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Cyclically Adjusted Government Balances in the Euro Area Economies:
Survey of Methods, Results and Usage in International Organisations

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Abstract

The structural budget balance has become increasingly significant indicator in the debate concerning fiscal policy. However, the most relevant international organisations, OECD, IMF and the European Commission, use different methods and their estimates differ. The most significant individual reason for the variance is a different estimate of the output gap.

Keywords: structural deficits, public finances, output gap

Tiivistelmä

Julkisen talouden rakenteellinen tasapaino on noussut merkittäväksi osaksi finanssipoliittista keskustelua. Keskeiset kansainväliset organisaatiot, OECD, IMF ja Euroopan komissio, käyttävät kuitenkin erilaisia menetelmiä ja heidän arvionsa poikkeavat toisistaan. Keskeisin yksittäinen syy eroihin on erilainen arvio tuotantokuilusta.

Asiasanat: rakenteelliset jäämät, julkinen talous, tuotantokuilu

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1 Introduction

Interest in the measurement of the structural budget balances has grown among economists and fiscal authorities during the past decade. Not only from a European, but also from a more global, perspective the sustainability of government finances and sound fiscal policies has become an important policy issue. In the euro area, the ability of a single country to smooth economic cycles under common monetary policy is more dependent on the strength of government's fiscal balance than before. Weak fiscal position means that there exists less room for automatic stabilisation during economic downturns. In worst cases countries may even have to react in a pro-cyclical manner to growth disturbances to avoid the risk of exceeding the three per cent of GDP reference value for the government deficit.

As both government expenditures and revenues exhibit cyclical variation, the actual fiscal balance does not always reflect the underlying budgetary position. Normally build-in budget automatics increase expenditures (e.g. unemployment benefits) and decrease tax revenues without any discretionary actions of fiscal authorities. Thus, it is convenient to decompose the actual budget balance to cyclical and non-cyclical components, the latter being often referred to as a structural balance. Changes in it should mainly reflect discretionary actions by the fiscal authorities.

International organisations, such as the European Commission, the OECD and the IMF, publish regularly estimates of the structural or cyclically adjusted budget balance for the general government sector.[1] This memo concentrates on a brief discussion over the mainstream methodology and survey of the main international estimates for output gap and structural deficit for the euro area, the USA and Japan.

[1] Kopits & Symansky (1998) discuss the fiscal rules in general. Economic Policy issue 26, April 1998, contains several articles on the Stability Pact, EMU and fiscal policy.

2 Survey of Methods

Broadly speaking, four steps or stages can be distinguished in the process leading to a measure of the structural budget balance: (a) choice of the fiscal statistics used (central or general government, inclusion of one-off measures, etc), (b) estimation of the potential or trend output and output gap, (c) estimation of the quantitative weight of built-in stabilisers, and (d) calculation of the structural and cyclical parts of the government balance[2].

A measure of potential or trend output is crucial for the calculation of structural or cyclically adjusted balances. There exist two main strands of methods for estimating the potential output. A fairly common way to estimate potential output is to use some statistical method, most typically the Hodrick-Prescott trend estimation method (HP filter). The estimates produced by the HP filter could be described more as being a normal trend level of production than the level of potential output. A second typical measure of potential output is based on the production function, like Cobb-Douglas $Q = B*K^{\alpha} L^{\alpha-1}$, where K and L denote "potential" levels of capital and labour.

The HP filter has gained popularity as a tool for estimating seasonal patterns of economic series. HP filter is not the only method for detrending, but it is readily available in most econometric software packages and applied economists are familiar with it. HP filter simply decomposes a time-series into a trend and cyclical components. Thus, the difference between the trend output and actual cannot really be interpreted as being output gap in strict economic sense. Furthermore, the HP filter has some other shortcomings. It does not fit well, in an economic sense at least, to series with large structural breaks, like many Finnish economic series for the early 1990's. Moreover, the HP filter may bias the estimates for the last observations due to the end-point problem, which is caused by the filter following more closely the actual series at the beginning and at the end than at the middle of the sample[3]. As the latest observations are the most important this can be a significant drawback. Canova (1998) reminds that the HP filter, especially with its default parameter values like $\lambda = 1600$ for quarterly observations, implies cycles with an average duration of 4–6 years. If the "standard cycle" is not valid, the HP filter may be misleading.

Ziebarth (1995) notes that most of the discrepancies between the various estimates of the structural budget balance can be attributed to methodological differences or different estimating techniques in determining the production potential. One of the main disputes between the pure statistics- and theory-based schools derives from the fact that many econometric filters mould the data without any economics behind. On the other hand, a theoretical model may not fully use the information in the data and could be subject to serious specification errors.

Canova (1998) adds that one main problem in choosing the appropriate methodology for detrending derives from the lack of professional consensus on

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[2] Brunila et al (1999) provide a useful description of the mainstream methodology used at the Bank of Finland.

[3] A partial solution to this is to use forecasts to extend the data. This approach has, of course, its own problems.

what constitutes a business-cycle. Definitions of cycle and trend often differ according to the researcher and problem at hand. Canova (1998) tests several series using univariate (Hodrick-Prescott, Beveridge-Nelson, Linear, Segmented, First Order Differencing, Unobservable Components, Fequency Domain Masking) and multivariate (Cointegration, Common Linear, Multivariate Frequency Domain) filters. His conclusions are that the results differ a lot, the use of only one filter can be analytically misleading and that one should pursue a more interactive relationship between theory and practice. All in all it seems that one should use several methods to test the robustness of the conclusions, be consistent in their usage and try to read from the "meta-data" what is going on behind the figures.[4]

The OECD has chosen to use production function method to estimate the potential output.[5] In brief, the OECD derives first the output gap with the help of a simple Cobb-Douglas production function.[6] The labour input is measured by using a "non-accelerating wage rate of unemployment" (NAWRU). Moreover, trend labour efficiency is a HP filter of actual labour efficiency. Secondly, the OECD calculates the structural deficit as a difference between structural revenue components (personal and corporate taxes, social security contributions and indirect taxes) and structural government expenditures (unemployment related expenditure) excluding capital spending. Finally, these level figures are expressed as per cent of potential output.

The IMF (1995) uses a fairly similar methodology, but they link their Cobb-Douglas potential output estimate to "non-accelerating inflation rate of unemployment" (NAIRU). Moreover, the IMF uses sometimes trend output to append their estimates and "manual" adjustments when considered to be appropriate. Cyclically sensitive expenditures include personal income taxes, corporate income taxes, indirect taxes, social security contributions and other revenues. The responsiveness of cyclical expenditures to GDP fluctuations is estimated only for unemployment insurance, as a function of variation of unemployment around the NAIRU.

Contrary to the OECD and the IMF, the European Commission has chosen to estimate trend output by using the Hodrick-Prescott filter. The Commission uses similar expenditure and revenue categories as the OECD and also partly utilises the OECD's elasticity estimates.

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[4] The rise of economics criticism towards the application of cyclically adjusted balances (CAB) goes back to the early 1990's at least. Blanchard (1990) among others has criticised the use of structural deficit on several grounds. One of the main points in disfavour of the CAB is that it can be vague or even misleading in many situations. Moreover, part of the CAB can be caused by changes in the economic environment, not political decision, exposing the CAB measure to Lucas critique.

[5] OECD is one of the pioneers in the field of mass application of "modern" fiscal indicators to policy (see Muller & Price 1984) and their estimates for most countries are well documented.

[6] Giorno et al (1995) and Suyker (1998)

3 Comparison of the Results

The following panel of graphs presents the estimates of the output gap and structural balance for all EU countries, the euro area, the USA and Japan, during the 1990's[7]. Generally it can be observed, that the estimates by the OECD, the IMF and the European Commission are highly correlated, the correlations between the series are typically over 0.9, for both the output gap and structural deficit estimates. Significant individual differences occur between all estimates, however, and especially the turning points of cycles seem to cause disparities. Largest differences are recorded for Finland, probably due to the rough cycle during the early 1990's. Overall, output gap estimates for 1991–93 appear to exhibit largest variation excluding forecasts for 1999 and 2000, which seem to differ in several cases. In most cases the changes in the estimates point to same direction, but in several cases the changes have different signs, which naturally means a different view on the economy and often different policy implications. Years from 1993–95 seem to cause most discrepancy in this sense, one natural reason for this is a different view on phase of the cycle. Forecasts for 1999 and 2000 differ for several countries.

Of the large countries and areas, the output gap estimates by the OECD and the IMF differ by more than one percentage point over several years, but the changes indicate same directions, except for Japan in few cases. The OECD appears to generally estimate the potential output smaller than the IMF, especially around 1993, but the observation does not hold for all countries. The vice-versa holds for the structural balance estimates, i.e. smaller negative output gap implies that the structural deficit balance is large. The estimates for Japan are fairly similar until recently. The euro area figures look fairly similar over the whole period. The Commission has estimated the lowest potential, or actually trend, output for the euro area and thus the biggest structural deficit. Moreover, the Commission's cyclically adjusted balance figures are often publicly presented per actual GDP and not per potential GDP as the IMF's and the OECD's estimates. The adjacent charts show all structural balances per potential GDP.

In few cases the estimates for output gap are surprisingly similar: Spain, Portugal, Ireland and Sweden. The structural balance estimates do, nevertheless, differ to a significant degree. The output gap estimates for Finland show once again the most typical order, the Commission estimates the lowest potential (trend) output, the OECD second lowest and the IMF the highest throughout the period. The levels are very different in the sense that the IMF often sees no significant structural deficit whereas the others do. The structural balance estimates draw fairly nicely from this order, the IMF estimates show the most positive balance and the Commission in general the most negative. The signs of the change are not always similar, e.g. the IMF estimates that the structural

[7] The OECD data is collected from the preliminary internet version of the Economic Outlook no. 65 (1999) and the IMF corresponds to the World Economic Outlook (May 1999) data, which has been received directly from the IMF. The Commission estimates are from the spring 1999 forecast. The estimates are, therefore, reasonably contemporary and comparable. European Commission does not give the figures for USA and Japan. IMF does not give aggregate figures for the output gap, thus estimates for the Euro-area and the whole EU are not available.

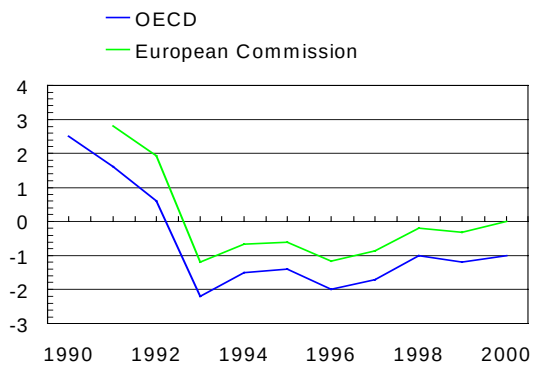
balance improved and the Commission that it deteriorated in 1994–1995 and 1996–1997. In all cases the output gap is big enough for the early 1990's to dampen the deep actual deficit into much less dramatical structural deficit. One interesting feature reported by Giorno (1995) is that the growth decomposition underlying the potential output estimate for Finland by OECD implies that the growth in business sector potential output in Finland derives more than elsewhere from the trend component, not capital or labour contributions.

The biggest source of divergence between the structural balance estimates is the output gap estimate, different methodologies produce sometimes closely matching but often very different results. Other sources for the disturbing variance are the different assumptions concerning automatic stabilisers etc. Detailed identification of the reasons for the variance is hardly possible without repeating the calculations.

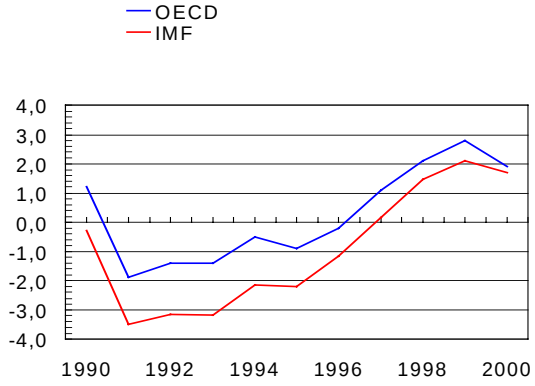
To sum up, there exists no single best method for estimating either the output gap or structural deficit. The estimates produced by international organisations differ worryingly in some cases, which can lead to misinterpretations of the fiscal stance and the changes in the policy. Thus, one need to use several complementary methods and read the data backed by other information carefully.

Output gap

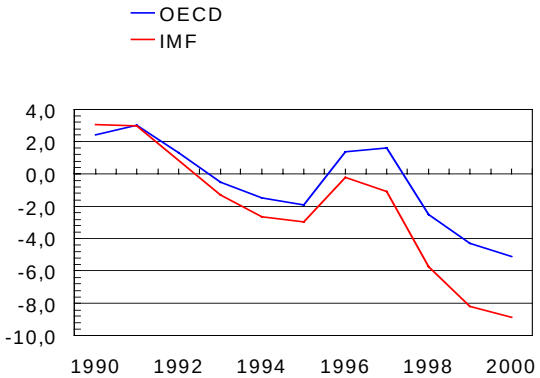
Euro area



USA

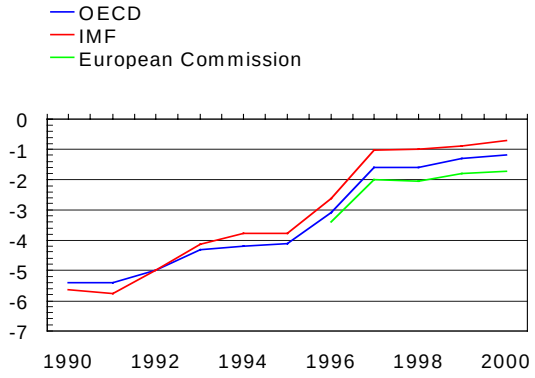


Japan

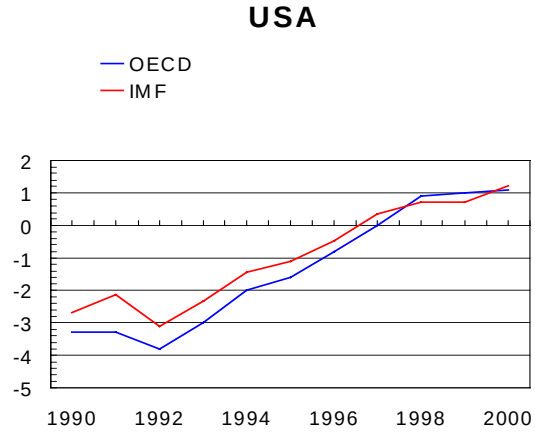


Structural balance

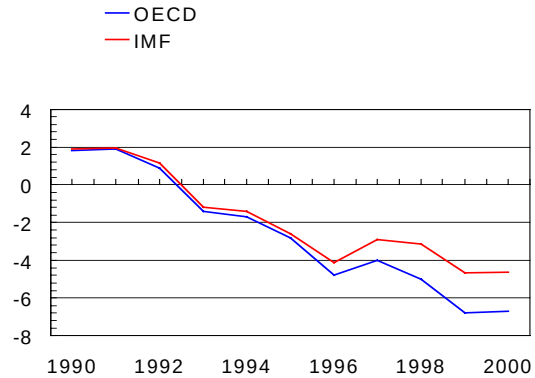
Euro area



USA

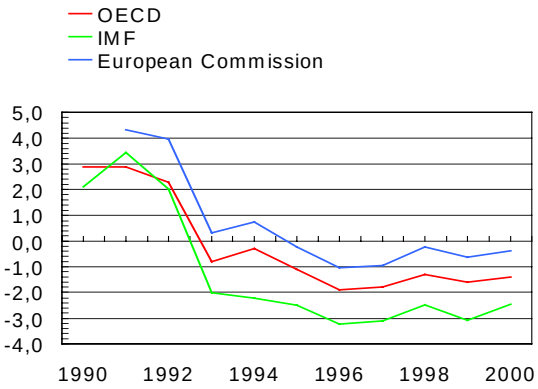


Japan

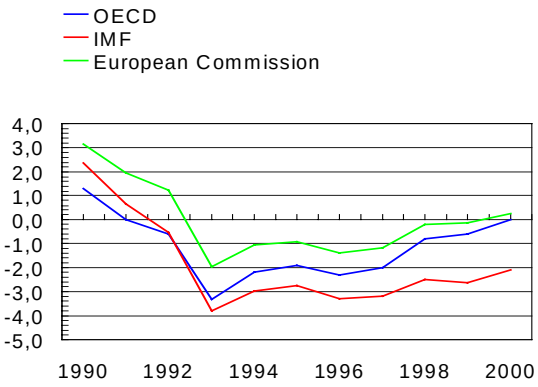


Output gap

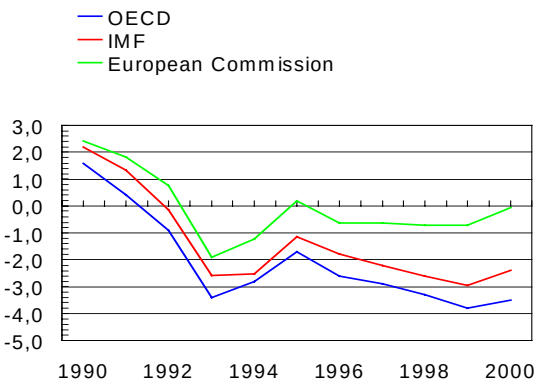
Germany



France

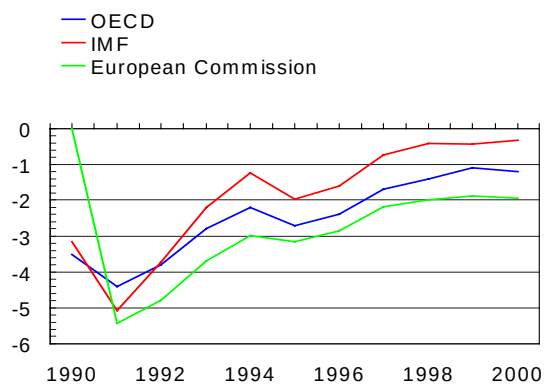


Italy

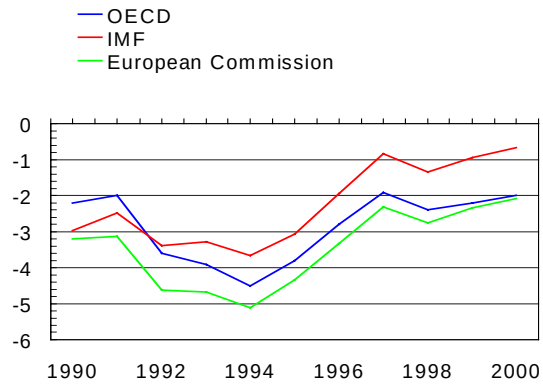


Structural balance

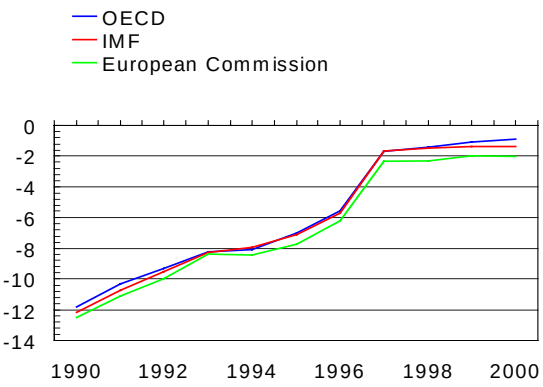
Germany



France

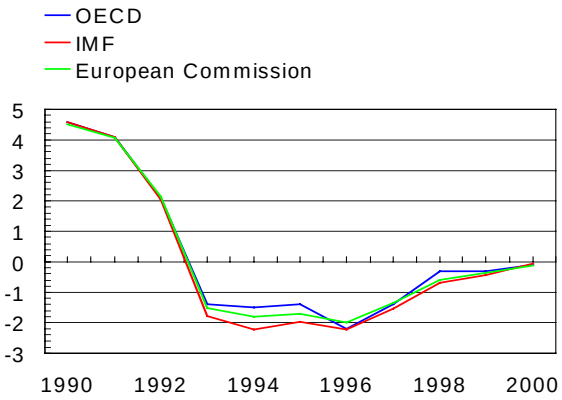


Italy

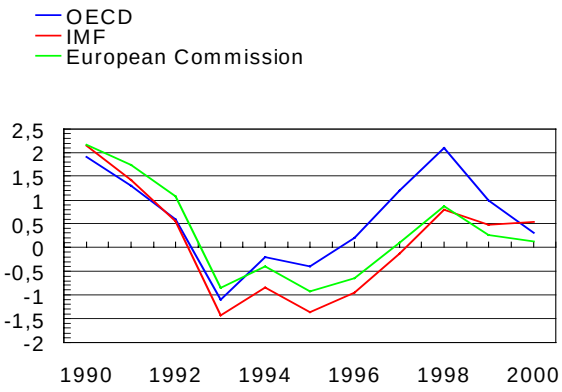


Output gap

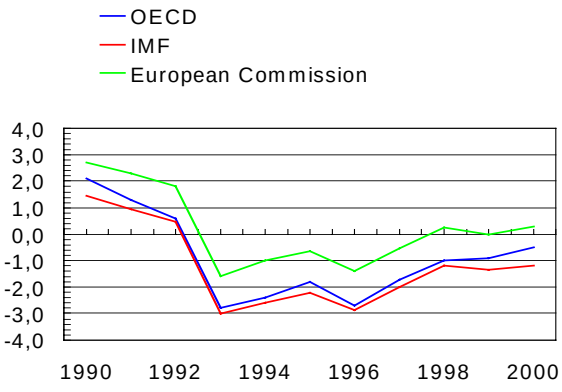
Spain



Netherlands

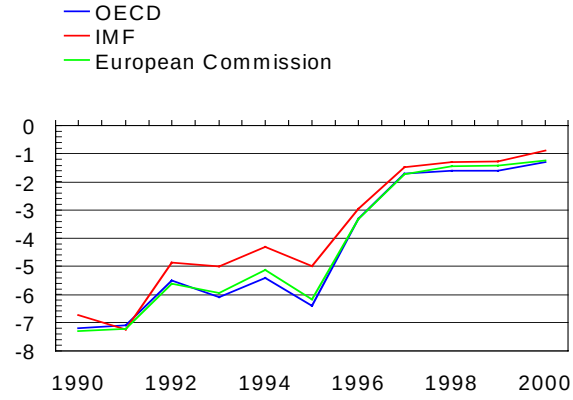


Belgium



Structural balance

Spain



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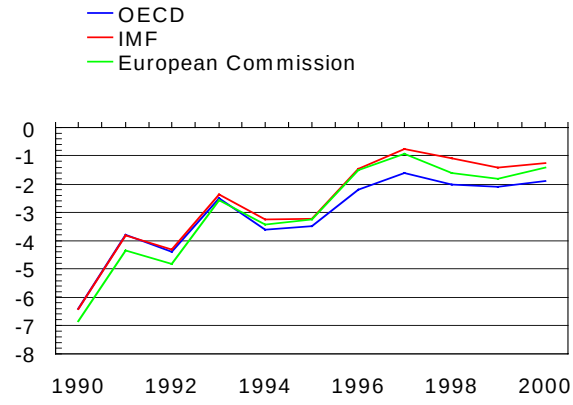

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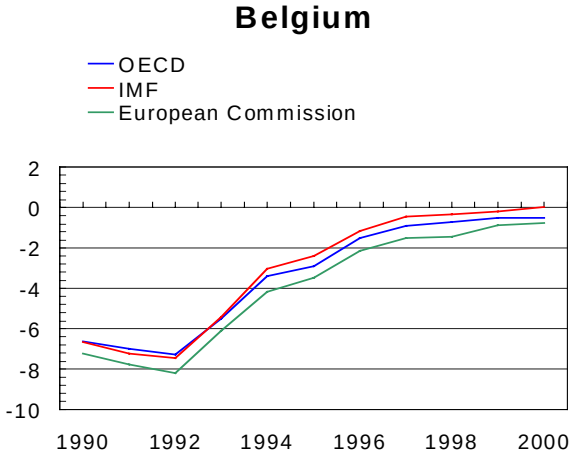
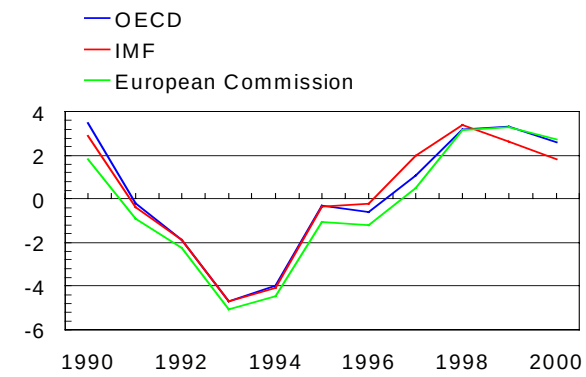
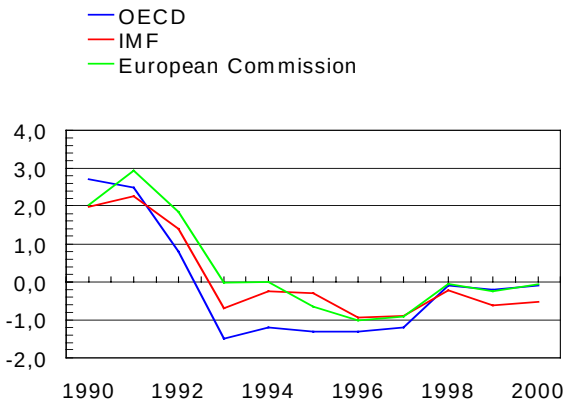


Output gap

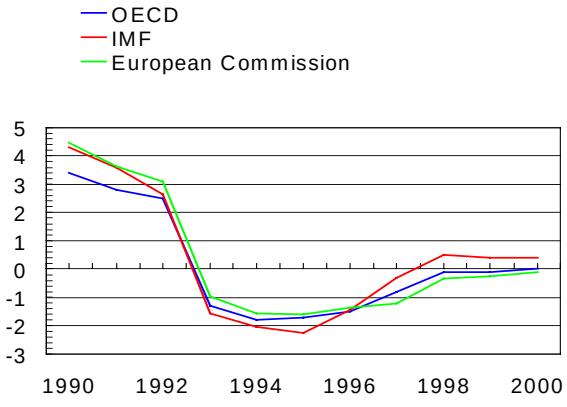
Ireland



Austria

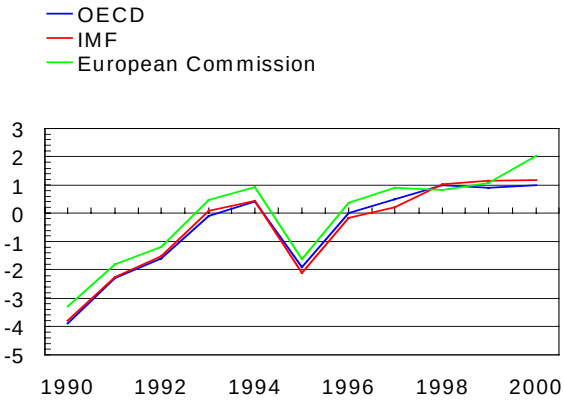


Portugal



Structural balance

Ireland



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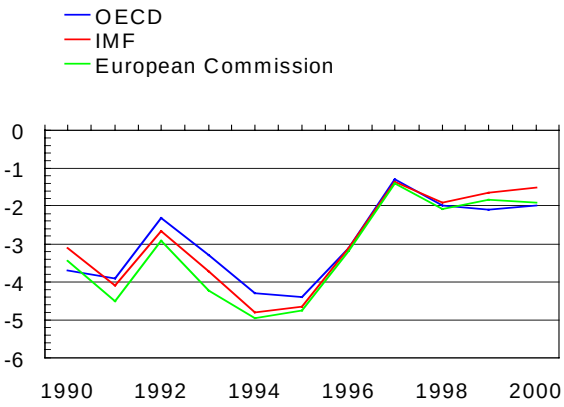
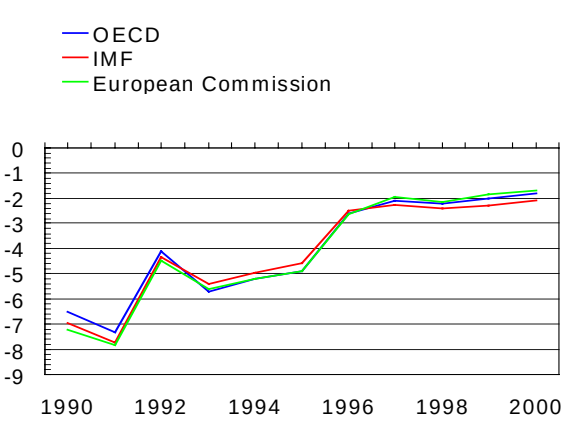
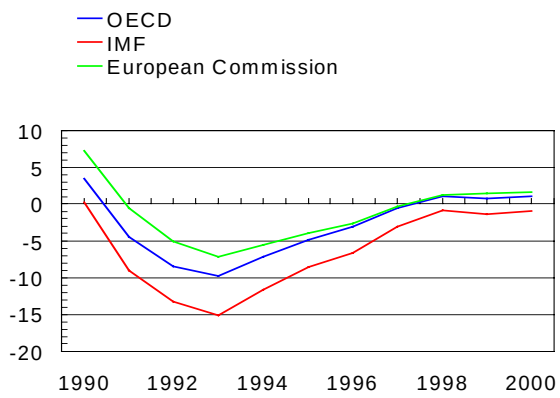


Portugal

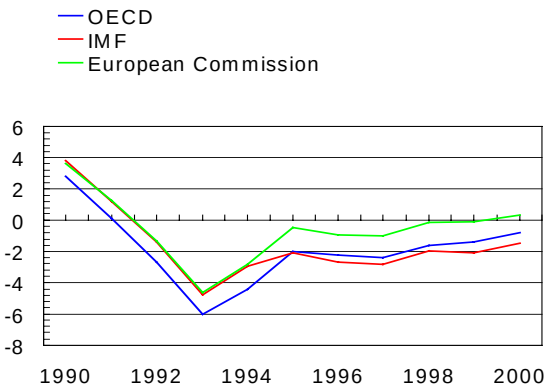


Output gap

Finland

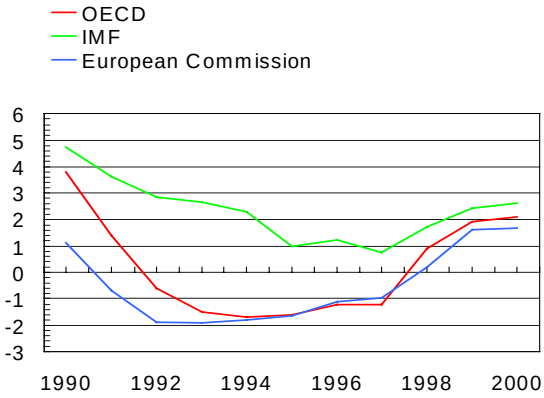


Sweden

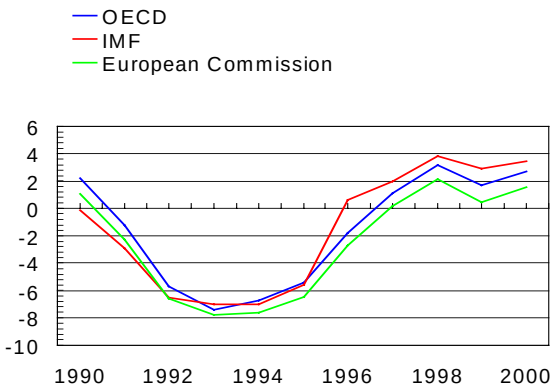


Structural balance

Finland

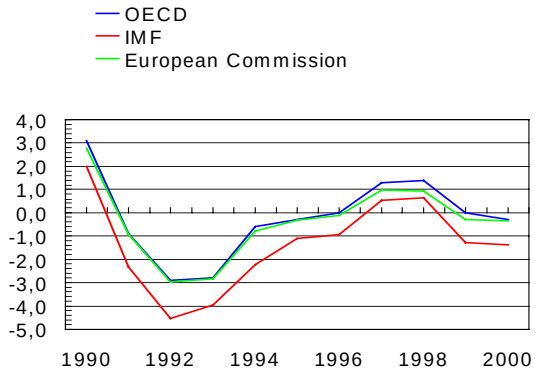


Sweden

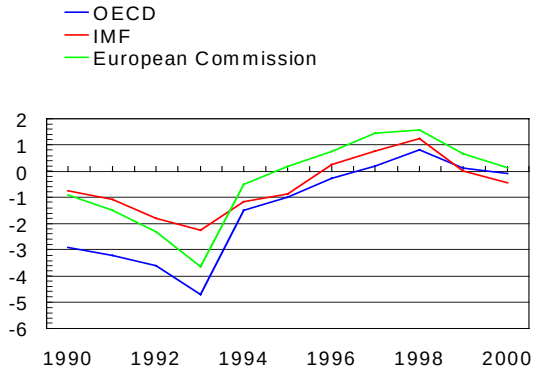


Output gap

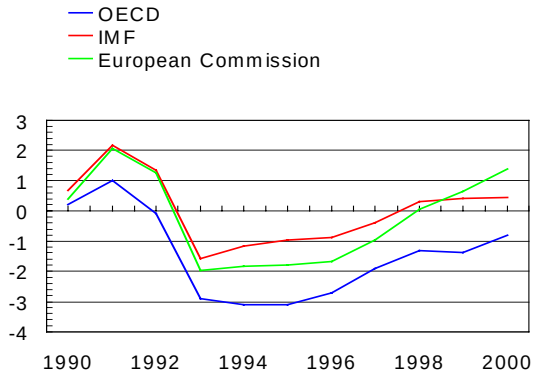
Great-Britain



Denmark

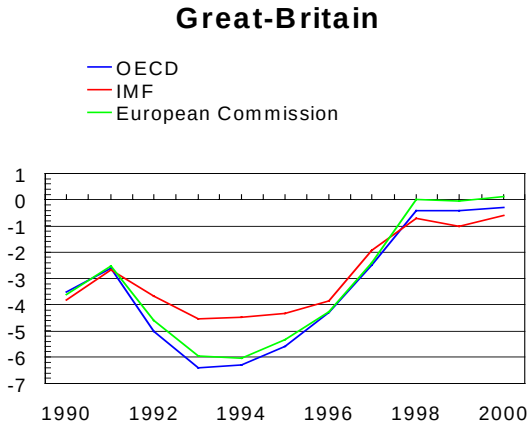


Greece



Structural balance

Great-Britain



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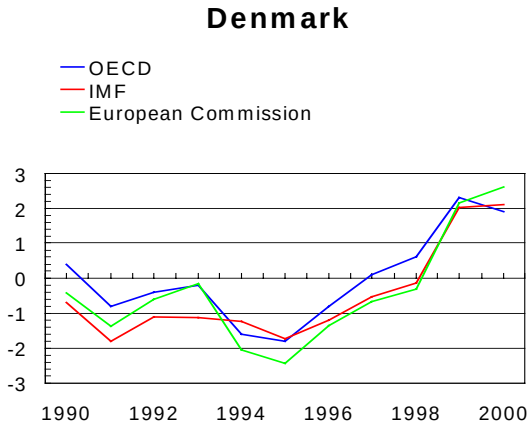
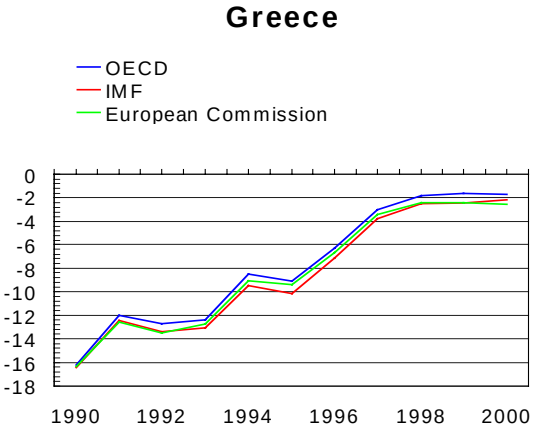


Greece



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