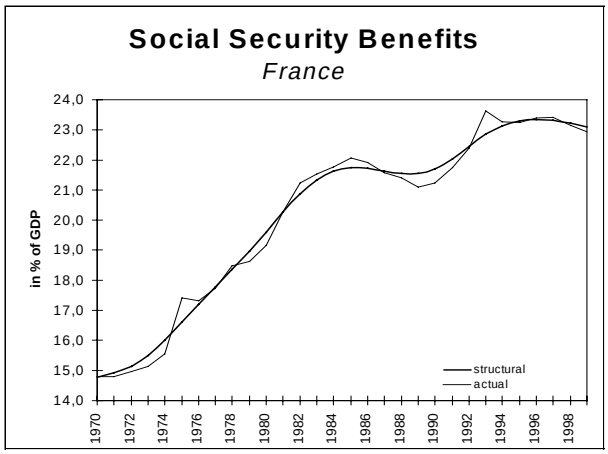

Social Security Benefits
Austria
in % of GDP
structural
actual

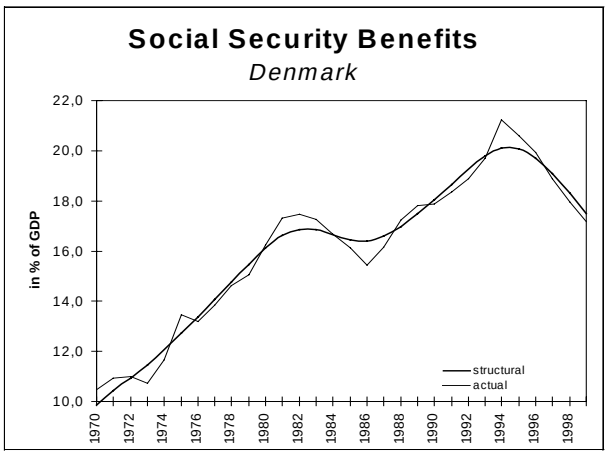

Social Security Benefits
Spain
in % of GDP
structural
actual

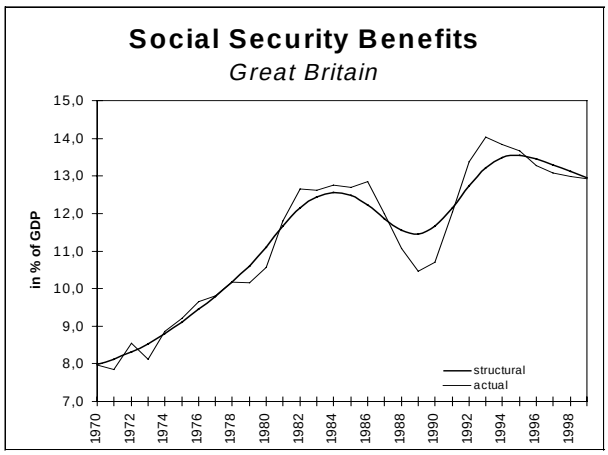

Social Security Benefits
Belgium
in % of GDP
structural
actual


Social Security Benefits
Finland
in % of GDP
structural
actual

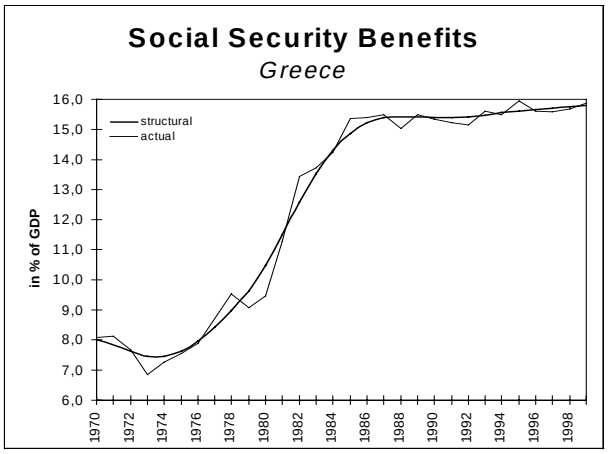

Social Security Benefits
Germany
in % of GDP
structural
actual

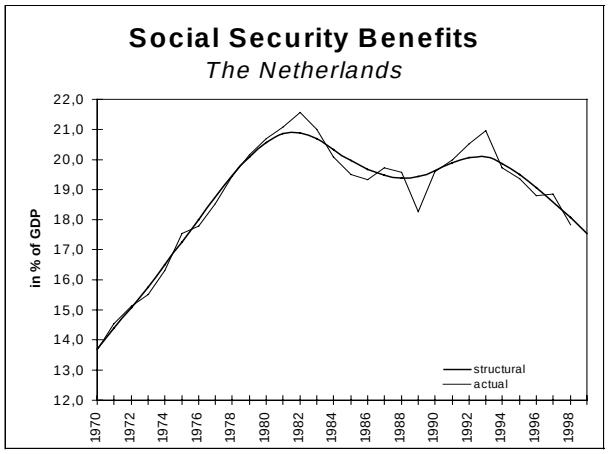

Social Security Benefits
France
in % of GDP
structural
actual

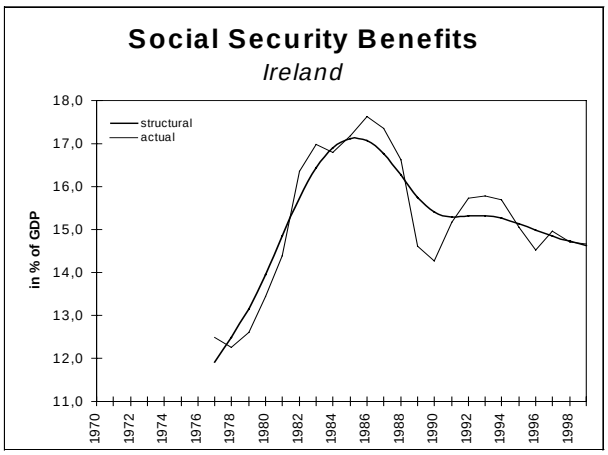

Social Security Benefits
Denmark
in % of GDP
structural
actual

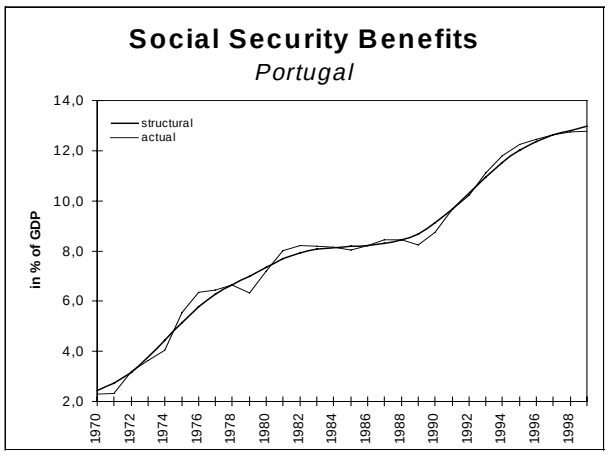

Social Security Benefits
Great Britain
in % of GDP
structural
actual

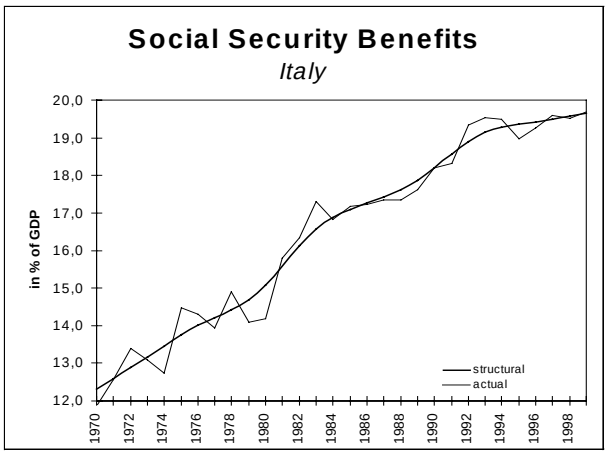
Annex 5j (continued)

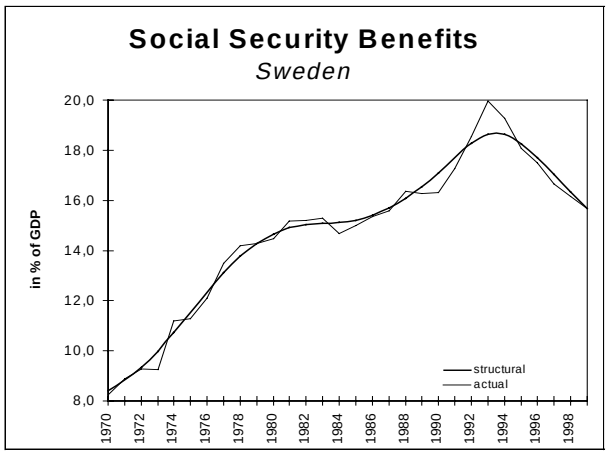




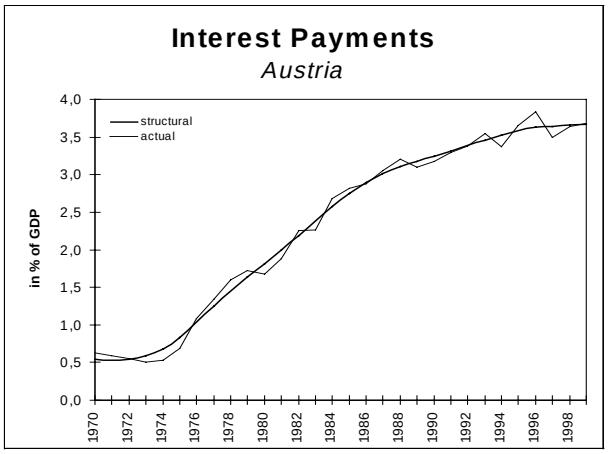


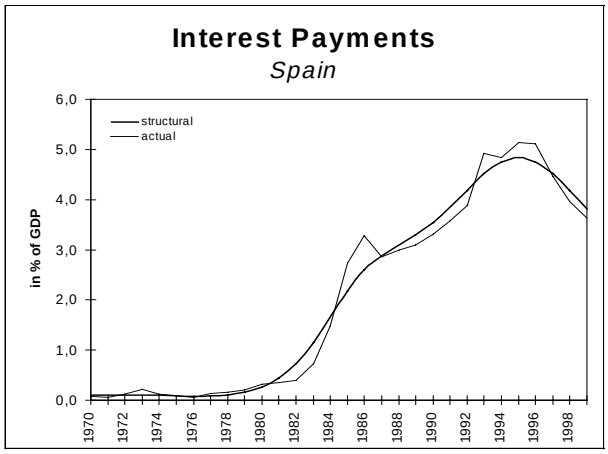


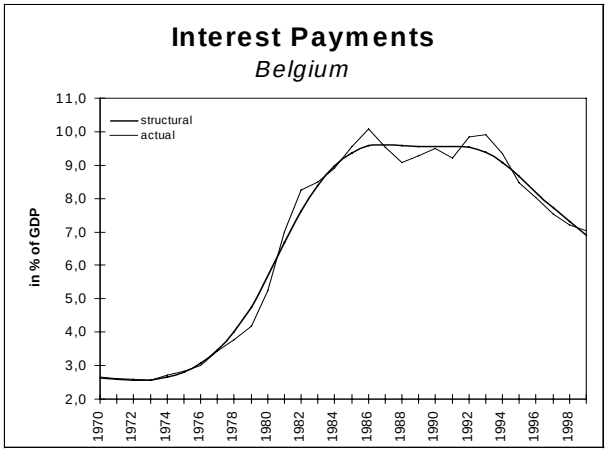


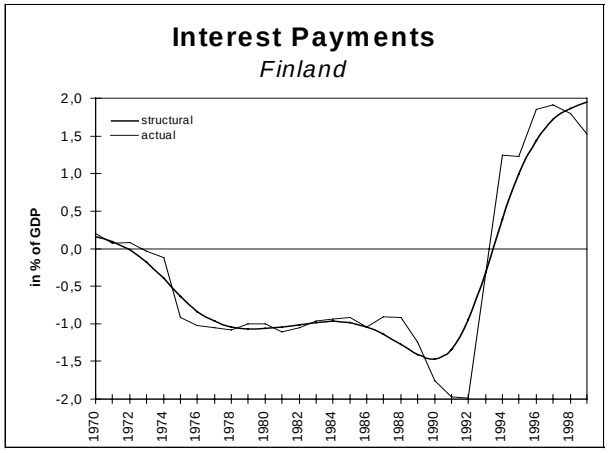


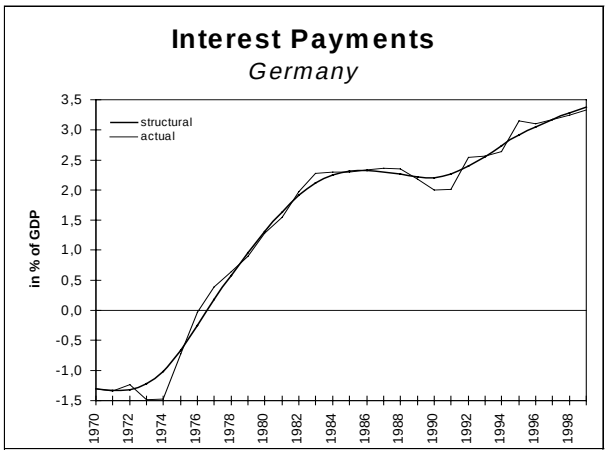
Annex 5k

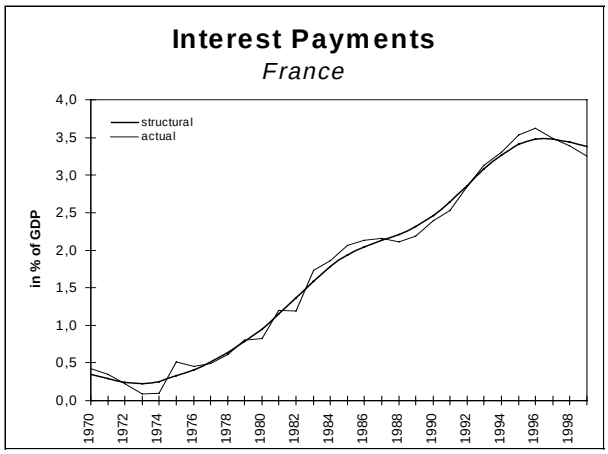

Interest Payments
Austria
structural
actual
in % of GDP

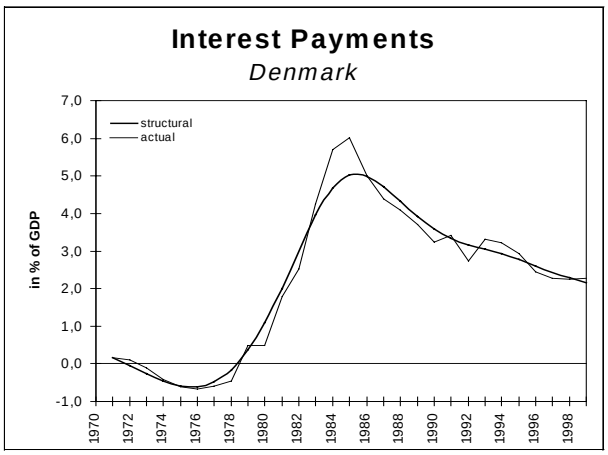

Interest Payments
Spain
structural
actual
in % of GDP

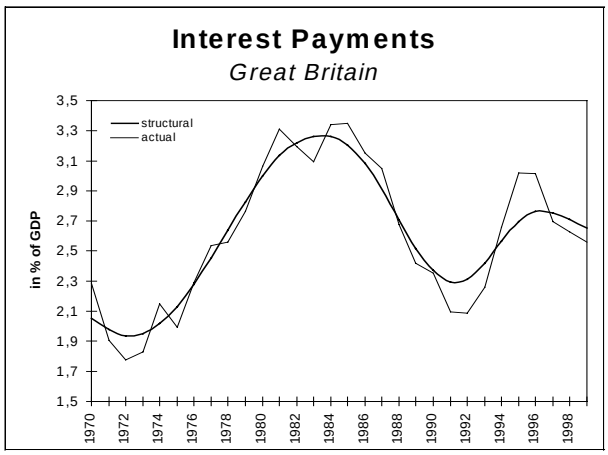

Interest Payments
Belgium
structural
actual
in % of GDP


Interest Payments
Finland
structural
actual
in % of GDP

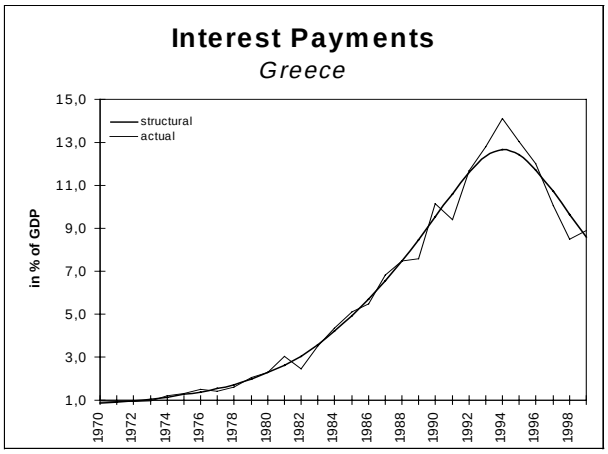

Interest Payments
Germany
structural
actual
in % of GDP

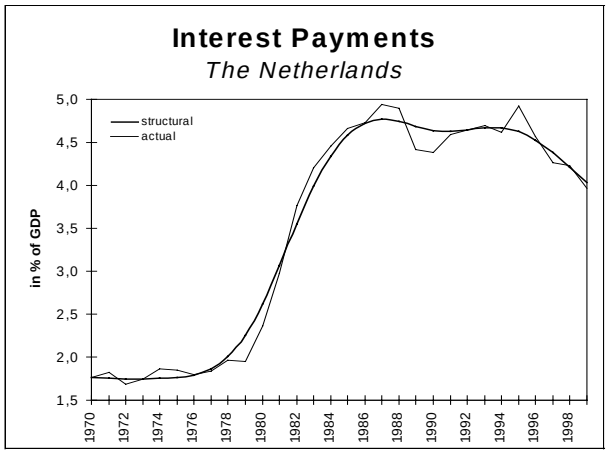

Interest Payments
France
structural
actual
in % of GDP

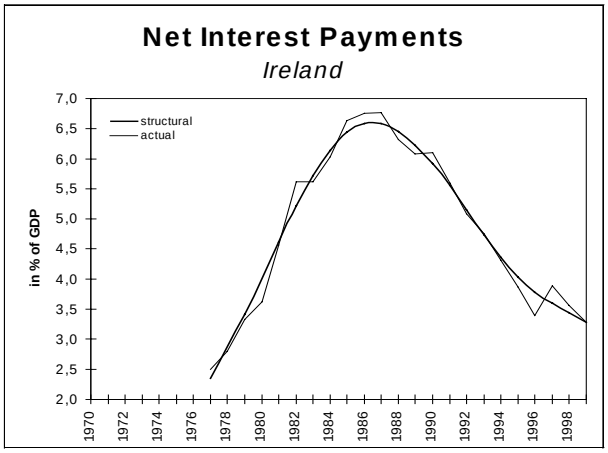

Interest Payments
Denmark
structural
actual
in % of GDP

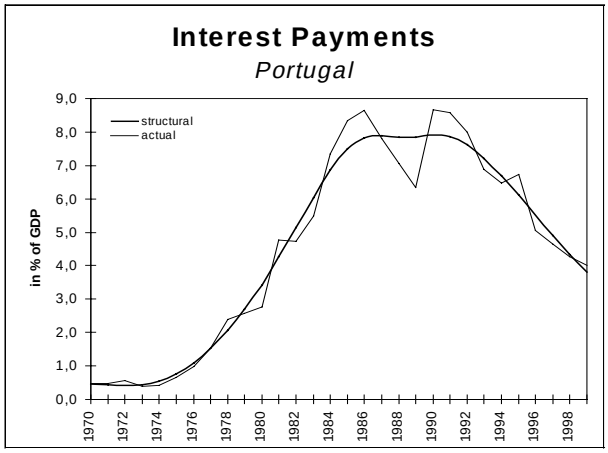

Interest Payments
Great Britain
structural
actual
in % of GDP

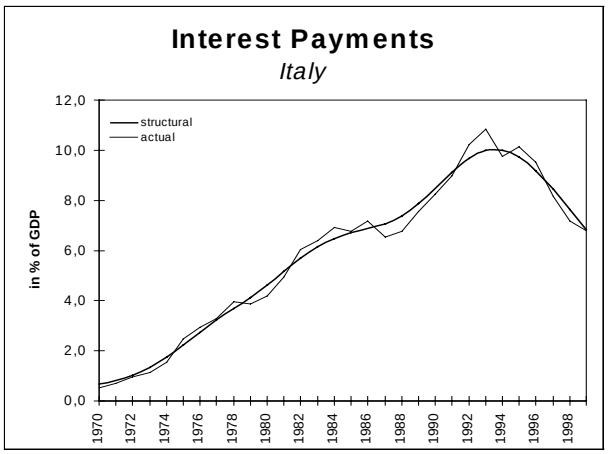
Annex 5k (continued)

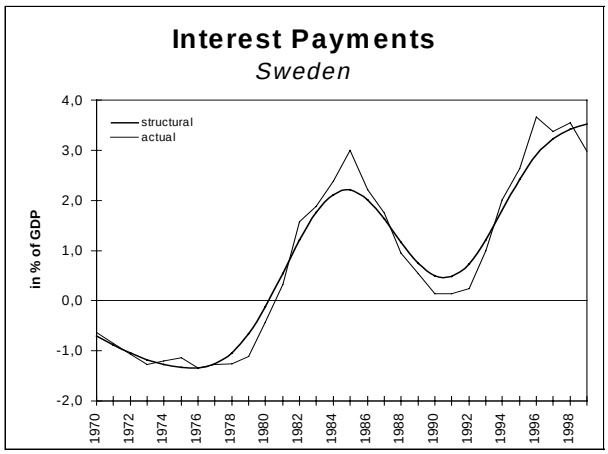




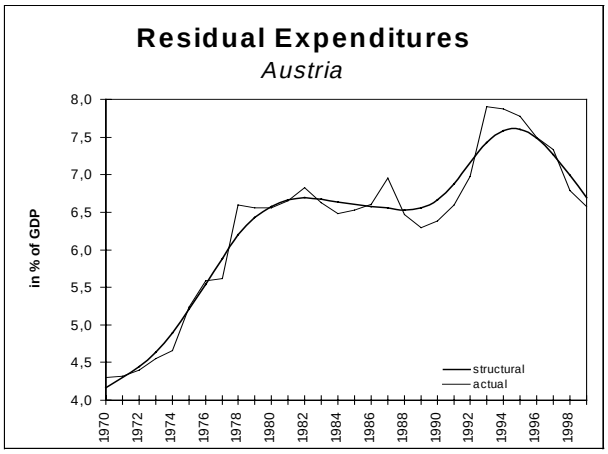


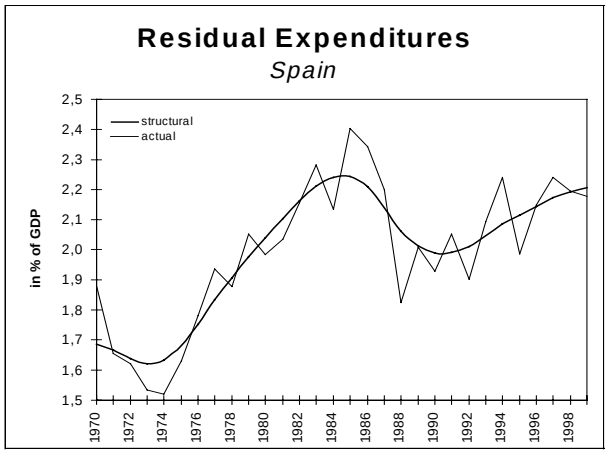


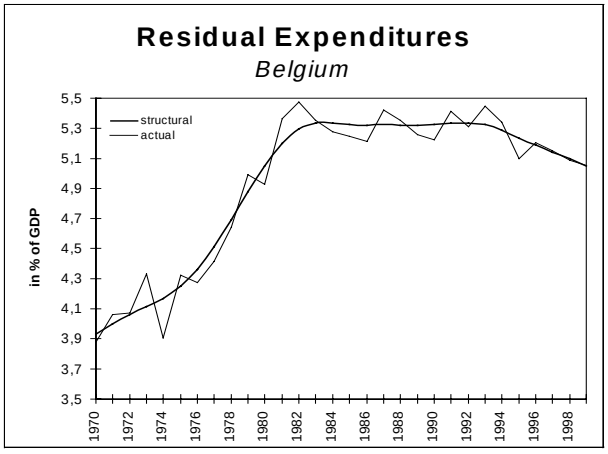


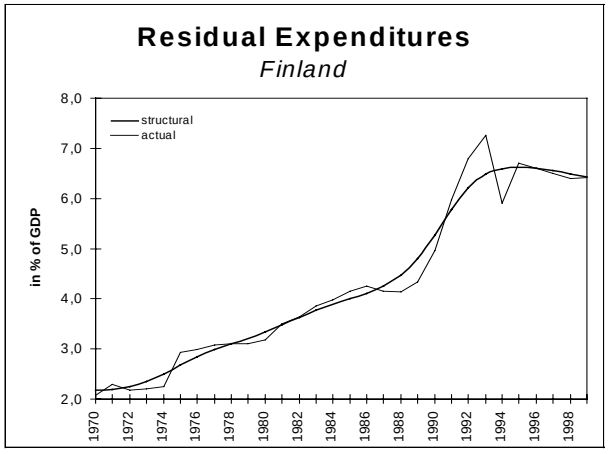


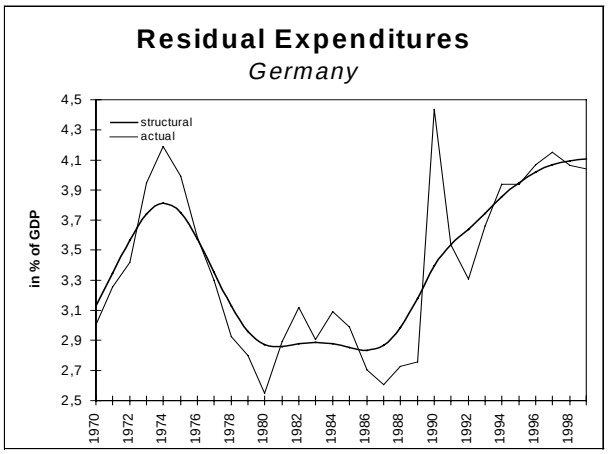
Annex 5l

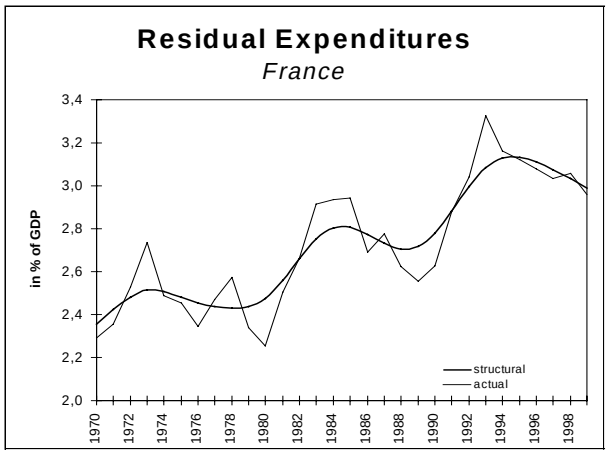

Residual Expenditures
Austria
in % of GDP
structural
actual

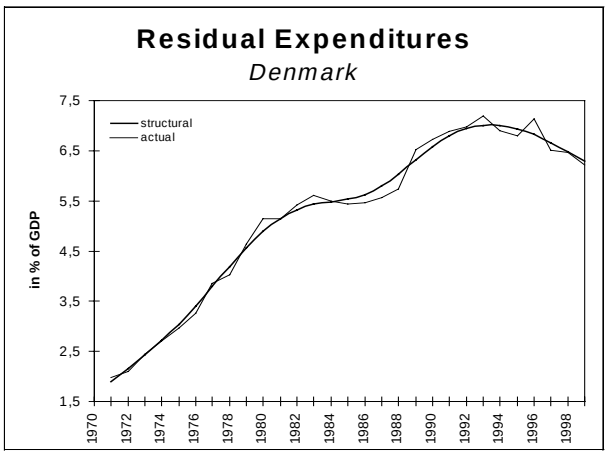

Residual Expenditures
Spain
in % of GDP
structural
actual

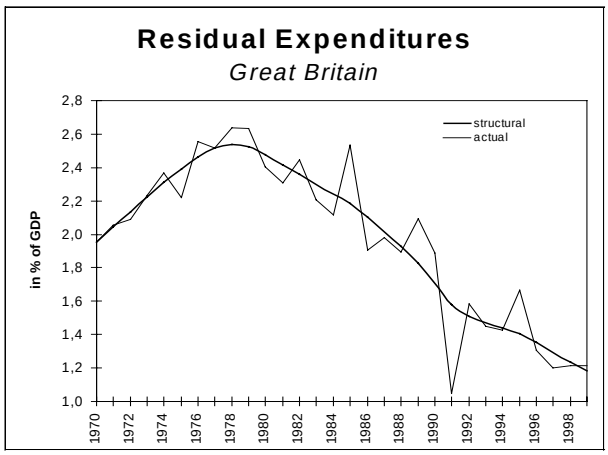

Residual Expenditures
Belgium
in % of GDP
structural
actual


Residual Expenditures
Finland
in % of GDP
structural
actual

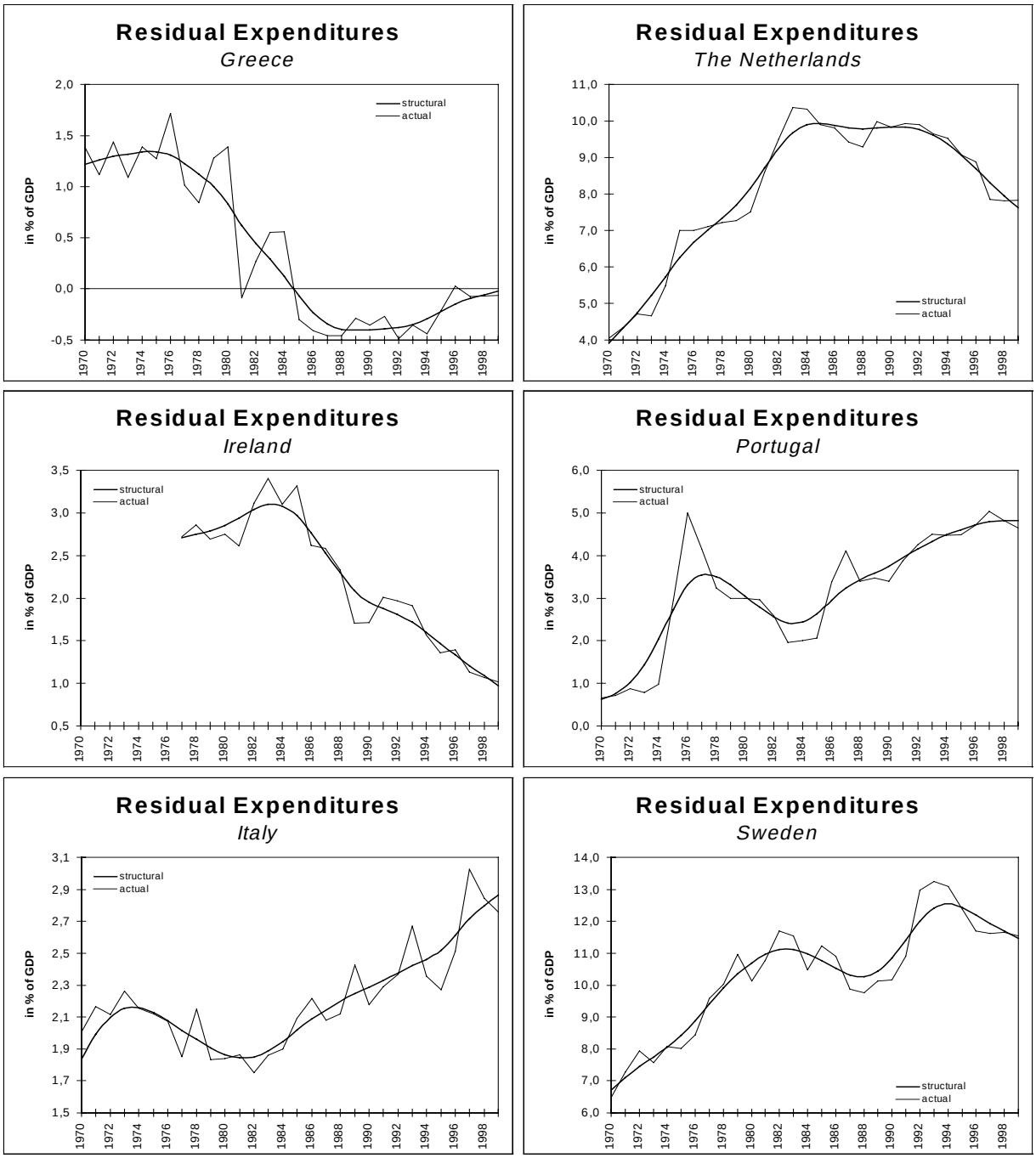

Residual Expenditures
Germany
in % of GDP
structural
actual


Residual Expenditures
France
in % of GDP
structural
actual

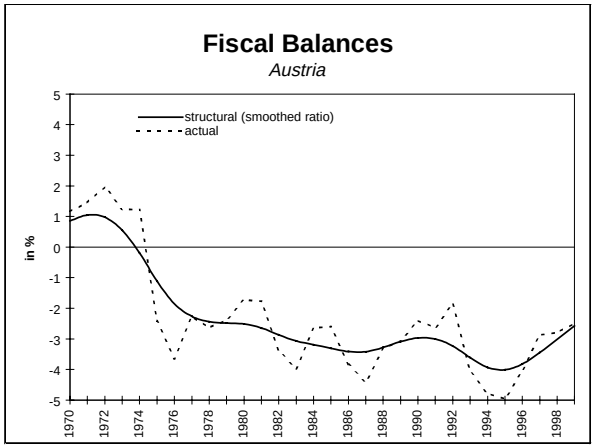

Residual Expenditures
Denmark
in % of GDP
structural
actual

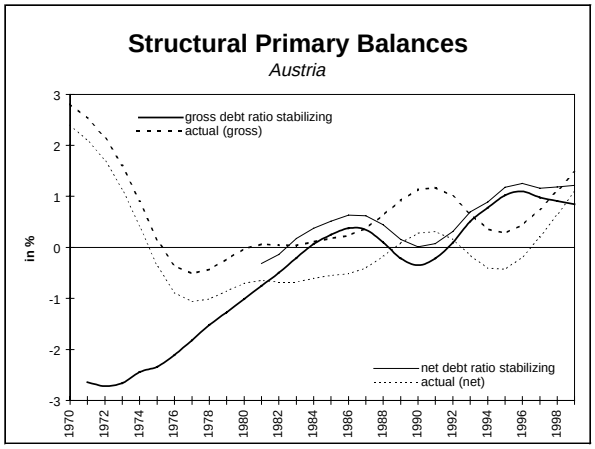

Residual Expenditures
Great Britain
in % of GDP
structural
actual

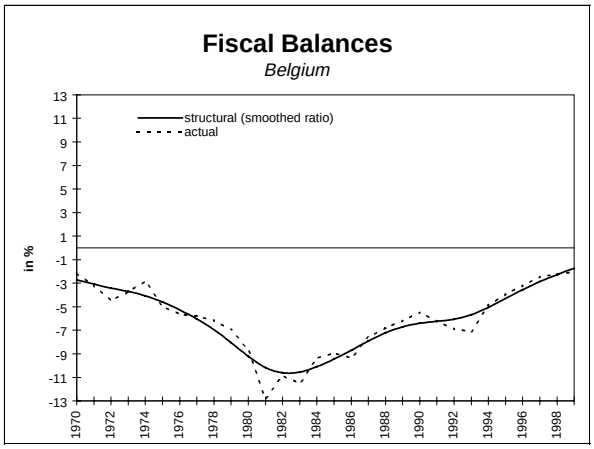
Annex 5l (continued)

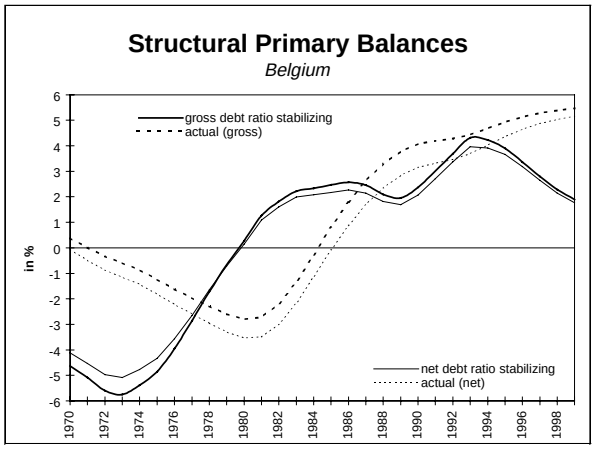


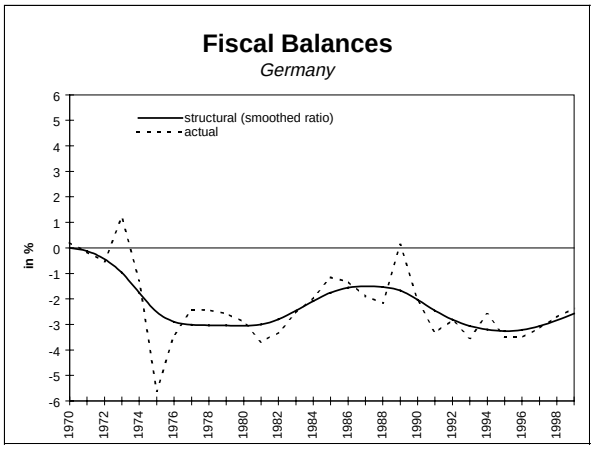
Annex 6

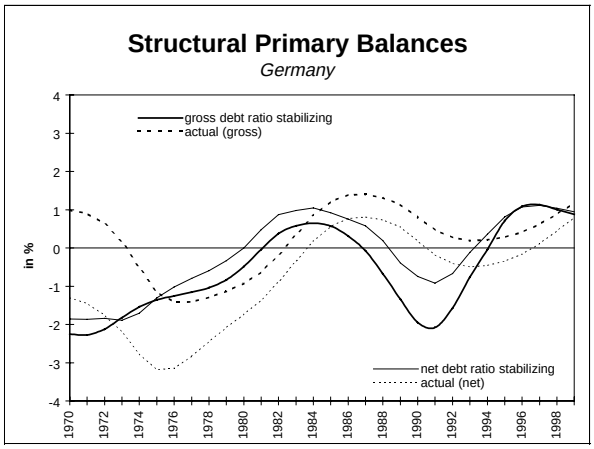

Fiscal Balances
Austria
structural (smoothed ratio)
actual
in %

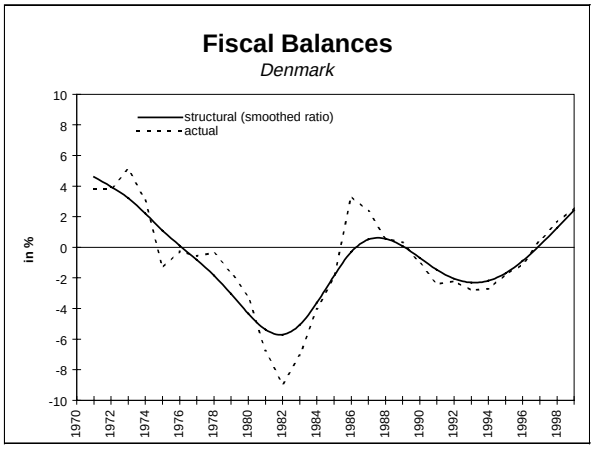

Structural Primary Balances
Austria
gross debt ratio stabilizing
actual (gross)
net debt ratio stabilizing
actual (net)
in %

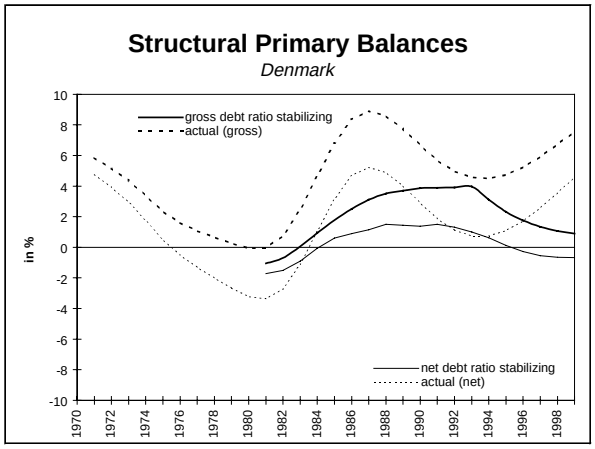

Fiscal Balances
Belgium
structural (smoothed ratio)
actual
in %


Structural Primary Balances
Belgium
gross debt ratio stabilizing
actual (gross)
net debt ratio stabilizing
actual (net)
in %

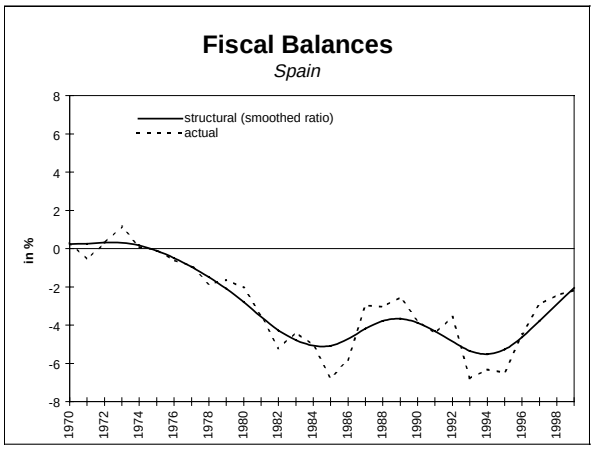

Fiscal Balances
Germany
structural (smoothed ratio)
actual
in %

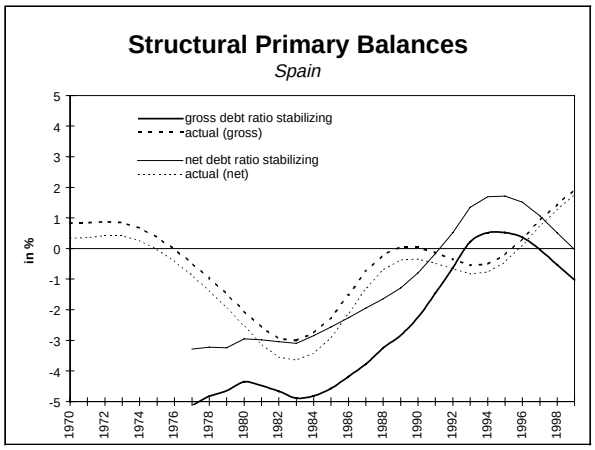

Structural Primary Balances
Germany
gross debt ratio stabilizing
actual (gross)
net debt ratio stabilizing
actual (net)
in %

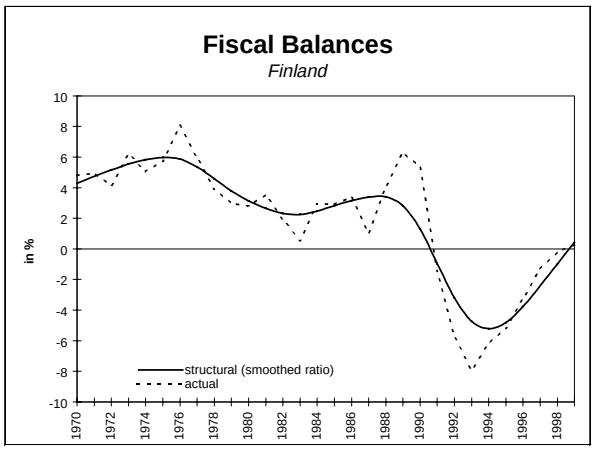

Fiscal Balances
Denmark
structural (smoothed ratio)
actual
in %

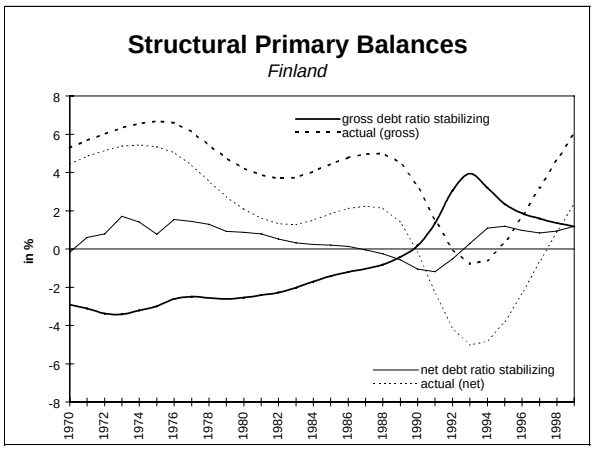

Structural Primary Balances
Denmark
gross debt ratio stabilizing
actual (gross)
net debt ratio stabilizing
actual (net)
in %

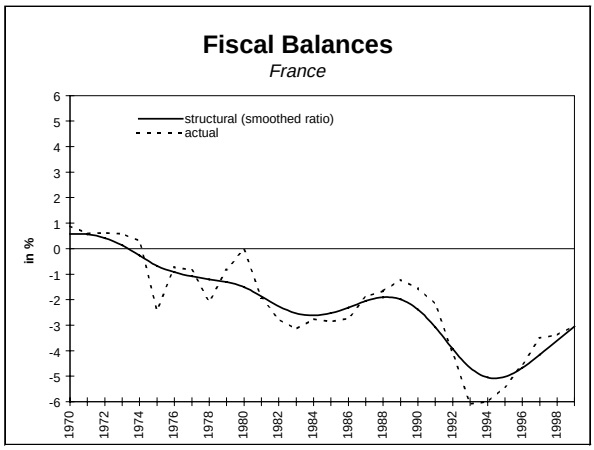
Annex 6 (continued)

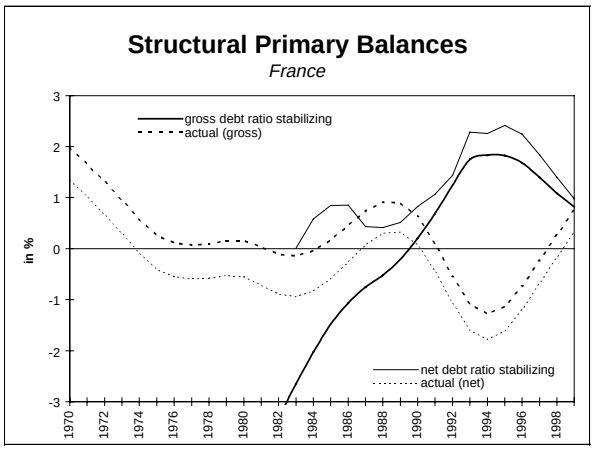


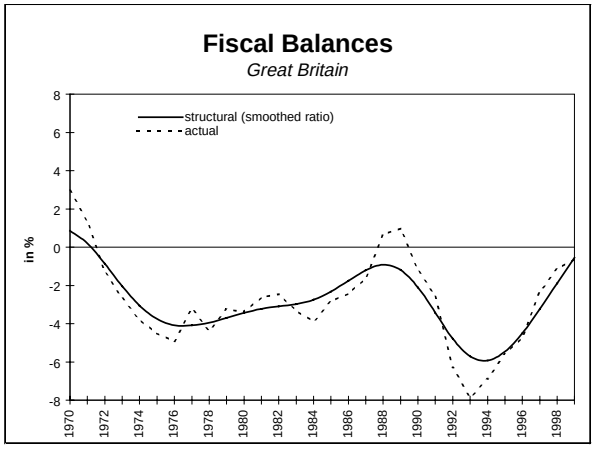


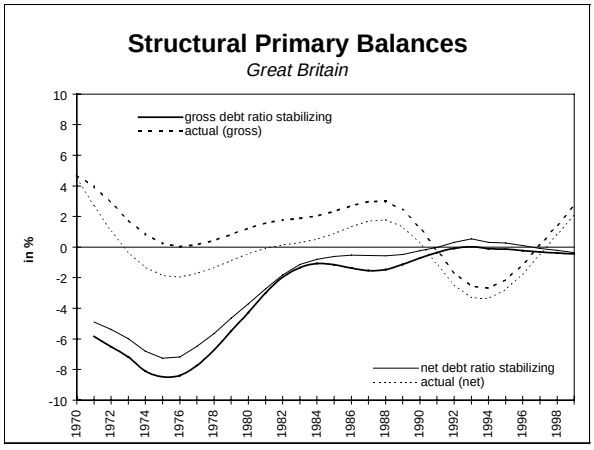




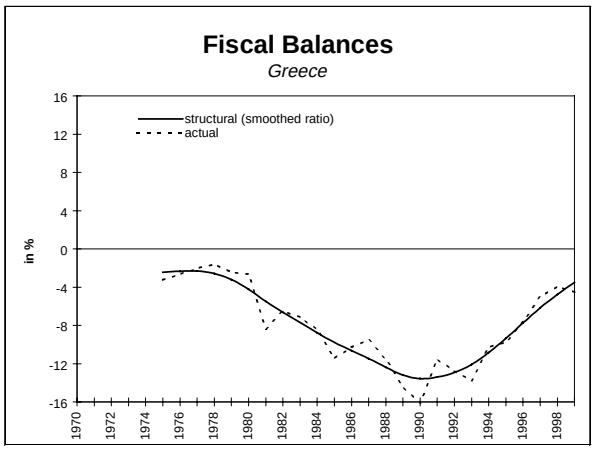


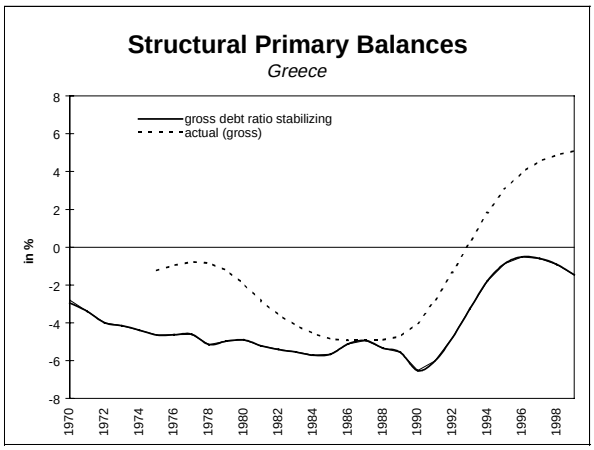


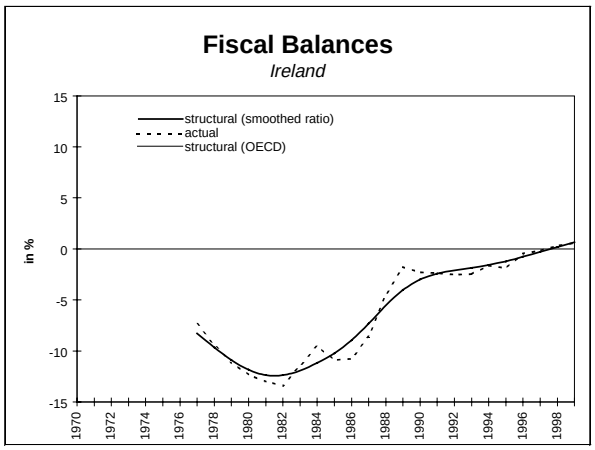


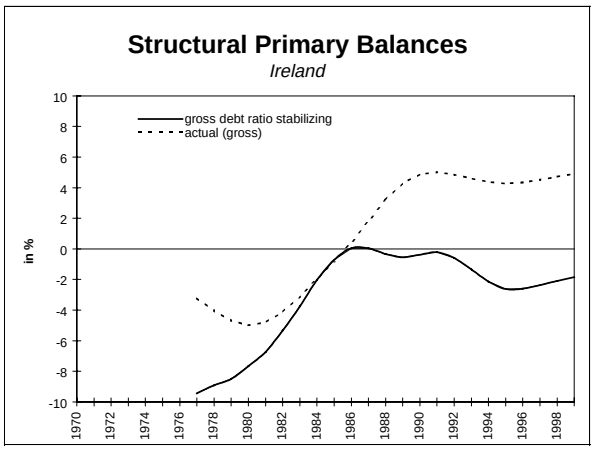


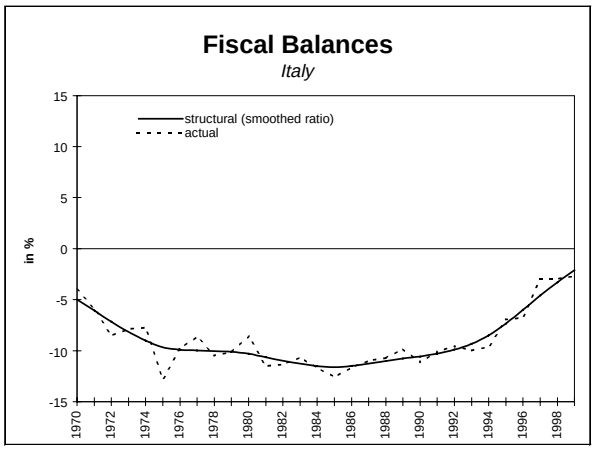
Annex 6 (continued)

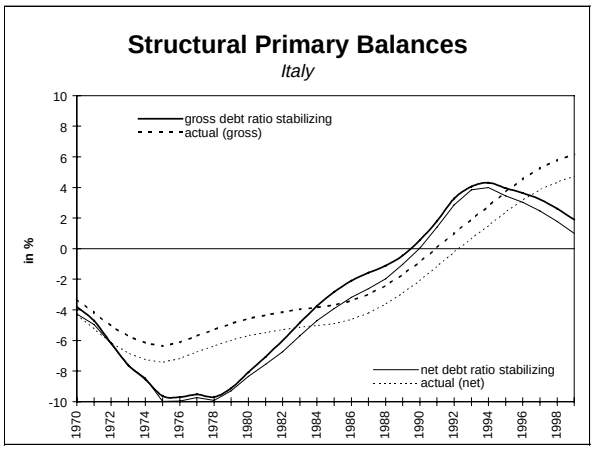


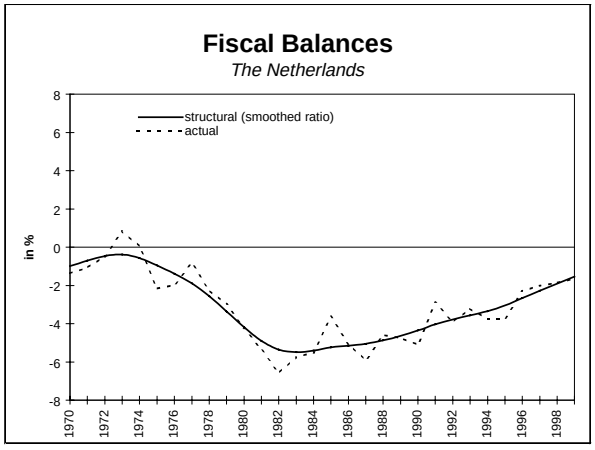


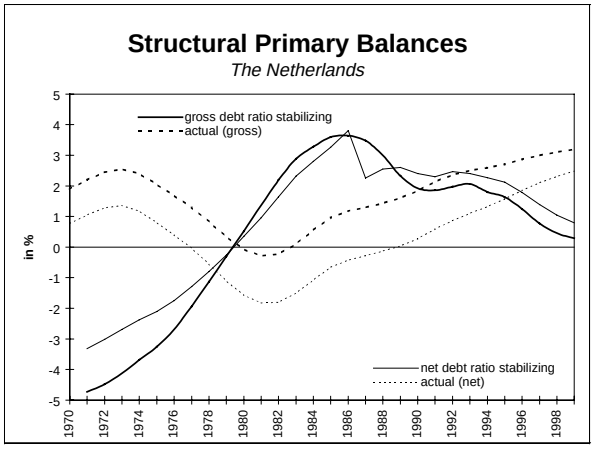












Annex 6 (continued)