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# THE SUSTAINABILITY OF FISCAL POLICY: NEW ANSWERS TO AN OLD QUESTION

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# INTRODUCTION

The early 1980s were a time of large budget deficits and increasing ratios of government debt to GNP for many of the OECD countries (Table 1), prompting concerns that the fiscal policies which led to such outcomes were not only unwise, but also unsustainable. Assessing wisdom is not easy, however, and surely not an exercise which can or should be reduced to the construction and examination of a few indicators. Assessing sustainability, on the other hand, is a much less ambitious task and one for which indicators are well suited. The purpose of this paper is to derive, construct and examine the behaviour of such indicators for the recent past and for the present.

Sustainability is basically about good housekeeping. It is essentially about whether, based on the policy currently on the books, a government is headed towards excessive debt accumulation. Thus, a good indicator of sustainability is one which sends clear and easily interpretable signals when current policy appears to be leading to a rapidly growing debt to GNP ratio. The conceptual issues involved in constructing such an indicator are simple. They have to do with the exact meaning of "current policy" and "excessive" debt accumulation. These issues are reviewed in the first two parts of this paper, where the use of a small set of indicators is suggested, each associated with a specific time horizon. For each horizon, the indicator is defined as the difference, or "gap", between the "sustainable" tax rate over this horizon and the current tax rate. The sustainable tax rate is in turn defined as that tax rate which, if constant, would achieve an unchanged debt to GNP ratio over the relevant horizon, given forecasts of spending and transfers. When the indicator is positive, it signals the need for either increases in taxes and/or decreases in spending and transfers, at some stage in the future. The size of the adjustment, if undertaken without delay, is equal to the indicator itself. The cost of delay, measured by the increase in the required adjustment, is a simple function of the indicator itself.

In the third part of the paper, three such indicators are constructed for selected OECD countries, each associated with a different time horizon. These are referred to as the short-term, the medium-term and the long-term gaps. *The short-term gap* is associated with a very short horizon, namely one year. Its main advantage is that it can be constructed easily, without the use of forecasts; it thus serves as a useful benchmark. Its principal weakness is that it is obviously myopic and does not take

## Table 1. **Net public debt of the general government**

As a per cent of GNP/GDP

| | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987[a] | 1988[a] | 1989[a] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| United States | 19.0 | 19.0 | 18.7 | 21.7 | 24.3 | 25.2 | 27.2 | 29.4 | 30.8 | 30.6 | 30.2 |
| Japan[b] | 14.9 | 17.3 | 20.7 | 23.2 | 26.2 | 26.9 | 26.6 | 26.4 | 21.9 | 19.3 | 16.4 |
| Germany[b] | 11.5 | 14.3 | 17.4 | 19.8 | 21.3 | 21.5 | 21.9 | 21.5 | 22.9 | 23.7 | 22.1 |
| France[b] | 13.8 | 14.3 | 14.2 | 17.8 | 20.0 | 21.1 | 22.9 | 25.2 | 25.5 | 25.2 | 24.7 |
| Italy | 55.3 | 53.6 | 57.8 | 63.4 | 68.7 | 74.4 | 81.3 | 86.2 | 90.1 | 92.3 | 95.0 |
| United Kingdom | 43.6 | 43.5 | 42.8 | 42.1 | 42.4 | 43.5 | 42.3 | 41.0 | 38.4 | 33.7 | 28.9 |
| Canada | 12.0 | 12.9 | 10.0 | 16.5 | 22.5 | 26.1 | 32.8 | 37.2 | 37.6 | 37.1 | 37.5 |
| Total of above countries[c] | 20.7 | 21.5 | 22.6 | 25.5 | 28.2 | 29.5 | 31.1 | 32.6 | 32.4 | 31.7 | 30.6 |
| Australia[d] | 27.9 | 25.1 | 22.3 | 22.1 | 24.1 | 25.2 | 26.4 | 26.6 | 23.5 | 20.5 | 17.0 |
| Austria[d] | 36.0 | 37.2 | 39.3 | 41.6 | 46.0 | 47.9 | 49.6 | 54.1 | 57.6 | 57.3 | 56.4 |
| Belgium | 62.0 | 69.3 | 83.5 | 92.6 | 103.6 | 108.6 | 112.3 | 116.8 | 121.8 | 123.7 | 122.3 |
| Denmark | 1.8 | 7.3 | 16.6 | 26.4 | 34.2 | 37.2 | 35.0 | 28.6 | 23.2 | 21.2 | 20.[illegible] |
| Finland[b] | -6.8 | -6.1 | -4.7 | -1.9 | 0.4 | 0.7 | 0.9 | 0.0 | 1.1 | 0.0 | -1.9 |
| Greece[d] | 27.6 | 27.7 | 32.8 | 36.1 | 41.3 | 49.5 | 57.9 | 60.9 | 65.2 | 69.2 | 76.7 |
| Ireland[d] | 76.2 | 78.0 | 83.5 | 92.2 | 104.7 | 113.3 | 117.8 | 133.4 | 133.1 | 130.4 | 123.5 |
| Netherlands[b] | 21.8 | 24.9 | 27.3 | 31.3 | 36.5 | 39.9 | 43.0 | 46.5 | 52.1 | 54.8 | 56.4 |
| Norway[b] | 9.8 | 0.4 | -2.2 | -4.7 | -8.4 | -12.5 | -16.0 | -20.9 | -23.6 | -25.3 | -24.3 |
| Spain | 5.9 | 7.9 | 11.8 | 14.6 | 18.6 | 23.2 | 27.9 | 30.4 | 30.9 | 30.9 | 29.8 |
| Sweden | -19.9 | -13.5 | -5.2 | 4.4 | 10.5 | 12.6 | 16.1 | 16.1 | 10.8 | 7.0 | 3.0 |
| Total of smaller countries[c, d] | 17.0 | 18.9 | 22.9 | 27.1 | 31.8 | 34.6 | 37.1 | 38.5 | 38.8 | 38.3 | 37.3 |
| Total of European countries[c, d] | 24.6 | 25.8 | 28.4 | 31.8 | 34.8 | 37.0 | 39.0 | 40.4 | 41.3 | 41.1 | 40.1 |
| Total of above countries[c, d] | 20.2 | 21.2 | 22.6 | 25.7 | 28.6 | 30.1 | 31.8 | 33.3 | 33.2 | 32.5 | 31.4 |

*a)* Estimates.

*b)* Financial assets exclude corporate shares.

*c)* 1987 GNP/GDP weights and exchange rates.

*d)* Including gross financial liabilities for Australia, Austria, Greece and Ireland.

*Source: OECD Economic Outlook 46.*

into account expected future changes in spending or transfer programmes. There are indeed at least two reasons why government spending and transfers might be expected to change in the future. The first is that cyclical movements in output affect public spending programmes and receipts; in the case of an economic recession, for example, the ratios of spending and transfers to GNP will tend to automatically increase. The second reason is that, in the longer run, changes in the structure of the population can be expected, or the relative price of government-provided or subsidised services might change, leading also to trends in public spending and transfers.

These factors suggest the construction of two forward-looking indicators: the *medium-term gap* which relies on projections of activity, government spending and transfers over the following five years (the horizon of five years being dictated by the availability of the required forecasts); the *long-term gap* which is based on an horizon of 40 years, focusing primarily on the implications of population ageing. The latter indicator is clearly the most tentative of the three measures, but one which is essential to an overall assessment of sustainability.

Finally, in the fourth part of the paper, the projected indicators are briefly compared to those used in the past, and emphasis is placed on the ways in which they improve upon the widely used "cyclically-adjusted" measures.

## I. THE CONCEPT OF SUSTAINABILITY

### A. The government budget constraint

Any discussion of sustainability starts with the dynamic government budget constraint. Let B be nominal debt and i be the nominal interest rate on the debt, G be nominal government spending on goods and services, H be transfers and T be taxes. Then, the change in the nominal value of the debt is given by:

$$dB/ds = G+H-T + iB \qquad [1]$$

The value of spending plus transfers minus taxes is often referred to as the primary deficit. It will play an important role below, and it is denoted by D. The right hand side of equation [1] corresponds to the usual definition of the *deficit*.

As economies are growing through time, it is more useful to rewrite the budget constraint in terms of ratios to GNP. Thus, let b denote the ratio of real debt to real GNP. Similarly, let g, h and t denote the ratios of real spending, transfers and taxes to real GNP. Let d be the ratio of the primary deficit to GNP, $\theta$ be the real rate of growth of GNP, and r be the *ex post* real rate of interest ($i-\pi$, where $\pi$ is the rate of inflation). Equation [1] becomes:

$$db/ds = g+h-t + (r-\theta)b = d + (r-\theta)b \qquad [2]$$

Equation [2] is central to any discussion of sustainability. It says that the evolution of the ratio of debt to GNP depends on two sets of factors. The first, which reflects current spending, transfer and tax rules, is the primary deficit. The second, which reflects the inheritance from the past, is the product of the ratio of accumulated debt to GNP times the difference between the real interest rate and the growth rate. If this difference is positive, a primary surplus is needed to maintain a constant ratio of debt to GNP.

## B. Defining sustainability

A formal definition can now be given to the notion of sustainability of fiscal policy. Fiscal policy can be thought of as a set of rules, as well as an inherited level of debt. And a *sustainable fiscal policy* can be defined as a policy such that the ratio of debt to GNP eventually converges back to its initial level, $b_0$. Obviously, it would make little sense to classify as unsustainable a policy which implies a temporary bulge in the ratio. The justification for requiring the ratio to eventually return to its initial level, as opposed say to zero, or to a higher but stable level, is, however, much less evident. As noted later, this condition can be substantially relaxed with no change in results; the discussion will be easier once the basic equations have been laid out.

What restrictions does sustainability then impose on fiscal policy? To answer the question, the first step is to use equation [2] to characterise the evolution of b. Suppose one starts at time zero with a ratio of debt to GNP equal to $b_0$, and that fiscal policy as currently set by spending and taxes yields a sequence of ratios of primary deficits to GNP, $[d_s]$. It is assumed that the difference between r and $\theta$ is constant, and is positive. Although constancy is only for notational simplicity, the assumption that $(r-\theta)$ is positive is an important one, about which more is said below. The debt to GNP ratio at any time n is then given by:

$$b_n = b_0 \exp(r-\theta)n + \int_0^n d_s \exp(r-\theta)\,(n-s)\,ds \qquad [3]$$

The ratio of debt to GNP at time n is equal to the value of the initial ratio at time zero, accumulated at a rate equal to the difference between the interest rate and the growth rate, plus the accumulated value, at the same rate, of the primary deficits along the way.

Two simple manipulations of [3] are needed. First, both sides of equation [3] are premultiplied by $\exp-(r-\theta)n$ (which, in economic terms, is equivalent to discounting both sides to time zero), yielding:

$$\int_0^n d_s \exp-(r-\theta)s\,ds = -b_0 + b_n \exp-(r-\theta)n \qquad [4]$$

Second, taking the limit of equation [4] as n goes to infinity, yields the proposed definition of sustainability. The requirement that the ratio of debt to GNP, $b_n$, tends eventually back to $b_0$ as n tends to infinity implies that the discounted value of debt goes to zero:

$$\lim_{n \to \infty} b_n \exp-(r-\theta)n = 0 \qquad [5]$$

Combining equations [4] and [5] yields a second important relation:

$$\int_0^{\infty} d_s \exp-(r-\theta)\, s\, ds = -b_0 \qquad [6]$$

Equation [6] says that a fiscal policy is sustainable if the present discounted value of the ratio of primary deficits to GNP under the latter policy is equal to the negative of the current level of debt to GNP. Put another and simpler way, for a fiscal policy to be sustainable, a government which has debt outstanding must anticipate sooner or later to run primary budget surpluses. Those surpluses have to be large enough to satisfy equation [6].

## II. A NEW SET OF SUSTAINABILITY INDICATORS

### A. Methodological background

If the left hand side of equation [6] were constructed using the best forecasts of d under current fiscal rules, it is unlikely that a value exactly equal to the right hand side of the equation, the current ratio of debt to GNP, would be obtained. Suppose for example that such calculations resulted in the left hand side being much larger than the right hand side. This would suggest that, sooner or later, the government would need to reduce its primary deficit, either through increases in taxes and/or reductions in spending/transfer programmes. Barring that, the government would have to eventually repudiate its debt, either through straight repudiation or through the use of inflation.

This suggests a number of ways of assessing sustainability, all conceptually equivalent. The first would follow the procedure sketched above, and compute the difference between the present value of primary surpluses and the debt to GNP ratio. But it is not clear how one should then interpret the result. Would a number like 30 per cent indicate a dramatic sustainability problem? If not, would 300 per cent be of concern?

This difficulty suggests a second, more easily interpretable, indicator of sustainability. It is constructed as follows. Given forecasts of spending and transfers,

as well as the initial level of debt, one can compute the constant tax rate which would satisfy equation [6]. The result could be referred to as the sustainable tax rate. Then, the indicator of sustainability is obtained by computing the gap between the sustainable and the current tax rates.

Recalling that the ratio of the primary deficit to GNP, d, is equal to g+h−t, replacing in equation [6], and solving for the constant, sustainable, tax rate, t*, gives:

$$t^* = (r-\theta)\ [(\int_0^x (g+h)\exp - (r-\theta)s\ ds) + b_0] \qquad [7]$$

The index of sustainability is then given by (t*−t).

Despite the complexity of this derivation, both the sustainable tax rate and the index of sustainability have simple interpretations:

- The sustainable tax rate is equal to the annuity value of future expected spending and transfers, plus the difference between the *ex ante* interest rate and the growth rate times the ratio of debt to GNP. If the sustainable tax rate, t*, is greater than the current tax rate, t, then sooner or later taxes will have to be increased, and/or spending decreased;
- The magnitude of (t*−t) is easy to interpret: it is simply the size of the adjustment, were it to take place today.

What a positive (t*−t) implies will vary across countries, depending in particular on the initial level of t. In a country in which t is low, a positive (t*−t) will indicate a need for some correction at some stage in the future. But if t is already high, a positive (t*−t) will be more worrisome, indicating a risk of crisis, of pressure to resort to monetisation of the debt and to consider various forms of repudiation. To the extent that the dangers associated with a positive (t*−t) increase with the initial level of t, this strongly argues against the use of some normalised index such as (t*−t)/t. On the other hand, (t*−t)/(1−t) would be a good indicator of the limited room for manoeuvre available to the government on the revenue side, as the term (1−t) in the denominator approximates the amount of resources that could still be appropriated by the government.

This brief discussion brings up two issues. The first is that of the symmetry of treatment between taxes, spending and transfers implicit in the index. The same approach could have been used to compute the "sustainable" spending rate given the sequences of t and h, or the "sustainable" transfer rate given the sequences of g and t. One reason for preferring the tax calculation is that the government is usually more committed to most spending and transfer programmes embodied in the current fiscal rules than to current taxes. But it is important to realise that a positive value of (t*−t) does not imply that taxes *should* be increased; the index is agnostic as to whether the adjustment should come from increased taxes, or decreased spending and transfers.

The second issue is related to the timing of adjustment. The index suggests by how much taxes (or spending, or transfers) should be adjusted *today* for fiscal policy to become immediately sustainable. But a very relevant question is whether delaying adjustment substantially affects the size of the needed policy action. Suppose that adjustment were delayed for some time. When the adjustment eventually took place, the debt ratio would then be higher, requiring a larger value of $t^*$. By how much would $t^*$ have to increase in order to achieve sustainability then? What would be the cost of delay? Manipulation of equation [7] gives a simple, nice answer:

$$dt^*/ds = (\exp(r-\theta)n-1)\ (t^*_n-t) \qquad [8]$$

Thus, if for example, $(r-\theta)$ were equal to 2 per cent per year, and $t^*-t$ was initially equal to 10 per cent, waiting one year to adjust would increase $t^*$ and the required adjustment in taxes by 0.2 per cent.

## B. Two theoretical points of relevance

Two assumptions were made in deriving the index: *i)* that sustainability requires that the ratio of debt to GNP eventually returns to its initial level, and *ii)* that the difference between the interest rate and the growth rate remains positive. These warrant some elaboration.

The requirement that the ratio of debt to GNP eventually returns to its initial level is clearly not very convincing. A policy aimed at stabilising the debt to GNP ratio at 40 per cent rather than at 20 per cent should clearly not be characterised as an unsustainable fiscal policy. Although the requirement of return to the initial debt ratio is too strong, a weaker requirement will still yield the above derivations. To see this, recall the condition that was used earlier:

$$\lim_{n\to\infty} b_n \exp(-(r-\theta)n) = 0$$

As long as this condition holds, the derivation of the sustainable tax rate will also hold, and thus the indicator will be unchanged. But this condition will hold under much more general conditions than the initially suggested requirement; it will hold as long as the debt to GNP ratio converges to any ratio, not only the initial one. It may even hold if the debt to GNP ratio grows forever, as long as it does not grow eventually at a rate equal to or greater than $(r-\theta)$, or equivalently as long as debt itself does not grow eventually at a rate equal to or greater than the interest rate[1]. This is because of discounting, which implies that things far in the future do not matter much for today. Two different levels of debt to GNP far in the future imply nearly exactly the same sustainable tax rate today; in the limit, they make no difference[2].

The other issue is a more serious one, and one which is pervasive in macroeconomics. It is assumed that the real interest rate exceeds the growth rate of the

economy. If this condition were to not prevail, the discussion of sustainability would be very different. To see this, return to the dynamic government budget constraint noted earlier:

$$db/ds = d + (r-\theta)b$$

If $(r-\theta)$ were negative, the government would no longer need to generate primary surpluses to achieve sustainability. With the primary balance in surplus, the debt to GNP ratio would steadily decline over time, at rate $(\theta-r)$. The government could even run permanent primary deficits of any size, and these would eventually lead to a positive but constant level of debt, $d/(\theta-r)$[3].

If this configuration of interest and growth rates could be easily ruled out, either on theoretical or empirical grounds, this would be a theoretical curiosum, worth a brief footnote. But theory suggests that this case, which corresponds to what is known as "dynamic inefficiency", cannot be excluded, and that in such a case, a government should, on welfare grounds, probably issue more debt until the pressure on interest rates made them at least equal to the growth rate. The fact is that, in the 1970s, the growth rate was quite consistently above realised real interest rates. And even in the 1980s, a decade of high real interest rates by post-war standards, the difference between the realised real interest rates and growth rates was only of about 1 per cent for the OECD as a whole. As the 1990s begin, real interest rates continue to exceed growth rates, but not by a large margin. Still, there is general agreement that the condition of an excess of the interest rate over the growth rate probably holds, if not always, at least in the medium and long run[4]. Thus the paper assumes, albeit tentatively, that this condition prevails generally.

## C. Towards implementable indicators

A natural extension of the initial indicator is to look at finite time periods into the future. This can be achieved in the following way. Let $t_n^*$ be the constant tax rate such that, given forecasts of spending and transfers under current policy rules, the ratio of debt to GNP at time n is equal to the ratio at time zero. Manipulating equation [4] gives the following expression for $t_n^*$:

$$t_n^* = (r-\theta)\ [b_0 + [1-\exp-(r-\theta)n]^{-1}\ [\int_0^n (g+h)\exp-(r-\theta)s\ ds]] \qquad [9]$$

The expression is more complicated but the intuition behind it is still straightforward. First, the tax rate must cover $(r-\theta)b_0$, the amount needed to keep the debt to GNP ratio constant in the absence of a primary deficit. Then, it must also cover average spending and transfers over the period, or, more precisely, the discounted value of spending and transfers between time 0 and time n, normalised so that the sum of the weights on g+h in different periods equals one.

As n goes to infinity, $t_n^*$ converges to $t^*$, the indicator derived earlier. And, as n goes to zero instead, the sustainable tax rate reduces to $t_0^* = g+h+(r-\theta)b$, so that the index of sustainability becomes:

$$t_0^*-t = g+h-t+(r-\theta)b = d+(r-\theta)b \qquad [10]$$

This is a familiar expression from equation [2] and is just the change in the debt to GNP ratio[5].

How to choose n will be discussed in Part III. Mountaineers are told to always look three, thirty and three hundred feet ahead. The same advice applies to indicators, and thus the use of a short, a medium, and a long-term indicator, each focusing mainly on one aspect of sustainability, can provide potentially additional information to policy-makers.

## III. EVIDENCE FROM SELECTED OECD COUNTRIES

### A. The choice of three indicators

It was suggested earlier that it is desirable to use a set of indicators, each of which is associated with a different time horizon, say n, and each of which is equal to the gap between the sustainable tax rate over the horizon – the tax rate which would leave the debt to GNP ratio unchanged – and the current tax rate. In this part, three such indicators, corresponding to n equal to 1, 5 and 40 years, are constructed and interpreted for a number of OECD countries for which sufficient data are available. These shall be called the short-term, medium-term and long-term gaps, respectively.

The choice of n equal to one year is easily justified, as it leads to an indicator which does not require forecasts, and is thus easy to construct from publicly available data. The short-term gap serves as a useful benchmark, facilitating comparison with assessments based on the more elaborate, forward-looking indicators.

The choice of n equal to 5 years is motivated by the desire to take into account predictable cyclical movements in the ratios of spending and transfers to GNP on the one hand, and by data limitations on the other. Five-year projections for most OECD countries are made on a regular basis by the OECD Secretariat, and these data are used to construct the medium-term gap.

The choice of n equal to a much larger value, namely 40 years, is an attempt to quantify the implications for sustainability of slower but steady changes in spending and transfers. One can think of many such changes, from the need to overhaul public infrastructure which was neglected in the 1980s, to additional spending on environmental projects, to a decreased defence budget, and so on. In this paper,

the computations incorporate only the implications of the ageing of population, and only through the latter's effects on public pensions and medical care expenditure. The effects of future demographic changes on public educational outlays have not been taken into account in light of the uncertain impact which ageing might have on these; despite the fact that public spending on education is heavily concentrated in the younger age groups, the need to shift such investment outlays to other age groups in an ageing population has frequently been suggested (Heller *et al.*, 1987, OECD, 1988)[6].

Different assumptions about the interest rate-growth rate differential are made for each indicator. In the case of the medium-term gap, $(r-\theta)$ is computed using forecasts of the real rate of interest on general government public debt and the rate of real output growth. For the long-term gap, a constant value of 2 per cent annually is used for $(r-\theta)$. Although this is a reasonable if perhaps conservative assumption, sensitivity analyses are presented below based on different values. Not surprisingly, a lower value makes the indicators look more optimistic, while a higher value has the opposite effect. There is also a slightly more subtle effect at work: for the long-term gap, a lower value also gives more relative weight to the distant future; this effect is present but quantitatively irrelevant for the medium-term gap; it is obviously irrelevant for the short-term gap.

In what follows, these three indicators are analysed, starting with the first two.

## B. The short-term and medium-term gaps

From equation [10], the short-term gap is given by:

$$d + (r-\theta)b_0 \qquad [11]$$

From equation [9], a good approximation to the medium-term gap is given by:

$$[(\text{average over the next 5 years of } g+h) + (r-\theta)b_0] - t \qquad [12]$$

where r and $\theta$ are the expected average real interest and growth rates over the next 5 years. In order to preserve consistency with the long-term gap discussed below, a somewhat complicated discrete-time counterpart to equation [9] is used[7]. In constructing historical series, however, one should use for each year the forecasts of g and h over the following five years formed as of that year. These forecasts often do not exist, or are no longer available. Thus, in constructing historical series for the short-term and medium-term gaps shown in Tables 2 and 3, realised values of spending and transfers have been used instead. Beginning with 1986, however, the medium-term and long-term indicators incorporate forecasts for the years 1990 and after. For example, the gap for 1988 is based on the actual values of non-interest spending in 1988 and 1989, and the 1989 forecasts for 1990 to 1992. The gap for 1989 is based on the actual values of 1989 and OECD projections for 1990 through 1993.

Table 2. **Alternative indicators of sustainability of fiscal policy: major OECD countries[a]**

As a per cent of GNP/GDP[b]

| | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 |
|---|---|---|---|---|---|---|---|
| **United States** | | | | | | | |
| Short-term gap | 2.49 | 1.11 | 1.55 | 1.66 | 0.73 | 0.34 | -0.33 |
| Medium-term gap | 2.04 | 1.79 | 1.29 | 0.79 | -0.14 | -0.04 | -0.55 |
| **Japan** | | | | | | | |
| Short-term gap | 2.30 | 0.38 | -0.96 | -0.79 | -2.04 | -2.63 | -3.04 |
| Medium-term gap | 1.20 | 0.16 | -0.62 | -0.76 | -2.14 | -2.68 | -3.13 |
| **Germany** | | | | | | | |
| Short-term gap | 0.64 | -0.04 | -0.90 | -0.81 | -0.20 | 0.18 | -1.98 |
| Medium-term gap | -0.26 | -0.72 | -1.57 | -1.50 | -1.60 | -1.50 | -2.81 |
| **France** | | | | | | | |
| Short-term gap | 2 09 | 1.57 | 1.46 | 1.32 | 0.75 | 0.06 | -0.11 |
| Medium-term gap | 2.14 | 0.93 | 0.37 | 0.35 | -0.46 | -0.57 | -0.58 |
| **Italy** | | | | | | | |
| Short-term gap | 4.94 | 5.15 | 6.57 | 5.46 | 5.89 | 5.50 | 5.16 |
| Medium-term gap | 5.77 | 6.22 | 6.36 | 5.60 | 5.66 | 5.21 | 4.64 |
| **United Kingdom** | | | | | | | |
| Short-term gap | 1.12 | 1.18 | -0.20 | -0.22 | -0.97 | -2.79 | -3.54 |
| Medium-term gap | -0.01 | -1.44 | -2.96 | -3.34 | -3.64 | -3.75 | -3.65 |
| **Canada** | | | | | | | |
| Short-term gap | 4.57 | 3.53 | 3.40 | 2.12 | 1.01 | -0.73 | -0.34 |
| Medium-term gap | 3.30 | 2.44 | 1.91 | 0.41 | -0.46 | -1.67 | -1.10 |

*a/* The short term gap is estimated using equation [11] in the text. The medium-term gap is obtained from equation [12], and is defined as the difference between, on the one hand, general government receipts required on average over the current and next 4 years in order to return the debt ratio to its initial level and, on the other hand, current receipts.

*b/* A positive sign indicates a need for spending decreases and/or tax increases to prevent a debt explosion.

*c/* Negative differential between interest rate and growth rate for 1985 to 1989.

*Source:* OECD estimates.

Tables 2 and 3 show estimated primary and medium-term gaps for the major and selected smaller OECD countries. These estimates are also depicted graphically in Chart A, where they are juxtaposed against the ratio of net public debt to GNP in each country. The tables show the dramatic turnaround in fiscal policy since 1983. In most countries, (Norway is the main exception) the short-term and the medium-term gaps were not only positive but often large in 1983. With the exception of Italy, Greece, the Netherlands, Norway and Spain, the gaps had become either negative or insignificantly positive by 1989[8].

Table 3. **Alternative indicators of sustainability of fiscal policy: smaller OECD countries[a]**

As a per cent of GNP/GDP[b]

| | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 |
|---|---|---|---|---|---|---|---|
| **Australia** | | | | | | | |
| Short-term gap | 3.63 | 2.49 | 1.79 | 1.36 | -0.18 | -1.53 | -1.96 |
| Medium-term gap | 3.34 | 1.63 | 0.19 | -1.56 | -2.62 | -3.53 | -2.62 |
| **Austria** | | | | | | | |
| Short-term gap | 2.43 | 0.48 | 0.18 | 1.49 | 1.94 | 1.00 | 1.08 |
| Medium-term gap | 2.63 | 1.08 | -0.42 | -0.82 | -1.44 | -1.58 | -0.67 |
| **Belgium** | | | | | | | |
| Short-term gap | 6.91 | 3.66 | 1.65 | 1.21 | 0.36 | 0.54 | 0.31 |
| Medium-term gap | 4.37 | 1.48 | -0.49 | -0.83 | -2.17 | -1.79 | -1.45 |
| **Denmark** | | | | | | | |
| Short-term gap | 4.10 | -0.22 | -2.62 | -7.15 | -5.30 | -3.43 | -2.25 |
| Medium-term gap | 0.75 | -1.17 | -2.04 | -3.70 | -3.64 | -3.61 | -2.70 |
| **Finland** | | | | | | | |
| Short-term gap | 1.05 | -1.08 | -0.95 | -1.49 | 0.48 | -1.68 | -2.46 |
| Medium-term gap | 1.77 | 0.10 | -1.44 | -2.80 | -1.44 | -2.10 | -1.49 |
| **Greece[c]** | | | | | | | |
| Short-term gap | 4.06 | 5.12 | 8.84 | 8.10 | 6.80 | 8.73 | 11.89 |
| Medium-term gap | 7.12 | 6.87 | 8.34 | 7.76 | 7.44 | 9.38 | 11.12 |
| **Ireland** | | | | | | | |
| Short-term gap | 10.73 | 8.66 | 8.79 | 8.36 | 5.53 | 0.00 | -0.91 |
| Medium-term gap | 9.98 | 8.10 | 6.00 | 3.76 | 1.45 | -2.94 | -3.21 |
| **Netherlands** | | | | | | | |
| Short-term gap | 3.06 | 2.63 | 0.86 | 2.19 | 2.91 | 1.36 | 1.26 |
| Medium-term gap | 0.96 | 1.64 | 0.39 | 1.04 | -0.28 | -0.66 | 0.64 |
| **Norway** | | | | | | | |
| Short-term gap | -4.10 | -6.88 | -9.82 | -5.00 | -4.20 | -2.69 | 0.23 |
| Medium-term gap | -4.59 | -4.62 | -5.59 | -2.44 | -2.31 | -1.71 | 0.96 |
| **Spain** | | | | | | | |
| Short-term gap | 4.46 | 4.36 | 4.67 | 3.16 | 1.22 | 0.90 | 0.29 |
| Medium-term gap | 4.72 | 4.70 | 3.34 | 2.41 | 0.99 | 1.17 | 0.63 |
| **Sweden** | | | | | | | |
| Short-term gap | 3.33 | 0.81 | 1.08 | -0.66 | -5.21 | -3.35 | -3.37 |
| Medium-term gap | 0.48 | -0.22 | -0.33 | -2.33 | -3.57 | -2.58 | -2.52 |

a/ The short-term gap is estimated using equation [11] in the text. The medium-term gap is obtained from equation [12], and is defined as the difference between, on the one hand, general government receipts required on average over the current and next 4 years in order to return the debt ratio to is initial level and, on the other hand, current receipts.

b/ A positive sign indicates a need for spending decreases and/or tax increases to prevent a debt explosion.

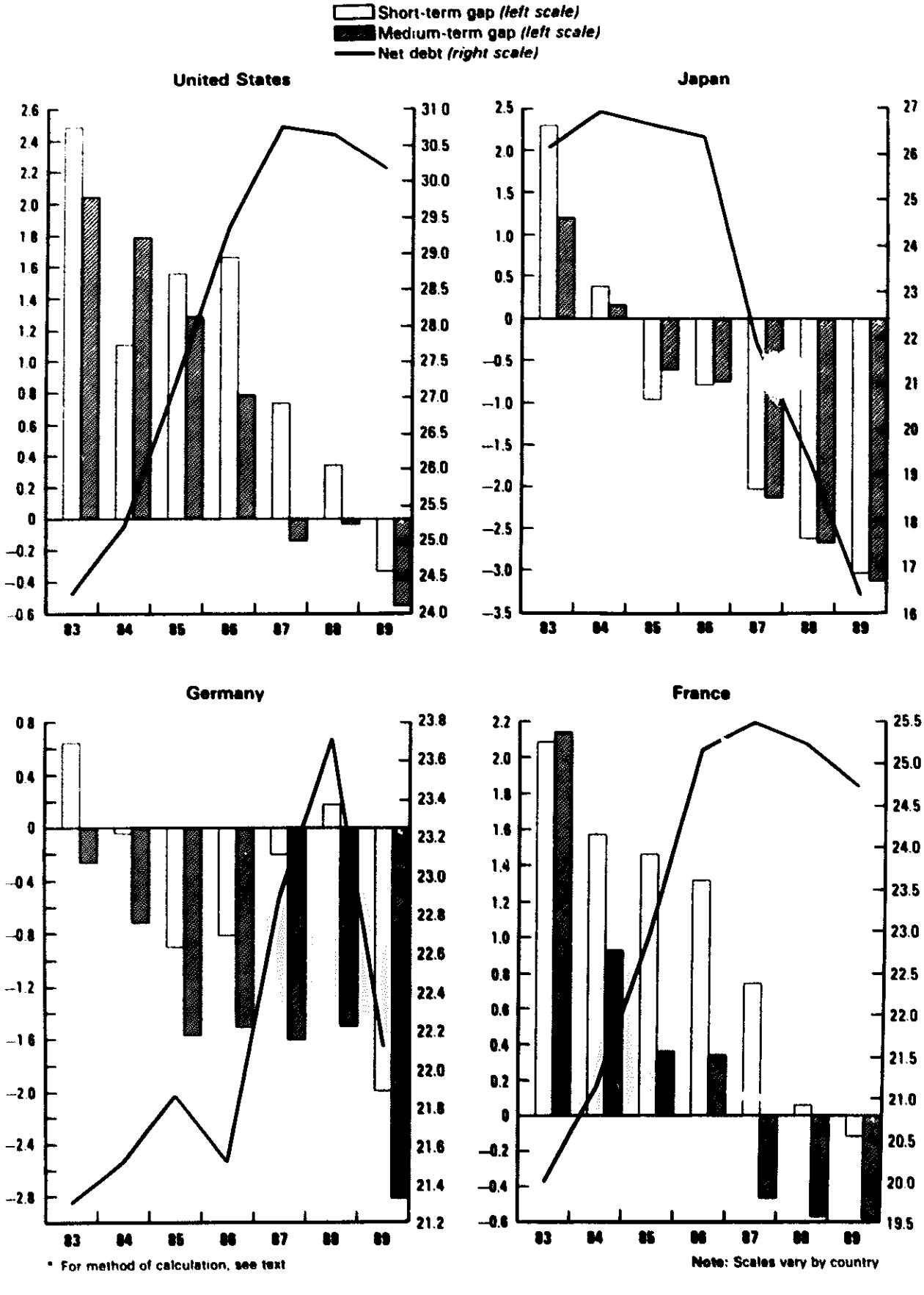
c/ Negative differential between interest rate and growth rate for 1983 to 1984.

*Source:* OECD estimates.

CHART A

# FISCAL SUSTAINABILITY MEASURES* AND PUBLIC DEBT IN OECD COUNTRIES

(Per cent of GDP/GNP)



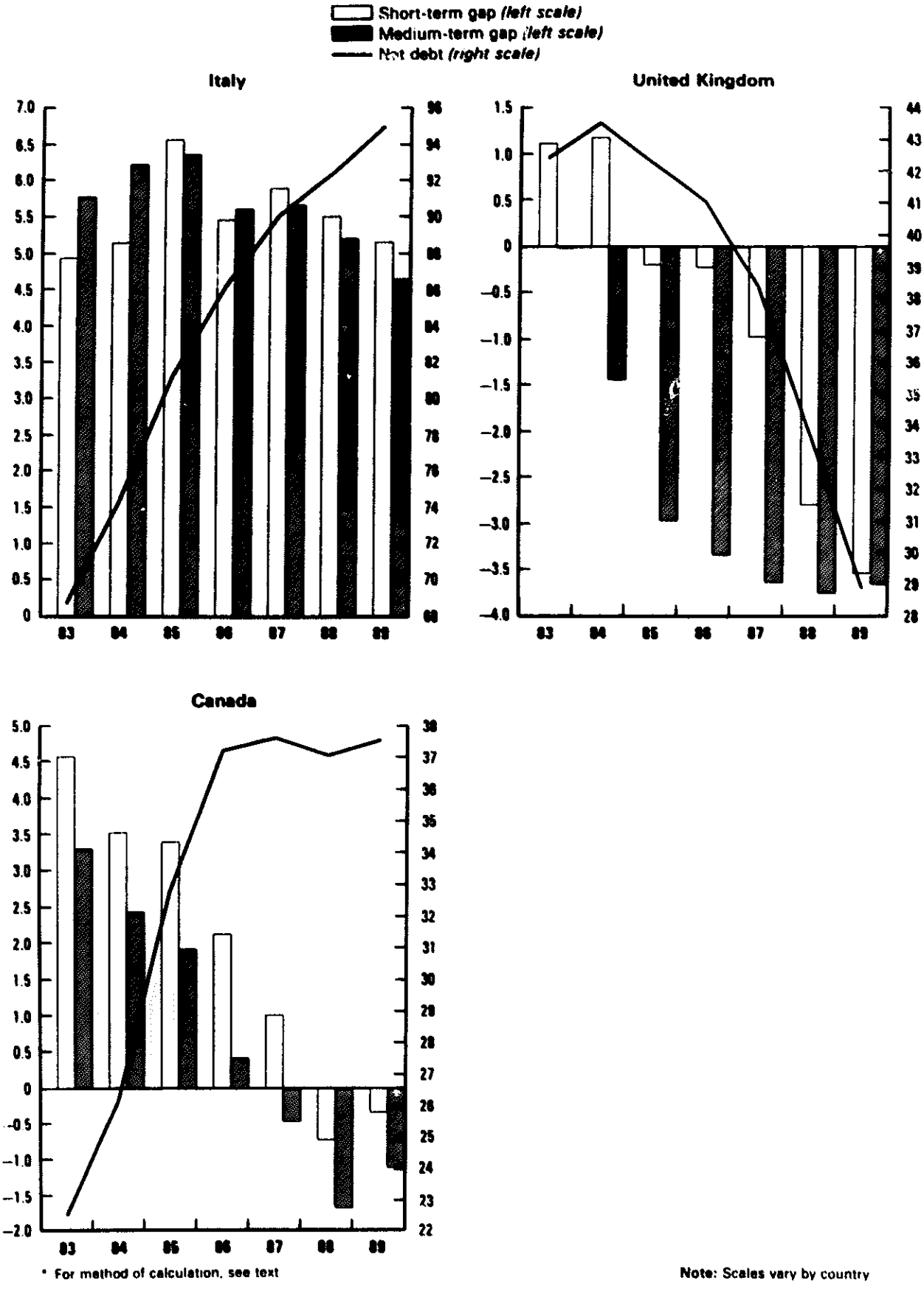

* For method of calculation, see text

Note: Scales vary by country

CHART A (continued)

# FISCAL SUSTAINABILITY MEASURES* AND PUBLIC DEBT IN OECD COUNTRIES

(Per cent of GDP/GNP)




* For method of calculation, see text

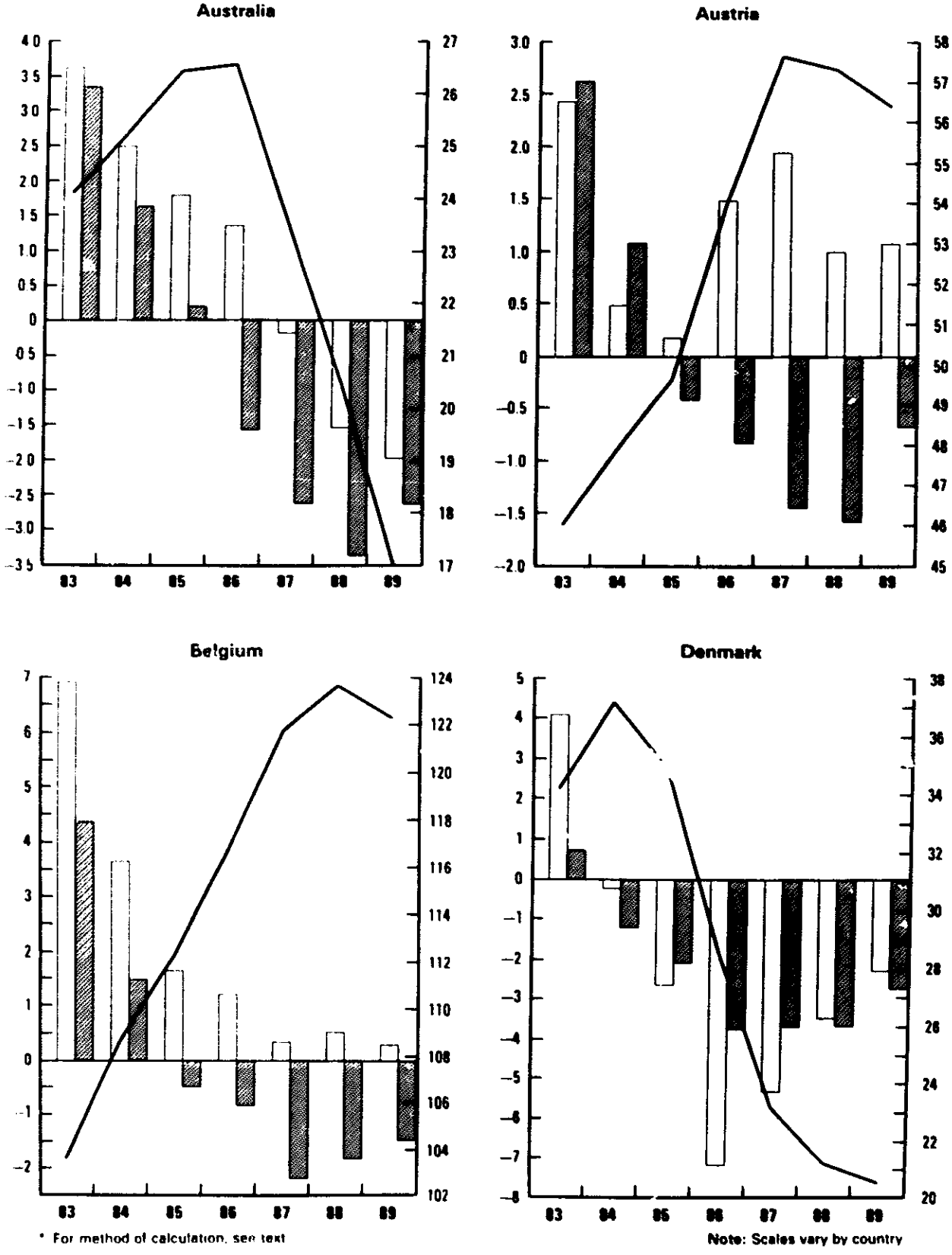
Note: Scales vary by country

CHART A (continued)

# FISCAL SUSTAINABILITY MEASURES* AND PUBLIC DEBT IN OECD COUNTRIES

(Per cent of GDP/GNP)

Short-term gap *(left scale)*
Medium-term gap *(left scale)*
Net debt *(right scale)*




* For method of calculation, see text

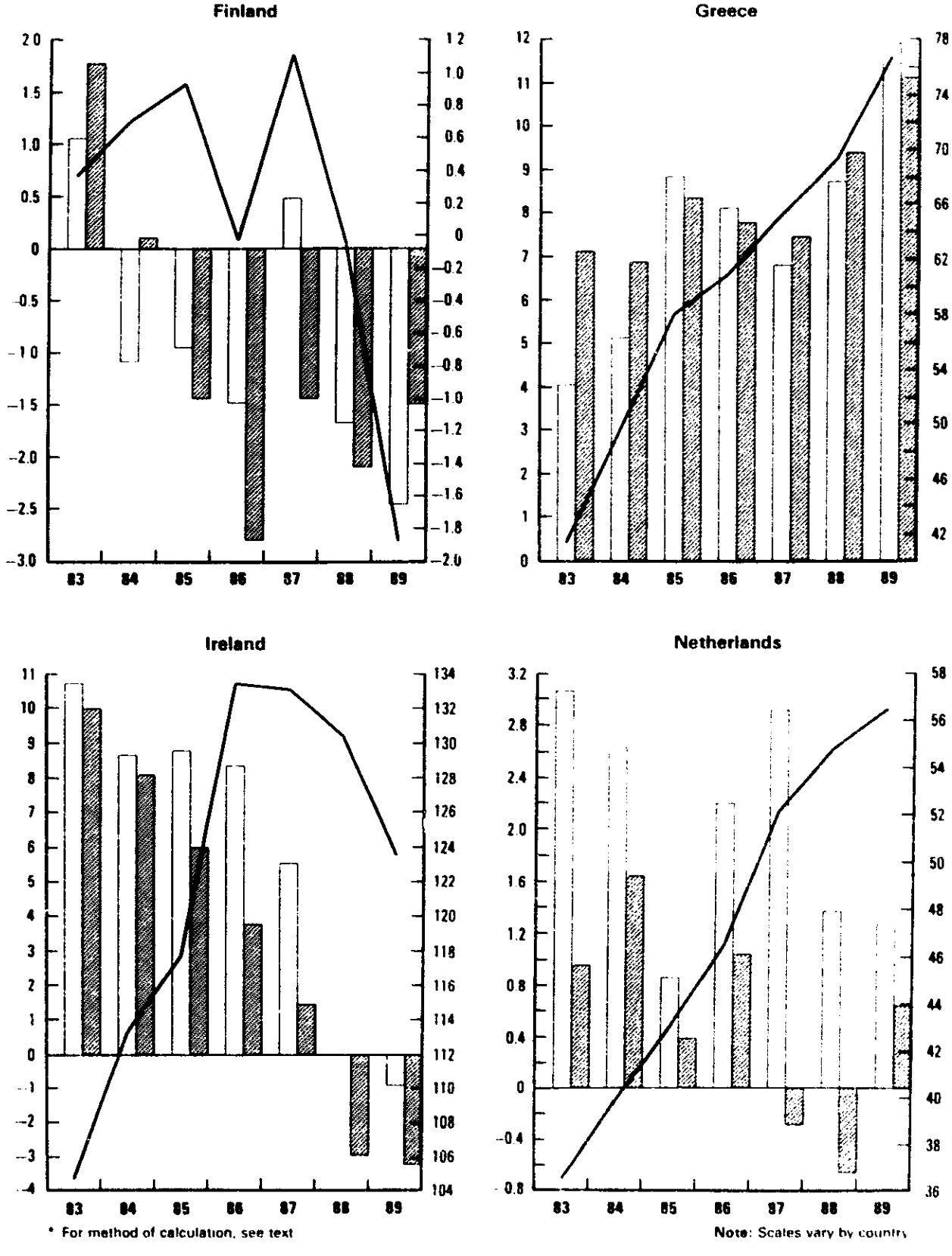
Note: Scales vary by country

CHART A (continued)

# FISCAL SUSTAINABILITY MEASURES* AND PUBLIC DEBT IN OECD COUNTRIES

(Per cent of GDP/GNP)

Short-term gap *(left scale)*
Medium-term gap *(left scale)*
Net debt *(right scale)*



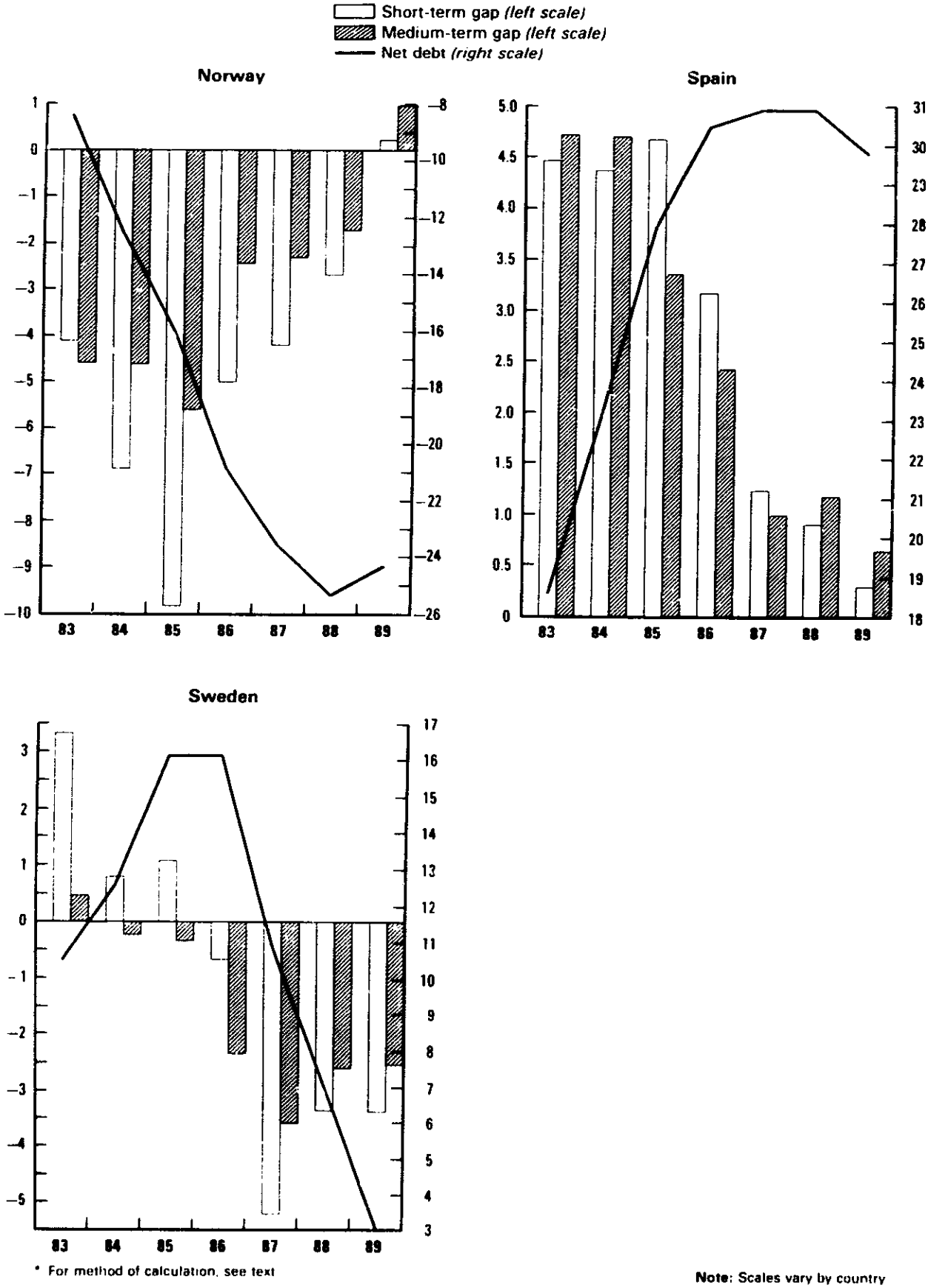

* For method of calculation, see text

Note: Scales vary by country

CHART A (continued)

# FISCAL SUSTAINABILITY MEASURES* AND PUBLIC DEBT IN OECD COUNTRIES

(Per cent of GDP/GNP)

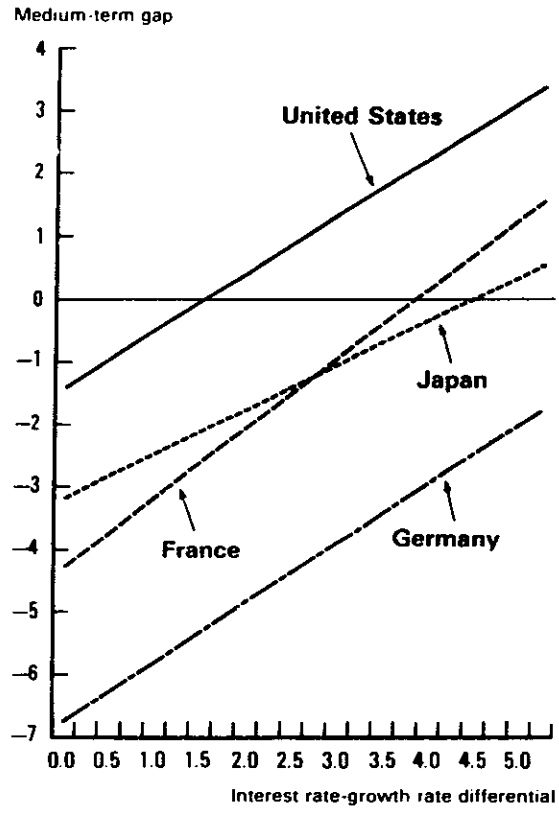


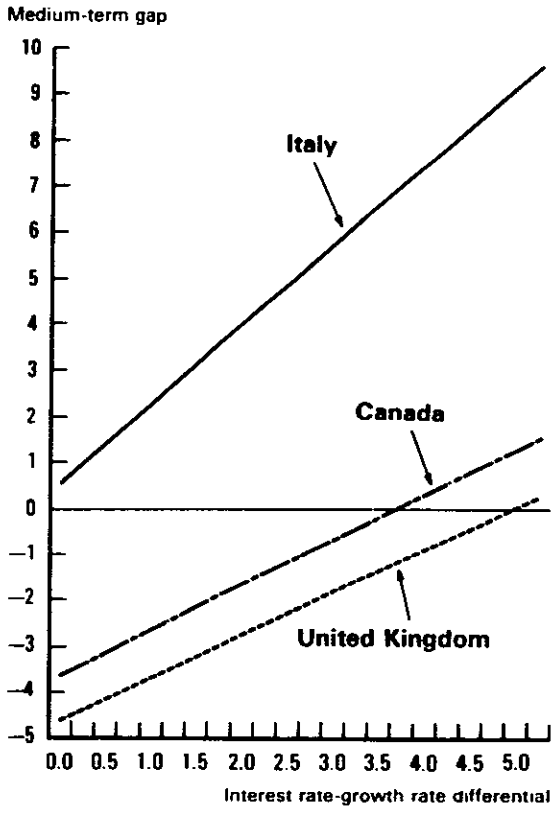

* For method of calculation, see text

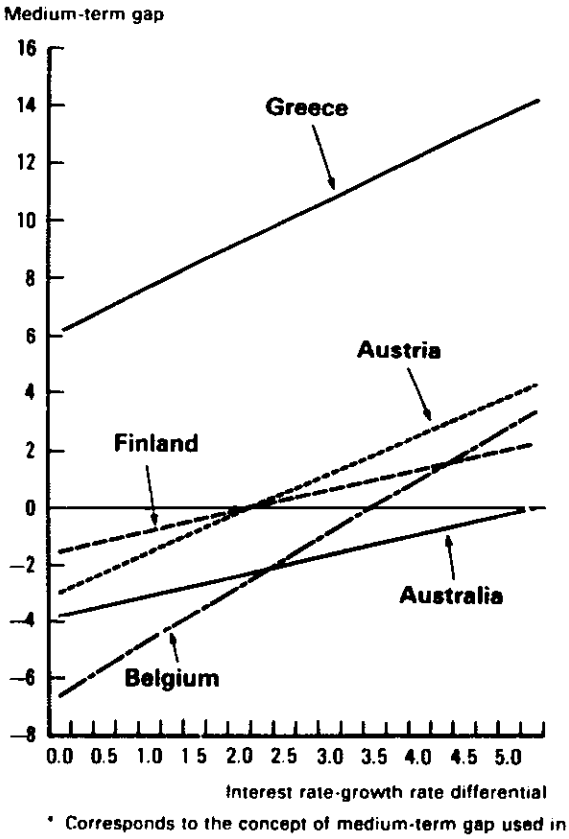
**Note:** Scales vary by country

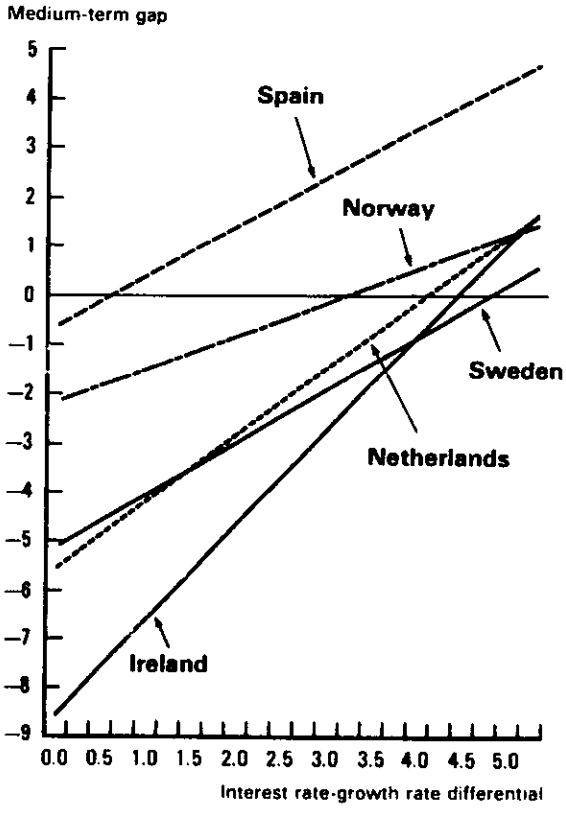
CHART B

# MEDIUM-TERM FISCAL ADJUSTMENT* IMPLIED BY ALTERNATIVE INTEREST RATE-GROWTH RATE DIFFERENTIALS




* Corresponds to the concept of medium-term gap used in the text.

The comparison between the short-term and the medium-term gaps does not show major differences. In retrospective data, the medium-term gap anticipates movements in the short-term gap; while this is clearly a desirable characteristic of a medium-term gap, this is due here to the use of actual rather than forecast data in the construction of retrospective gaps. A fair comparison must therefore be limited to 1989. In 1989, the two gaps are nearly always within 1.0 per cent of each other. The only exceptions are Austria, Belgium and Ireland; in all three cases, the medium-term gap paints a more optimistic picture than the short-term gap.

Does this general coincidence between the signals given by the short-term and the medium-term gap imply that there is no need for the latter? Clearly not, for two reasons. First, the period since 1983 has not been one of sharp predicted movements in aggregate activity, which would lead to large differences in the two gaps. Second, and more importantly, the very fact that the two give the same message is often important information. For example, the fact that, in Italy, the medium-term gap is only 0.5 per cent below the short-term gap shows the seriousness of the fiscal situation in that country. The fact that the short-term and medium-term gaps for Greece are equal to 11.9 per cent and 11.1 per cent, respectively, gives exactly the same message.

How sensitive are the estimated gaps to underlying assumptions? The medium-term gap is clearly only as good as the forecasts on which it is based. And both gaps depend on the value of $(r-\theta)$; equations [11] and [12] show that the derivative of the gap with respect to $(r-\theta)$ is equal to the debt to GNP ratio. Put more simply, increases in real interest rates or slowdowns in growth are more threatening in countries with high levels of debt. Chart B plots the 1989 medium-term gaps as a function of the assumed $(r-\theta)$. The gap for Belgium for example, which has a debt to GNP ratio of 122 per cent, varies from −5.0 per cent for $(r-\theta)$ equal to 0, to a more pessimistic 1.0 per cent for $(r-\theta)$ equal to 5 per cent.

### C. The long-term gap

The long-term gaps are constructed by using the discrete time equivalent of equation [9] for n equals 40. Only long-term gaps in 1989 are constructed, based on projections of spending and transfers for the period 1989-2030.

The most obvious and generally acknowledged source of future threat to the sustainability of fiscal policies is associated with the ageing of populations in OECD countries. The projected increase in the number and relative importance of the elderly in most countries during the first half of the next century has been identified by several studies (OECD, 1988, and Heller *et al.*, 1986) as a major source of spending pressure on several government programmes. Thus, the long-term indicator takes into account the implications of ageing for both pensions and medical care.

For the first five years, the same projections of spending and transfers as for the medium-term gap are used. For subsequent years, the share of non-interest

spending in GNP is adjusted to take into account the implications of ageing for both pensions and medical care (for a subset of the countries considered).

To construct forecasts of non-interest spending, population projections have been made using software provided by the U.S. Bureau of the Census; these projections are based on the most recent population censuses and broadly consistent assumptions about fertility, mortality and international migration developments in the future[9]. Population projections for the Federal Republic of Germany are, naturally, considerably more speculative in light of German unification. This should be kept in mind in considering the estimates reported below.

Simulated pension spending has been obtained by making the assumption that the ratio of public pension expenditure to GNP changes in line with variations in the old-age dependency ratio. More formally, the initial share (in GNP) of public spending on pensions is increased or decreased in each year to 2030 by the same percentage change as is calculated in the projected old-age dependency ratio (allowing, to the extent possible, for cross-country variations in age of retirement). The resulting share of pension spending is then added to a constant ratio of non-interest spending net of pension outlays. This amounts to an implicit assumption that the ratio of the average pension to the average gross wage remains unchanged over time. While this is a somewhat rough means of deriving future pension spending, the methodology has the merit of being broadly applicable to many countries while at the same time reflecting general tendencies in the countries considered[10].

To construct projections of public health care spending, a similar approach to the one used in a previous OECD study (1988) has been employed. In particular, estimates of aggregate public medical care spending in each year to 2030 are obtained by multiplying the projected population size of each age group by the 1980 average spending for same age group. Dividing the projected aggregate for the total population in each year by the 1989 aggregate yields an index of real growth of public medical spending. The initial share of public spending on medical care in GNP is then adjusted by this index to obtain a projected ratio in each year. This ratio is then added to the projected ratio of non-interest spending (adjusted for pension growth as described earlier) net of medical spending. One important element in this calculation is the evolution of the relative price of medical care, about which there is little certainty. Thus, the long-term gaps including medical care have been computed under three alternative assumptions: 0, 1 and 2 per cent relative price inflation over the period. No account is taken of the substitution effects that relative price increases might generate. Hence, these projections are likely to be upwardly biased, other things remaining the same.

The growth in spending (as a share of GNP) obtained from the preceding method is shown in Table 4. The first column gives the value for 1990, while the second reports the estimated ratio of spending in 2028 to spending in 1990, as shares of GNP, taking into account pension benefit growth only. The third column gives the same ratio, but taking into account both pension and medical care growth

Table 4. **Future growth in general government non-interest spending**

| | Non-interest spending as a per cent of GNP in 1990 | Ratio of share of non-interest spending in GNP in 2028 to share in 1990 accounting for potential growth in: | |
|---|---|---|---|
| | | Pension spending | Pension and health care spending |
| United States | 31.4 | 1.17 | 1.24 |
| Japan | 27.8 | 1.26 | 1.31 |
| Germany | 40.9 | 1.27 | 1.27 |
| France | 46.8 | 1.16 | 1.18 |
| Italy | 42.5 | 1.21 | 1.22 |
| United Kingdom | 33.2 | 1.06 | 1.08 |
| Canada | 33.3 | 1.16 | 1.25 |
| Australia | 28.1 | 1.09 | 1.18 |
| Austria | 42.9 | 1.23 | * |
| Belgium | 38.4 | 1.17 | 1.17 |
| Denmark | 52.2 | 1.09 | 1.08 |
| Finland | 36.4 | 1.25 | * |
| Greece | 42.6 | 1.07 | * |
| Ireland | 41.7 | 0.95 | * |
| Netherlands | 46.4 | 1.25 | 1.30 |
| Norway | 49.8 | 1.11 | * |
| Spain | 36.5 | 1.08 | * |
| Sweden | 54.0 | 1.13 | 1.15 |

*Source:* OECD estimates.

(for those countries for which data are available), under the assumption of no increase in the relative price of medical care. The increase in total spending is in some cases relatively sharp. For instance, in the United States, impacts of demographic change on pensions and health spending result in a 24 per cent increase in the share of non-interest expenditure in GNP. This is mainly a reflection of the fact that public outlays on medical care are heavily concentrated in the older age groups in that country. By contrast, in France, the importance to all groups of public provision of medical care, although making for a comparatively high *level* of such spending in GNP, implies a smaller *increase*. In reading the table, the mechanical nature of the forecasts should be kept in mind. Almost surely, there will be many changes in the programmes during the next 4 decades. It is precisely the role of a long-term indicator to assess the urgency and size of the required adjustments.

Table 5 gives the implied long-term gaps. The message in the table is clear: taking into account the implications of ageing leads to a more conservative assessment of sustainability. Focusing first on the effect of pension growth (first column),

## Table 5. **Sustainability of fiscal policy in the long term**

Long-term gaps based on projected growth of general spending on pensions and health care

As a per cent of nominal GNP/GDP

| | Gap based on growth in: | | | |
|---|---|---|---|---|
| | Pensions only[a] | Pensions and health, assuming a medical care cost differential of[b]: | | |
| | | 0 per cent | 1 per cent | 2 per cent |
| United States | 0.08 | 0.63 | 1.36 | 2.27 |
| Japan | 0.70 | 1.40 | 2.23 | 3.27 |
| Germany | 0.06 | 0.17 | 1.01 | 2.03 |
| France | 0.58 | 0.94 | 1.89 | 3.07 |
| Italy | 5.39 | 5.59 | 6.07 | 6.67 |
| United Kingdom | -3.76 | -3.63 | -2.98 | -2.18 |
| Canada | -1.02 | -0.07 | 0.92 | 2.17 |
| Australia | -2.98 | -2.11 | -1.27 | -0.21 |
| Austria | 0.26 | .. | .. | .. |
| Belgium | -2.21 | -2.15 | -1.49 | -0.68 |
| Denmark | -3.10 | -3.11 | -2.35 | -1.42 |
| Finland | 1.47 | .. | .. | .. |
| Greece | 9.39 | .. | .. | .. |
| Ireland | -6.16 | .. | .. | .. |
| Netherlands | 2.48 | 3.13 | 4.12 | 5.34 |
| Norway | 3.40 | .. | .. | .. |
| Spain | 1.35 | .. | .. | .. |
| Sweden | -0.38 | -0.18 | 1.02 | 2.51 |

*a)* Defined as the difference between, on the one hand, general government receipts required on average over the current and next 39 years in order to return the debt ratio to its initial level and, on the other, current receipts, taking into account the potential growth of public pensions associated with rising old-age dependency ratios.

*b)* Same as in footnote *a)*, but taking into additional account the effects of ageing on public health care spending.

.. Not available.

*Source:* OECD estimates.

the long-term gap is usually larger, on average by 1 to 2 per cent, than the medium-term gap shown in Tables 2 and 3. For Japan, for example, the medium-term gap in 1989 is equal to −3.13 per cent, but the long-term gap is equal to 0.7 per cent. Exceptions to the general pattern include Canada, Denmark and Ireland. These numbers give a sense of how large the adjustment in either taxes or benefits will have to be to confront the implications of ageing. The relation derived earlier to assess the cost of waiting, namely equation [8], can be used here. If the dynamics of ageing require an adjustment of roughly 2 per cent today, deferring the increase 10 years would require an adjustment of 2.4 per cent, while deferring it 20 years would require an adjustment of 3 per cent.

Although these estimates are generally small, it is important to remember that they are average annual excesses or deficiencies in receipts[11], so that over time they could lead to the accumulation of large "stocks" of debt or assets (in the case of a negative tax gap). Also, it should be emphasised that in most OECD countries, the tax base on which pensions (and other components of social insurance) are financed is not GNP, but rather a portion or all of the total wage bill. As has been shown elsewhere (Halter and Hemming, 1987, and Hagemann and Nicoletti, 1989), the contribution rates that may be required in the future can be expected, on unchanged policies, to increase quite substantially in some countries.

Columns 2-4 of Table 5 focus on the implications of the projected growth of medical care expenditures. The conclusion is similar across countries. The long-term gap that is derived taking into account medical care growth and a relative price increase of 2 per cent per year is about 2 per cent higher than that which takes account only of pension growth. Under the given assumptions, the long-term gap is positive in most major OECD countries, with the notable exception of the United Kingdom. On the other hand, it is negative in 3 of the 5 smaller economies

Table 6. **Long-term gaps at alternative discount rates**[a]

| | Interest rate-growth rate differential (in per cent) assumed at: | | | | | |
|---|---|---|---|---|---|---|
| | -1.0 | 0.5 | 1.0 | 2.0 | 3.0 | 4.0 |
| United States | -0.35 | -0.15 | -0.08 | 0.08 | 0.24 | 0.41 |
| Japan | 1.13 | 0.91 | 0.84 | 0.70 | 0.56 | 0.43 |
| Germany | 0.33 | 0.19 | 0.14 | 0.06 | -0.01 | -0.07 |
| France | 0.63 | 0.59 | 0.59 | 0.58 | 0.60 | 0.63 |
| Italy | 3.41 | 4.41 | 4.74 | 5.39 | 6.05 | 6.71 |
| United Kingdom | -4.44 | -4.10 | -3.98 | -3.76 | -3.53 | -3.29 |
| Canada | -1.62 | -1.33 | -1.23 | -1.02 | -0.81 | -0.58 |
| Australia | -3.20 | -3.10 | -3.06 | -2.98 | -2.90 | -2.81 |
| Austria | -0.54 | -0.15 | -0.02 | 0.26 | 0.55 | 0.85 |
| Belgium | -5.20 | -3.70 | -3.20 | -2.21 | -1.22 | -0.22 |
| Denmark | -3.17 | -3.14 | -3.13 | -3.10 | -3.05 | -2.99 |
| Finland | 2.33 | 1.89 | 1.75 | 1.47 | 1.21 | 0.96 |
| Greece | 7.49 | 8.45 | 8.77 | 9.39 | 10.02 | 10.64 |
| Ireland | -9.89 | -8.02 | -7.40 | -6.16 | -4.94 | -3.74 |
| Netherlands | 1.97 | 2.21 | 2.30 | 2.48 | 2.69 | 2.91 |
| Norway | 4.57 | 3.97 | 3.78 | 3.40 | 3.04 | 2.69 |
| Spain | 0.67 | 1.02 | 1.13 | 1.35 | 1.58 | 1.79 |
| Sweden | 0.18 | -0.11 | -0.20 | -0.38 | -0.55 | -0.71 |

a/ The gaps shown in this table are estimated using equation [12] at values of the interest rate-growth rate differential shown at the top of each column. The general government spending projections on which these estimates are based take into account public pension growth only.

*Source:* OECD estimates.

for which the simulations could be made, although the qualitative effect of the growth of medical care spending is the same as for other countries; the negative gaps are *less* negative. These estimates suggest less justification for a more relaxed budgetary policy in most OECD countries than emerges from short and medium-term considerations.

Table 6 shows the effects of alternative values of $(r-\theta)$ on the long-term gap[12]. Higher values of $(r-\theta)$ have two effects on the long-term gap. First, just as for the other two gaps, a larger $(r-\theta)$ increases the primary surplus needed to keep the debt to GNP ratio constant, and the effect is proportional to the debt to GNP ratio. Second, it changes the relative weights of public spending at different times, putting less weight on the distant future and, thus, making the issue of ageing less pressing. Table 6 shows that the second effect can be quite strong. For most countries, the net effect of raising the value of $(r-\theta)$ is to *reduce* the estimated gap, underscoring the gradualness of the future rise in spending over most of the period. In effect, because most of the increase in pension and medical spending is projected to occur toward the end of the simulation period, these distant higher values become less important as the discount rate is raised. Thus in countries in which the ratio of net public debt to GNP is relatively low, as in Japan and Sweden, for instance, the net effect of a higher discount rate is to lower the long-term gap. By contrast, in countries with high debt to GNP ratios (e.g., Italy and Greece), the net effect is to increase the apparent unsustainability of current policies.

## IV. A COMPARISON WITH PREVIOUS APPROACHES

Discussions of sustainability of fiscal policy can be found in Keynes (1923) and Domar (1944), and this paper is not the first to propose indicators aimed at assessing sustainability. It is therefore important to provide a comparison with other measures currently used.

### A. Debt simulations

One approach to assessing sustainability has been to simulate the future path of general government debt over a specific period of time taking into account any reasonably foreseeable changes in spending, receipts or the macroeconomic environment. By postulating assumptions about long-run rates of growth and real rates of interest, combined with an initial ratio of public debt to GNP and projections of receipts and non-interest spending, the potential *path* of the public debt to GNP ratio can be obtained. An example of this approach is Chouraqui *et al.* (1986). In that study, the authors estimated future debt to GNP ratios in a number of OECD countries

on the assumption that the then current stance of policy – characterised in terms of the primary budget balance – would remain unchanged except insofar as pension outlays would rise as a result of the increase in the old-age dependency ratio. The simulations were based in addition on the assumption that the real interest rate would exceed permanently the rate of output growth by two percentage points. A notable result of these simulations was that many countries faced the prospect of rapidly rising debt to GNP ratios, particularly after the turn of the century.

There is obviously a close relation between this question and the indicator of sustainability proposed in this paper, $t_n^*$, and this relation is easy to derive. Let $b_n^*$ be the debt to GNP ratio at time n derived under the same forecasts of g and h over the period until time n as those used to construct $t_n^*$, and assume that t is constant throughout and equal to its value at time zero. Then, the following relation holds:

$$(b_n^* - b_0) = [1/(r-\theta)]\,[\exp(r-\theta)n]^{-1}(t_n^* - t) \qquad [13]$$

Thus, the two measures are directly linked (they will not be if t is not assumed constant over time in the computation of $b_n^*$). But the change in debt will magnify the $t_n^*$ index, and the magnification will depend on n, making the interpretation of the resulting number more difficult. For example, a value of $(t_n^* - t)$ of 2 per cent will translate, if $r-\theta$ equals 2 per cent, into an increase in debt of 22 per cent if n equals 10 years, 49 per cent if n equals 20 years and of 122 per cent if n equals 40 years.

In short, the medium-term and long-term indicators give the same information as debt simulations. They summarise them through a single number which comes as a simple metric, allowing for a simple interpretation of the results.

## B. Cyclically adjusted indicators

Another line of research, and one which has figured prominently in OECD analyses of fiscal policy, has been to look at simple transformations of the primary budget balance, such as, for example, the cyclically adjusted deficit, plus debt times the difference between the average real interest rate and the average rate of growth. Such an index clearly is closely related to the medium-term indicator $t_n^*$, for n long enough to attenuate the effect of cyclical fluctuations. Recall equation [12]:

$$t_5^* \simeq [(\text{average over the next 5 years of } g+h) + (r-\theta)b_0] - t$$

Thus, like cyclically adjusted measures, $t_n^*$ also will average over the cycle, and will allow for the fact that current deficits, if due to a recession, may be nothing to worry about. However, the medium-term indicator is preferable, for three related but conceptually distinct reasons:

- First, the persistence and nature of cycles is the subject of much controversy, and there is less agreement on the proper adjustment than there was even a few years ago;

- Second, and obviously closely related, the cyclical adjustment is justified only if the economy is going to return to its mid-point fairly quickly; the cyclical adjustment is irrelevant if the economy is expected to remain depressed for a long time to come. This has turned out to be an important issue in the 1980s in Europe, as unemployment has stabilised at much higher levels than earlier. That, in the mid-80s, the debt to GNP ratio would be stable if the economy was back on trend was small comfort to governments which foresaw no such improvement on the horizon;
- Third, and most compelling, cyclical adjustments are not needed when forecasts are available. And such forecasts now exist for most OECD countries 3 to 5 years ahead. Even for the long-term indicator, a mechanical extension of the forecasts beyond 5 years is likely to dominate any mechanical cyclical adjustment. At some times, economies will be growing more or less on trend, leading cyclically adjusted indicators and the medium-term indicator to give roughly similar messages. The second half of the 1980s has been precisely such a circumstance. At other times, however, the two will give different messages. In such cases, the message from the medium-term indicator will be more reliable.

## CONCLUSIONS

This paper has proposed a set of indicators of sustainability of fiscal policy, designed to assess the extent to which governments can maintain current tax and spending programmes without experiencing a continued increase in public debt. These indicators have been constructed and illustrated for a sample of OECD countries for which the necessary data are available.

The analysis presented to this effect has emphasised that the assessment of the sustainability of fiscal policy must not be static, but forward-looking. As illustrated in the paper, because general government non-interest spending in many countries is projected either to decline or remain unchanged under current budgetary policies and continued favourable cyclical factors, the stability of public debt would appear to be assured.

The assessment of sustainability cannot always be limited to the medium term, however; governments' commitments to specific programmes have implications for fiscal policy which reach far into the future. Thus, projected future pressures, such as those on social spending arising from population ageing, should be incorporated in any measure which purports to indicate latent sustainability problems. The suggested indicators take such factors into consideration, as they are

computed over several different time horizons, collapsing into single numbers the scale of the needed adjustments to spending and/or taxation. In this respect, such indicators can play a useful role in the overall appraisal of fiscal policy and the types of budgetary actions that might be warranted.

# NOTES

1. The statement that the ratio of debt to GNP can increase forever without violating sustainability is a partial equilibrium argument, which takes the interest rate as given. In general equilibrium, such a debt policy may well not be feasible.
2. However, with respect to the finite horizon counterparts to t* that are discussed later in the paper, the required debt to GNP at the end of the horizon does matter.
3. One could still compute the finite horizon counterparts to t* derived below in the paper. But why the government should then worry about keeping the debt to GNP ratio from increasing would have a much weaker rationale.
4. For further discussion, see Blanchard and Fischer (1989).
5. There is one difference between this equation and equation [2] which the eye cannot see, but which should be mentioned. In equation [2], the real interest rate is the *ex post* interest rate, the difference between the nominal rate and realised inflation. In the equation here, as $t_n^*$ is forward looking, in the limit as n goes to zero, the real interest rate is the *ex ante* real rate, the nominal rate minus expected inflation.
6. The basic argument is that the more slowly growing labour force of an ageing population may require more "continuing" education in order to ensure its adaptability and flexibility.
7. Specially:

$$t_n^* = \left(\frac{r-\theta}{1+r-\theta}\right)\left[\left[1-\left(\frac{1}{1+r-\theta}\right)^n\right]^{-1}\left[\sum_{s=1}^{n}\left(\frac{1}{1+r-\theta}\right)^{s-1}(g_s+h_s)\right]+b_0\right] \qquad [14]$$

8. It is important to remember that Norway has generally been in surplus during this period.
9. See P.O. Johnson (1982).
10. The projections for Japan take into account OECD estimates of the increases in public pension benefits per retired person that can be expected as the system there matures. For the United Kingdom, the projection of public pension spending is based on the assumption that the State-Earnings-Related Pension Scheme remains in place and the estimates are based on figures published in the 1985 Green Paper "Reform of Social Security", Volume I, p. 16.
11. Or, conversely, less or greater spending than will be allowed by the current level of receipts.
12. The effects of ageing on interest rates and growth rates have been discussed in a number of recent contributions. See in particular the recent contributions by Auerbach and Kotlikoff (1987), Masson and Tyron (1990), Auerbach *et al.* (1989), Cutler *et al.* (1990).

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