

Methodology and technique
for determining structural budget deficits

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Abstract

The public authorities' financial balance has always played a prominent role when monitoring, interpreting and assessing budget policy decisions and developments. The Maastricht Treaty on European Union and the provisions contained therein on budgetary criteria and reference values gave rise to an additional demand for informative and comparable budget indicators. The financial balance that can be taken from the various statistics is initially only a conglomerate collated to a single numerical variable from a combination of trend-related, cyclical and transitory external influences, on the one hand, and the interaction of basic fiscal policy decisions on the public receipts and expenditure system and discretionary measures of current budget policy, on the other. Different cyclical positions, in particular, often conceal or distort the picture of basic financial tendencies in public sector budgets.

Perceptions of the fiscal weight of the structural deficit and, even more so, of that part of the core deficit requiring consolidation measures as well as the restructuring course to be adopted diverge considerably; the individual reasons for this often remain vague and unclear. Budgetary concepts can be of help in this context, albeit with various provisos. Seen as gauges, they help to determine the budgetary position of the public sector. They provide quantitative guidance - comparable to rules of thumb - and constitute a compromise between the complexity of the object to be examined and the general need for handy global variables which are readily available and simple to calculate. Apart from the fact that estimation is involved in deriving structural budget deficits, it must, above all, be borne in mind that the picture that emerges from a focus on the balance is a narrow one.

The present analysis is concerned primarily with the methodological and technical foundations of summary indicators of the fiscal deficit. Generally speaking, three construction steps are identified:

- choice of the statistical "raw" balance,
- determination of the so-called output gap,
- estimate of the quantitative weight of built-in stabilisers.

The question which real and/or financial transactions or which valuation and stock effects the financial balance is to measure must be considered carefully by weighing up the specific

advantages and disadvantages of various statistics (above all cash accounts, financial statistics, national accounts). The system of national accounts is preferred in this analysis. Firstly, it enables a better comparison with the budget calculations of international organisations and, secondly, it conforms with the method of calculation stipulated within the deficit criterion of the Maastricht Treaty.

The national account balance is the preformed raw material from which the structural core must be extracted by removing the cyclical shell (and possibly other temporary distortions). Simplified, the cyclical deficit can be thought of as a linear function of the output gap where the latter is considered to be a real economic disequilibrium phenomenon of the overall goods market. In the IMF's parlance, the link between the two is the cyclical response parameter which constitutes the yardstick for the sensitivity of public budgets to fluctuations in the overall degree of capacity utilisation. The size of cyclically induced financial balances consequently shows an indirect, proportional causal connection with the "law of motion" of the business cycle. Estimates of production potential are therefore at the macroeconomic "heart" of budgetary approaches. The results presented here are based on the Deutsche Bundesbank's calculations of production potential; a CES function whose parameters (for western Germany) were determined by means of a multi-stage procedure for the period from 1971 to 1994 serves as the basis of a production-theoretical approach. A comparison shows that most of the discrepancies in the calculations relative to the structural deficit can be attributed to methodological differences or different estimating techniques in determining production potential.

In this context, the output gap is of importance for public authorities insofar as it manifests itself in an income and/or a labour market gap. Only those variations in public receipts and expenditure are regarded as cyclical which respond automatically and directly to fluctuations in income and in the labour market (so-called passive budget flexibility). The relation between goods and labour markets can be tested empirically using the Okun approach. According to the estimates, a change in the output gap of 1 percentage point is on average reflected in a change of just over $\frac{1}{2}$ percentage point in the unemployment rate. The transfer payments which this triggers are calculated from the statistics of current transfers, compiled by the Federal Labour Office.

The financial implications for the inflow of contributions to the social security funds was derived on the basis of the difference between average pay and wage substitutes. Examination of the sensitivity of tax receipts to cyclical factors did not produce any stable, reliable elasticity coefficients at a disaggregated level. On the other hand, for aggregate tax revenue, an output elasticity of about 1 was found over the longer term - though with substantial "outliers" in several years.

As a key result, the present analysis produces the following general formula: fluctuations in the overall degree of capacity utilisation of 1 percentage point are on average reflected in a change of almost $\frac{1}{2}$ % of GDP in the general government budget, mainly on the receipts side. Limiting the structural deficit ratio to between 1 % and $1\frac{1}{2}$ % of GDP would therefore leave enough room for the built-in stabilisers to take effect, without violating the deficit criterion of Maastricht. The extent to which the built-in flexibility of the public sector budget can in actual fact exert a stabilising influence must be decided according to the prevailing situation. In terms of demand theory, the impact of the associated macroeffects is not fundamentally different to that of discretionary measures.

The determination of cyclically adjusted financial balances is, of course, only a first, indispensable step towards ascertaining budgetary consolidation requirements. An examination of the need to adjust the balance for inflation (as has often been called for), in addition to the adjustment for cyclical influences, did not provide sufficiently convincing arguments. The "investment-oriented borrowing" recently raised in the discussion by the German council of economic experts, which - apart from the primary criterion based on growth theory considerations - incorporates a special version of the sustainability condition of debt processes as a secondary budget policy criterion, does not appear to be "fully developed", despite some positive approaches. The suitability of the general sustainability restriction in the sense of a solvency condition derived from the intertemporal budget equation, which is dealt with in the final section of this paper, as a touchstone for deficit policy in practice, is likewise restricted because it is formulated too "softly"; nevertheless, the so-called primary budget gap derived from this approach leaves scope for a number of interesting modifications. For medium-term financial projections, in particular, even small consolidation adjustment models may be useful.

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Methodology and technique for determining structural budget deficits^{*)}

"If economists do not come up with one, the public or the Congress will probably invent its own ..."

Alan S. Blinder/Robert M. Solow (1974)

"The proof of the pudding is in the eating"

(English proverb)

I. A classical subject of analysis reconsidered

The search for an economically correct interpretation, and an assessment appropriate in economic policy terms, of public sector financial balances has long been part of the standard programme of macroeconomic analysis and of the "hard core" of the fiscal policy target-instrument debate. Both the theoretical and the practical use of budgetary measuring concepts stem from their broad-ranging applicability to a number of major problems. These include the determination of:

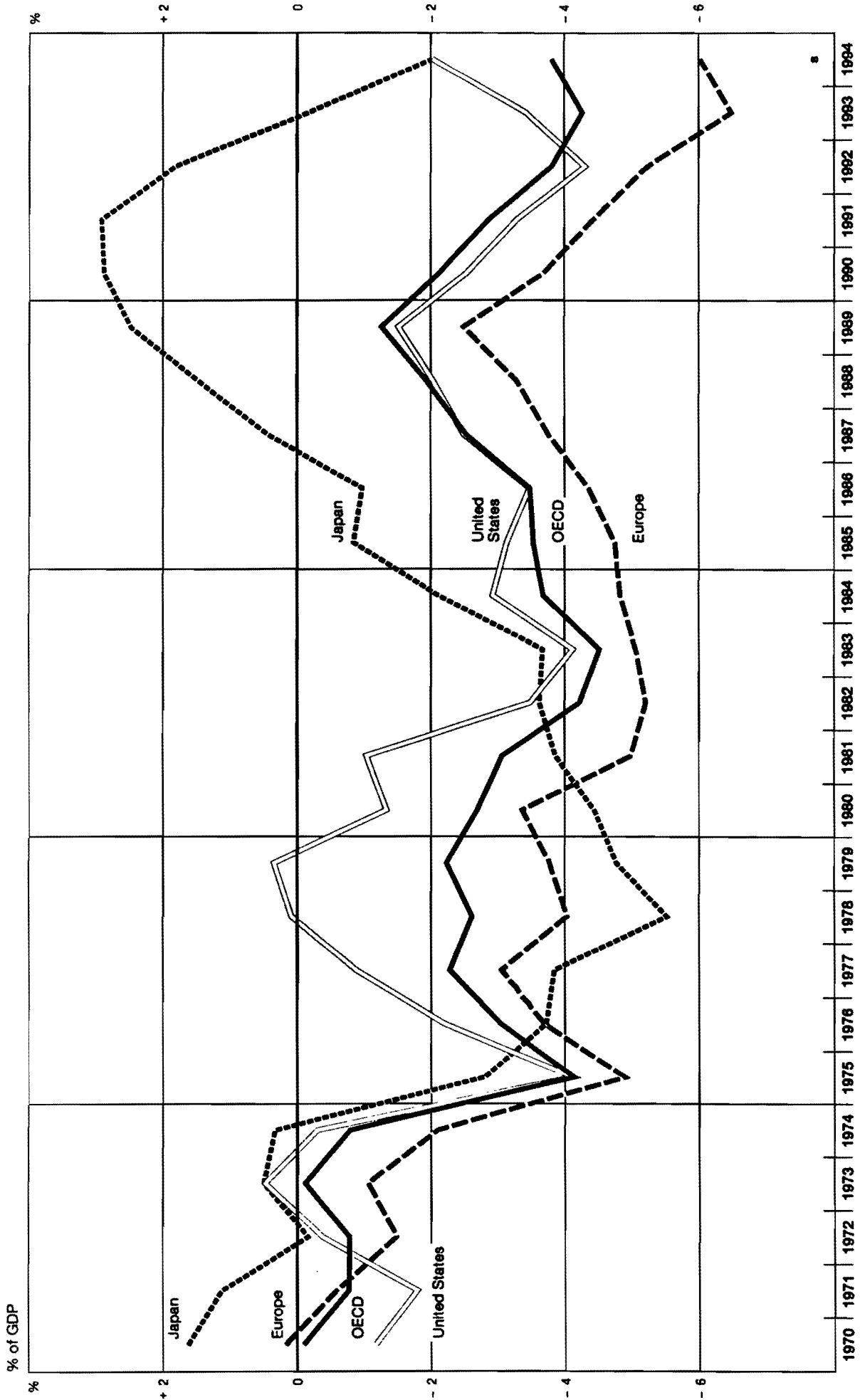
- the size of the built-in stabilisers,
- the size and thrust of the fiscal impulse,
- the significance of the structural financial balance.

International organisations (IMF, OECD, EU), in particular, have resorted regularly to such fiscal analyses and have recently revised them. Against the background of large budgetary gaps and a heavily increasing ratio of public sector debt in almost all western industrial countries (see figures 1 and 2), budget consolidation considerations have for some time strongly predominated over the use of financial balance concepts for traditional business cycle oriented analysis.

^{*)} I should like to thank especially Dr. Fecht, Dr. Tödter and Mr Neuhaus as well as my colleagues from the Bundesbank's Public Finance Division for their comprehensive assistance and valuable suggestions. The offices of the EU, the IMF and the OECD kindly made available their estimates of production potential.

Financial balances of the public sector in the OECD area *

Figure 1



* SNA basis; public authorities and social security funds. - Source: OECD (December 1994).

The resulting estimates of the size of the fiscal problem vary considerably.¹ The calculations of the OECD show a structural budget deficit (as defined in the national accounts) for Germany of 2.7 % of (potential) GDP in 1993 and of 2.1 % in 1994;² the European Commission, by contrast, puts the "hard" core of the deficit at 2.9 % and 2.3 % of GDP, respectively. According to the IMF, the structural budget gaps in these two years are put at 2.2 % and 1.2 % of (potential) GDP, respectively;³ the German Council of Economic Experts, on the other hand, gives figures in its most recent Annual Report 1994/95 (in the definition of the financial statistics) of 2.1 % and 1.7 % of GDP, respectively.⁴ Depending on which estimate is preferred, the structural deficit ratio is higher or lower by up to 0.8 percentage points and 1.1 percentage points, respectively. For other countries similarly "heterogeneous views" are found.

These disparate findings are all the more unfortunate as the budget criteria and reference values for the deficit ratio and the debt ratio laid down in the Maastricht Treaty on European Union have generated an additional demand for informative and comparable budget indicators. Although the criteria in the Treaty itself and in the relevant Protocol are defined in operational terms and have been given concrete shape in the ensuing secondary legislation, Article 104 c nevertheless leaves conspicuously ample room for interpreting these two convergence measures.⁵ A better evaluation of competing measuring concepts and of the statements and recommendations for fiscal policies based on them appears to be more urgent than ever before, especially in the second stage of EMU, which is the testing time and probation period for the candidates for monetary union.

The fact that the disaggregation of budget balances into various subcomponents is not an academic "valueless exercise" has recently been emphasised once again by the Economic Advisory Council at the Federal Ministry of Finance. The Council, for instance, considers that the non-cyclical part of the public sector deficit needs to be limited to a maximum of 1 % to 1.5 % of GDP if the Maastricht debt criterion is to be met.⁶ Revealingly, there are no indications whatsoever in the report as to how such an important calculation should be made with regard to its methodological basis and technical implementation or on which built-in stabilisers and on what scale it should be based.

¹ To ensure better comparability the following statements refer as far as possible to publications issued approximately at the same time.

² See OECD (1994), p. A33.

³ See IMF (1994), p. 40.

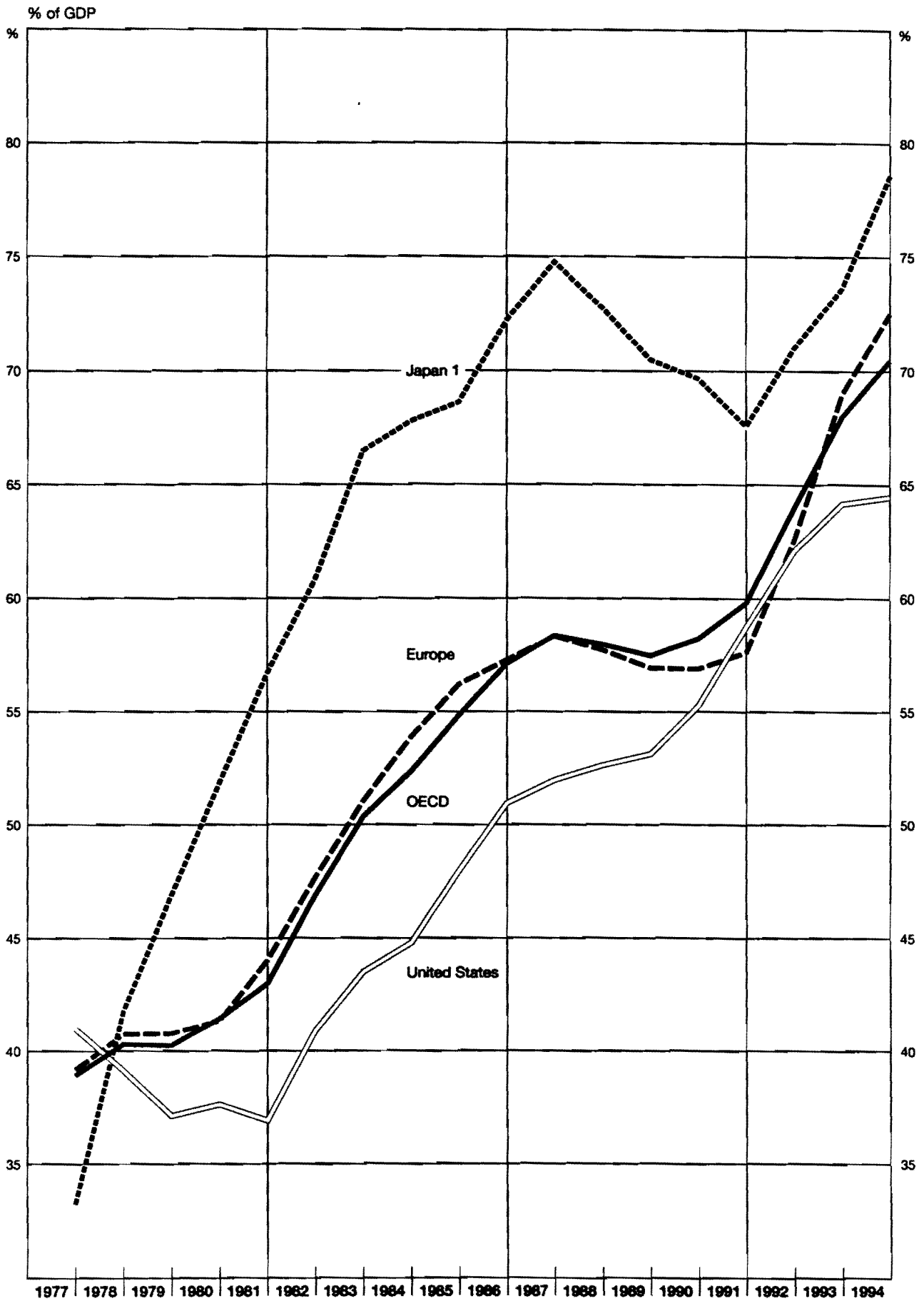
⁴ See Council of Economic Experts (1994/95), p. 156 f.

⁵ See also European Monetary Institute (1994), particularly pp. 52-54.

⁶ See Economic Advisory Council at the Federal Ministry of Finance (1994), p. 19.

Public debt ratios in the OECD area *

Figure 2



* So-called "gross financial liabilities" of the public authorities and social security funds on an SNA basis. End-of-year levels. - 1 In the overall public sector in Japan gross liabilities compare with relatively large financial assets.

In Germany itself budgetary concepts have traditionally been something of a cinderella as regards their practical application. The major economic research institutes have been noticeably reticent on the issue of financial balance concepts, while official fiscal policy makers have steered a "course of pragmatic argumentation". Whereas the Federal Minister of Finance declared before the German Bundestag: *"It is undisputed that Germany has a structural deficit, over and above the cyclical fluctuations, in the public budget of approximately 3 % of the gross domestic product"*,⁷ another source stated:

*"The disaggregation of the public sector deficit into a structural and a cyclical component is a subject of hot debate among the experts. The Federal Government has therefore showed restraint in the past in commenting on the results of the calculations and has never adopted any of the various theoretical concepts."*⁸

The almost total absence of theoretical input in Germany - it is essentially broken only by Council of Economic Experts - is in striking contrast to the "seller market situation" in a period of high public sector debt and the general call for (more) consolidation of the public sector budgets. The widespread exchange of opinions by means of implicit models "in the mind" is no substitute for a rigorously researched analysis resp. substantiation of debt policy action or non-action. Of course, anyone bold enough to *"... step out of the fog of nebulous non-commitment ... lays himself open to attack"*.⁹

Nevertheless: not least, more recent debt-theoretical contributions on the long-term effects of public sector debt under the labels fiscal sustainability, intertemporal budget constraint or primary budget gap, which further develop the underlying Domar model, make it once again worthwhile to deal with what has now become a classical research subject in public finance; linking the old and the new might be of some use, especially for medium-term budget projections.

7 Deutscher Bundestag (1993), p. 16452.

8 Reply by the Federal Government (1994), p. 3.

9 Krause-Junk (1983), p. 52.

II. Typology of balance concepts: "Drawing the line"

"Almost everybody talks about budget deficits. Almost everybody seems in principle to be against them. And almost no one, literally, knows what he is talking about."

Robert Eisner (1994)

Among fiscal indicators, budget balance concepts have always been very popular. The (budget) balance stands at the interface of the economic and the financial sphere; it is the central link between the goods and income circular flow, on the one hand, and the financial circular flow, on the other; it is both a flow and a change in stock variable. This prominent dual nature - located at the sources and uses level, on the one hand, and anchored in the financial and assets sphere, on the other - establishes a great number of interrelations and interlinkages. The "output of balances" is correspondingly large. In this context the question arises of which kind of real and/or financial transactions or which (re-) valuation and stock effects are to be recorded/measured by the balance as the most compressed expression of fiscal policy action. As a first step in all methodological-conceptual approaches, an initial decision has always to be made as to what raw material is to be entered "above the line" and what is to be recorded "below the line".

By way of example, this is illustrated for the Federal budget and the two most conventional statistical approaches. For the financial year 1993 the Federal Government's financial deficit as defined in the national accounts amounted to just over DM 56 ½ billion (see table 1); by contrast, the Federal Government's budgetary net borrowing (which comprises so-called financial transactions less seigniorage) came to about DM 66 billion, whereas actual net new borrowing on a cash basis in the credit market must be put at DM 79 billion (given refinancing needs of DM 70 billion) and the debt level of the Federal Government (excluding its special funds and the Treuhand agency) grew by about DM 74 billion. From the capital market's point of view borrowing was therefore DM 22 ½ billion higher than the deficit on the overall income and flow account. The cash balance of receipts and payments into or from the accounts maintained at the Deutsche Bundesbank, which is geared to the liquidity provision, amounted to roughly DM 62 billion in 1993.

A comparison between the official financial statistics and the national accounts for the public overall budget also sometimes indicates great differences between the financial balances (see figure 3). As an average over the past ten years, the deficit, as shown in the financial statistics, exceeded the national accounts balance by 2/3 % of GDP.

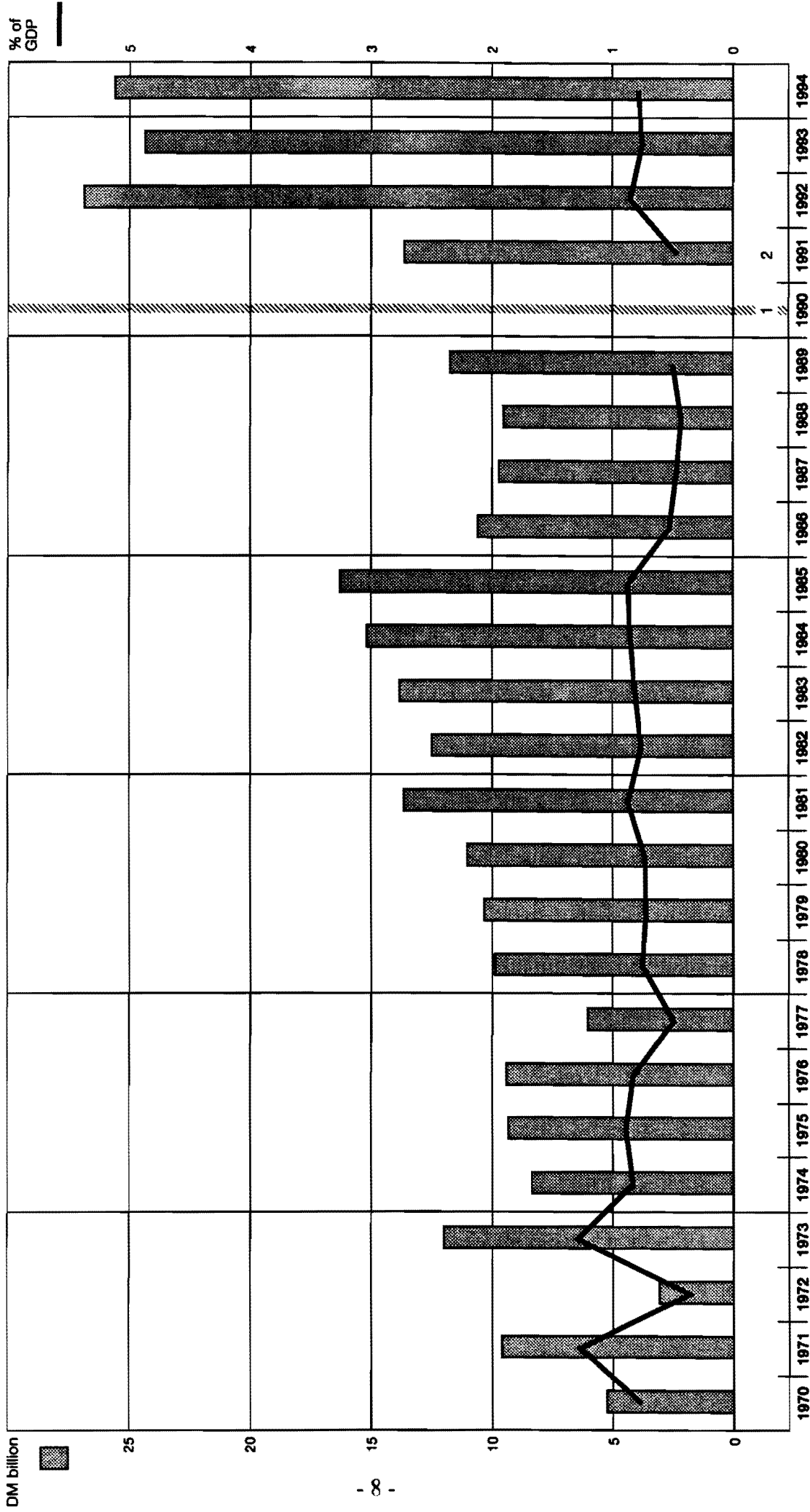
Table 1: Financial balances and debt of the Federal Government in the financial year 1993

- A comparison -

Item	Figures (rounded) in DM billion	Item	Figures (rounded) in DM billion	Item	Figures (rounded) in DM billion
Net borrowing according to the flow-of-funds account	n.a.	Financial deficit according to the financial statistics	66.9	Budgetary gross borrowing	130.3
- Financial asset acquisition according to the flow-of-funds account	n.a.	- Seigniorage from issuing coins	0.8	+ Interim financing	19.0
= Financial deficit according to the national accounts (excluding special funds)	56.7	- Balance of reserve movements and settlements relating to the previous year	-	= Gross borrowing for the calendar year	149.3
+ Lending	8.7	= Budgetary net borrowing	66.2	- Total redemptions	70.2
+ Net acquisition of participating interests	1.2	- Bundesbank profit over and above the budgeted amount	6.1	= Net borrowing in the credit market	79.1
+ Other items (phase shifts. 1) discrepancies in settlements, estimate deviations, etc. 2)	0.3	= Net borrowing to finance the budget	60.1	- Adjustment items 3)	5.1
= Financial deficit according to the financial statistics	66.9	+ Refinancing	64.2	= Change in debt level according to Bundesbank statistics	74.2
		- Redemptions from Bundesbank profit	6.1	Memo item	611.1
		= Budgetary gross borrowing	130.3	Debt level: end 1992	685.3
				end 1993 4)	
<p>1) Backdating mainly of wage tax and social security contributions; including discrepancy between the construction and settlement of buildings. - 2) Including deductions of debt takeovers some of which are booked in the national accounts as capital transfers made; including statistical residual discrepancies. - 3) Mainly cash advances, debt takeovers. - 4) Nominal value, excluding own holdings; the debt level of the public authorities according to the Bundesbank statistics serves as a base value for the transformation of government debt as defined in the Maastricht Treaty.</p>					

Discrepancies in the financial balances of the public sector * between the financial statistics and the national accounts

Figure 3



* Public authorities and social security funds. The figures show the difference between fiscal deficit according to the financial statistics and the deficit as defined in the national accounts. - 1 For 1990 no comparable figures are available due to German unification. - 2 As from 1991, Germany as a whole.

The two statistical concepts under review follow different objectives:¹⁰

The financial statistics, as the original system, are based directly on the plans and calculated results of the public budgets and therefore record which funds were actually spent on the performance of various public sector functions in a given period and how they were financed. The concept thus provides information on the fiscal policy plans and their implementation; at the same time, it shows a link - albeit only an imperfect one - with the public sector's actual recourse to the credit markets. The government account within the national accounts is embedded in overall economic flows and thus tries to record public transactions at the time they influence these flows. The public-sector payment flows must simultaneously be brought into line, in methodological and quantitative terms, with the counterentries under the other sectors which requires adjustments and the inclusion of fictitious transactions. Whereas the financial statistics are geared to the actual payment flows, the income aspect is emphasised in the general government account; the balance records the net result of real transactions and provides information on the extent of the change in net financial assets or net debt. Accordingly, financial transactions (granting or repayment of loans, acquisition or sales of participating interests) in the national accounts - unlike in the financial statistics - are transactions not affecting the balance, whereas the assumption of third-party debt is a capital transfer made and therefore an expenditure item which increases the deficit. In addition, the differing times at which transactions are recorded (for example in the case of tax receipts and in the settlement of public construction expenditure) play a significant role (so-called phase shifts).

In principle the two statistical concepts supplement each other. In practice, however, they often coexist without any link; now as before there is no (official) summarising reconciliation.¹¹

If in the following sections the database of the national accounts is taken as a basis, this does not mean that liquidity and capital market effects of public sector borrowing should be underestimated compared with the income effects. The method preferred here allows, firstly, a direct comparison with the budget accounts of international organisations; secondly, it conforms with the statistical concept for the deficit criterion prescribed in the Maastricht Treaty. Compared with the financial statistics which have recently again been preferred by the Council of Economic Experts,¹² the concept of the national accounts is definitely of equal quality even from the aspect of consolidation. Whereas the former are geared to the reduction in gross debt, the latter focuses on net debt (financial debt less

¹⁰ See also Arlt (1994).

¹¹ For internal purposes the Bundesbank has developed a reconciliation system of its own.

¹² See Council of Economic Experts (1994/95), pp. 151-158.

financial assets). The Maastricht Treaty is, however, inconsistent in this respect insofar as it links the national accounts deficit ratio to the gross debt ratio. Incidentally, by introducing gross fixed capital formation as a secondary criterion, there is a second inconsistency in the Treaty which cannot be justified in growth-policy terms and can at best be legitimated by practical considerations only.

As regards the institutional definition, it appears to be appropriate for purposes of overall economic analysis to combine the public authorities and social security funds (so-called general government sector).¹³ Aggregation conceals the fact, however, that the cyclical and structural risks are distributed very differently among the individual levels of government and budgets in the government sector.

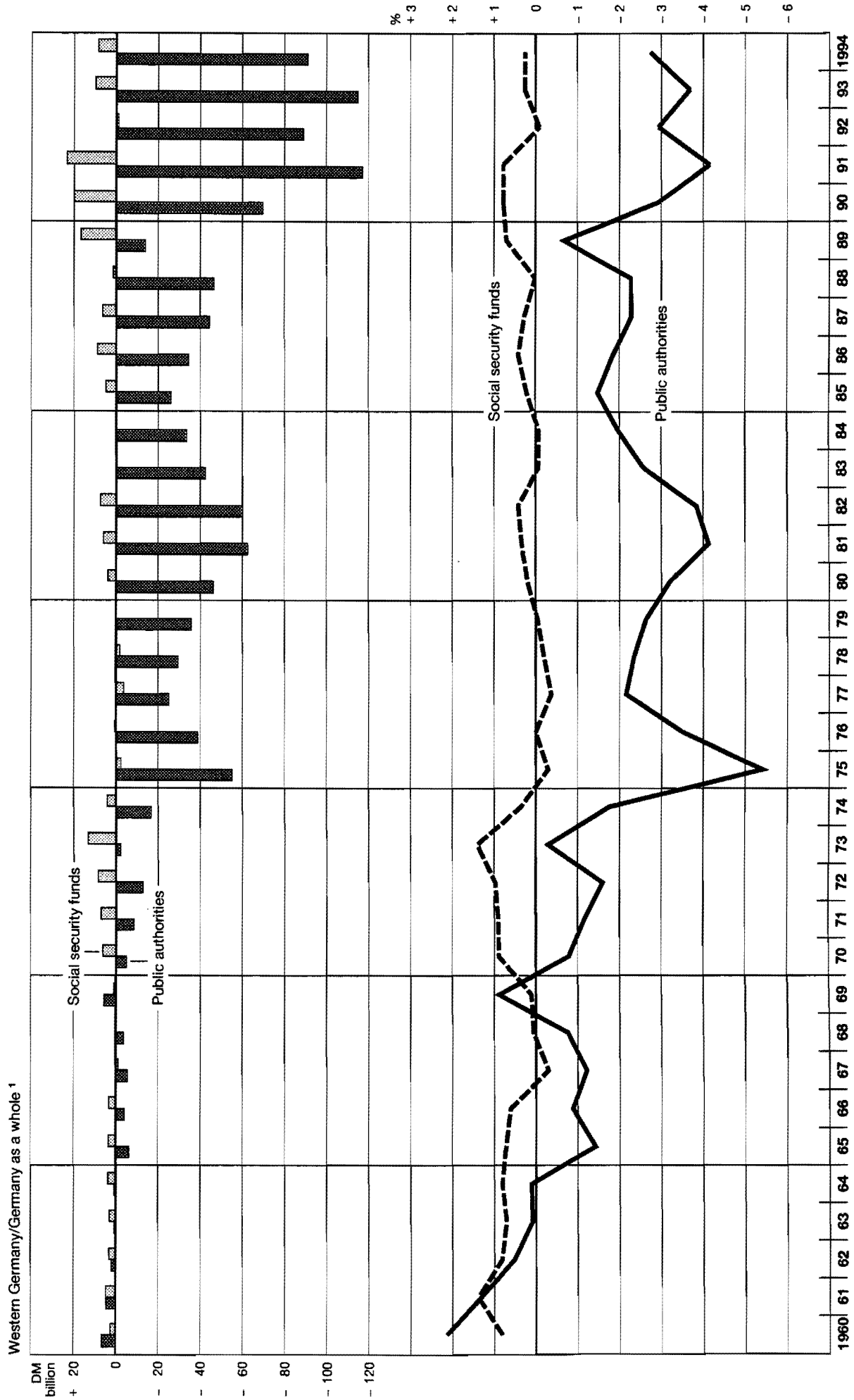
Within social security funds the margin of fluctuation of the financial balance is relatively limited from the outset and of an asymmetrical nature because of the design and construction principles applying to them (see also figure 4). The pay-as-you-go system which is typical of this large subsector of the public sector, according to which current expenditure is to be covered by current receipts, determines the basic financial rhythm. Budgetary financing via the credit market is legally prohibited - for good reasons; there is no systematic accumulation of assets - seen as a strategic reserve -, or else this accumulation is confined to insignificant exceptional areas (especially the supplementary pension scheme for government employees). It follows from this that situations of cyclical change are reflected only to a fairly limited extent in (direct) transactions relevant to the financial balance and the capital market. They are confined to the formation or release of reserves, most of which affect the short to medium-term maturity categories on account of the existing investment regulations. The main adjustment comes from the redefinition of the contribution rate (and supplementary reserve movements) or - as far as there is a cover guarantee by the Federal Government - from public cash grants.

In this context it should be noted that, in line with the statistical recording convention, the ultimate burden (in contrast to the payment obligation) of such cash grants is booked with the recipient as deficit reducing payments and - in contrast to the reserve movements - not as (separate) financial transactions. Thus neither the chronic financial deficit of the miners' pension insurance fund and the agricultural old age pension fund nor the sometimes sizeable liquidity assistance of the Federal Government for the Federal Labour Office are therefore reflected in the financial balances of the social security funds.

¹³ The central bank's "borrowing" from the private sector by the issue of demand debt in Tobin's sense is not attributed to public sector debt in the sections below because of the markedly differing quality of these debt instruments compared with the conventional forms of debt. The problems of shadow budgets and public special funds are not explicitly dealt with in detail; this would have to be taken into account by means of supplementary auxiliary calculations when assessing the measuring results.

Figure 4

Financial balances of the public authorities and the social security funds *



* As defined in the national accounts. -1 As from 1991, Germany as a whole.-

There is a second factor: the social security system as a whole normally shows financial surpluses; according to the annual accounts, moreover, it has sizeable financial assets at its disposal. Nevertheless its financial structure is by no means built on a solid base, above all owing to the demographic deterioration which is already apparent. This "structural" financial gap can as yet be recorded only rather roughly; there is a good deal of evidence suggesting, however, that the status quo will not be sustainable in the long run, at least not without high economic costs.

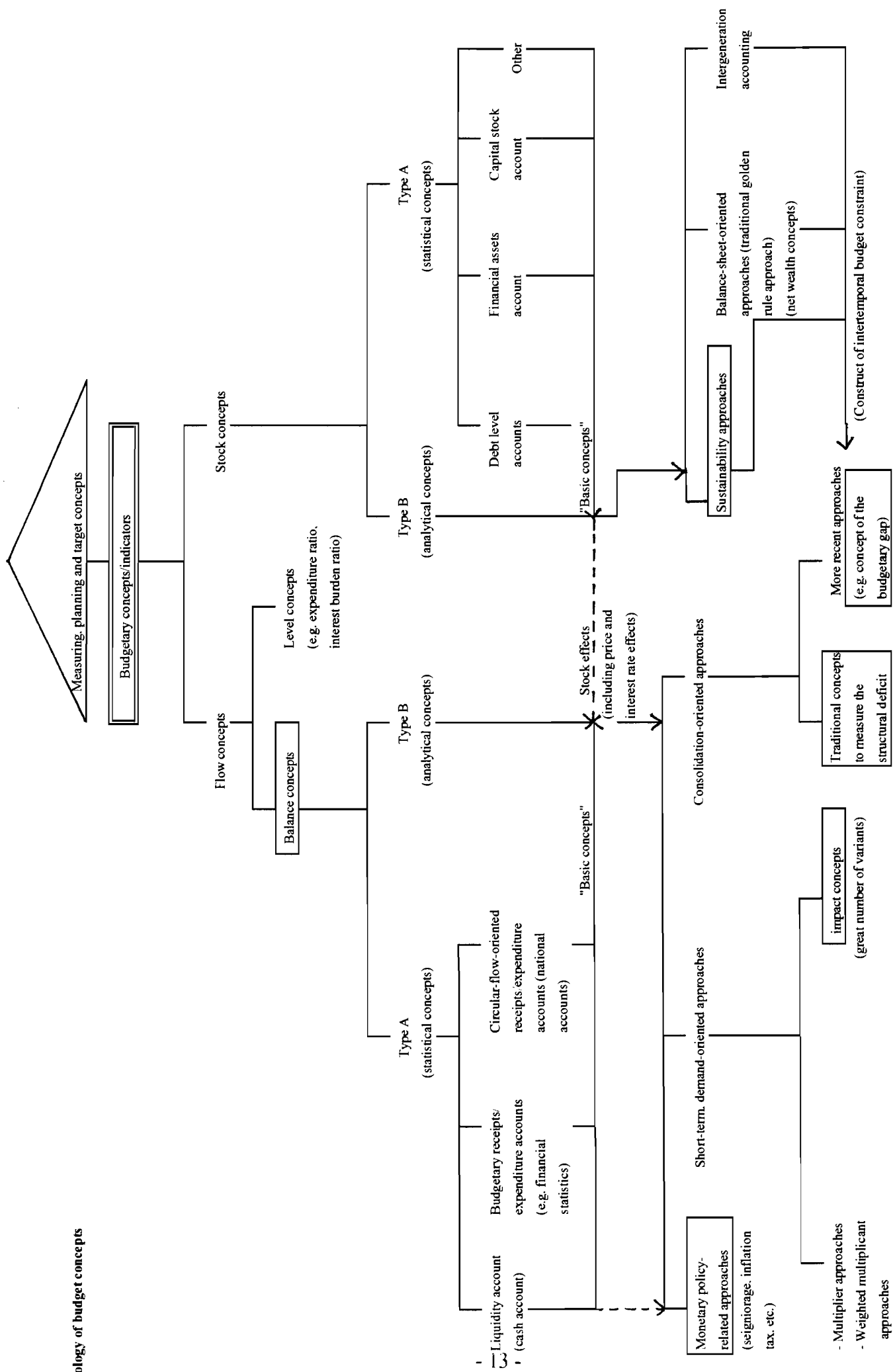
If the two aspects are taken together - the high permanent transfers to the social security funds¹⁴ and the growing future liabilities - the basic financial position of the social security system appears in a far less favourable light than is indicated by the conventional financial balances and the budget adjustment procedures, which will be examined in greater detail below.

In the meantime, with the so-called net wealth concepts and the approaches of intertemporal distribution calculations, a third generation of analytical balance concepts (in addition to the traditional fiscal impulse and structural deficit concepts) has been developed (see also the following classification of budget concepts). The unreliable and sometimes misleading deficit accounting is being replaced by intergeneration accounting; this subject deserves separate treatment, particularly as operational versions are still being developed.¹⁵

14 To the extent that the social security funds receive, via cash grants, only compensation for assuming non-insurance-related payments, these conclusions are to be modified. This applies mainly to the statutory pension insurance funds for wage and salary earners.

15 See Tietmeyer (1994) and the literature given there and, above all, Boll (1994).

Typology of budget concepts



III. Production potential and output gap: "Making the choice"

"... there is no escape from having to form an opinion about the level and growth rate of potential output."

Th.Mayer/J.Fels (1994)

1. Constructing the output gap

Estimates of production potential and the output gap derived from it provide the core of analytical fiscal balance concepts. To adjust the budget balance for cyclical influences - a major step on the road to deriving deficits requiring consolidation - requires a measure for the cyclical component. Empirical economic research normally uses a global ratio, namely the degree of overall capacity utilisation. The output gap is then only the complementary counterpart to the degree of overall capacity utilisation, defined as the relation between actual GDP and potential GDP (i.e. the production potential). If the degree of overall capacity utilisation (λ) is normalised at 100 %, a measured degree of utilisation of, for example, 95 %, would correspond to a (negative) output gap of 5 %. Generally the following applies:

$$(1) \quad \lambda = \frac{y}{y^*}$$

$$(2) \quad \text{gap} (y^*) = \frac{y - y^*}{y^*}$$

A useful approximation is:

$$(2') \quad \text{gap} (y^*) \approx \ln \lambda$$

The following applies to the change in the output gap:

$$\Delta \text{gap} (y^*) = \frac{g - g^*}{1 + g^*} \cdot \lambda$$

or approximately:

$$\Delta \text{gap} (y^*) \approx \Delta \ln \lambda$$

where g is the growth rate of real GDP and g^* the growth rate of real production potential.¹⁶

The following equation is likewise commonly used:

$$(2'') \quad gap(y^*) = \frac{y^* - y}{y^*}$$

Sometimes, the gap is also normalised with respect to GDP:

$$(3) \quad gap(y) = \frac{y - y^*}{y}$$

Whereas (2'') implies only a change in sign, compared with versions (2) and (2') preferred here, (3) involves a different base. Definition (3), however, can be easily transformed into (2):

$$(4) \quad gap(y^*) = gap(y) / [1 - gap(y)]$$

Generally the numerical difference between (2) and (3) does not have much of a bearing, especially when one considers the margin of error in the estimation of production potential.

The output gap is determined by a number of factors. If there are no severe supply shocks and the pace of structural change is not excessively high, it is mainly cyclical regularities which make themselves felt.¹⁷ The measured budget balance will then likewise fluctuate around a structural (or non-cyclical) core in line with the cyclical law of motion and the cyclical sensitivity of its partial components. If δ denotes the aggregated built-in flexibility of the overall budget, the actual deficit (in % of GDP), here denoted by b , can be subdivided into a structural part b^s and a cyclical component b^c :

¹⁶ As (1) shows, the degree of utilisation is independent of the price level only if, for the sake of simplicity, the same deflator is used for GDP and for the production potential - as is always done in such calculations.

¹⁷ The traditional assumption of a deterministic, trend-stationary model has recently been assessed critically. The degree to which fluctuations in real GDP are permanent or transitory and the trend in GDP contains elements of a random walk, and the extent to which the dichotomy between the trend and the cycle needs to be corrected by endogenous reinforcement mechanisms - as the new growth theory teaches - must remain open in the following.

$$(5) \quad b = b^S + b^C$$

$$(5') \quad b = b^S + \delta \cdot \text{gap}$$

from which follows:

$$(6) \quad \Delta b = \Delta b^S + \delta \cdot \Delta \text{gap}$$

The cyclical deficit is thus expressed as a linear function of the output gap.

Whereas in assessing the cyclical component of the fiscal impulse one could be satisfied or manage with the change in the cyclically adjusted financial balance compared with the previous year according to equation (6), the determination of the structural deficit requires a levels term.¹⁸ It is obvious that greater attention to consolidation requirements has also increased the demands on the quality of the yardstick measuring the degree of deviation from the aggregated goods market equilibrium.

2. Estimation results for production potential

Several theoretical concepts and empirical estimation methods can be used for the numerical determination of production potential or the output gap. In this paper recourse is taken to the production potential of the Deutsche Bundesbank which has long been used for analysing cyclical problems and for the derivation and review of the annual monetary target.¹⁹ Potential GDP is generally understood as the overall economic output which can be generated given the existing technology and the existing capital stock if the full-employment labour supply is utilised and the two factors labour (A) and capital (K) are used with normal intensity.

Overall economic output (Y) is based on the following CES function:

$$Y = C \times e^{\lambda} \left[a \times A^{\sigma} + (1 - a) \times K^{\sigma} \right]^{1/\sigma}$$

¹⁸ The indication of the trend would then give an idea of the pace and the success (failure) of the consolidation process.

¹⁹ The Bundesbank's estimate of the potential is being reviewed at present and extended to include eastern Germany. The results described here are therefore necessarily provisional. The following considerations are confined to western Germany.

In a multi-stage procedure the following values for the parameters were estimated:

Parameter	Designation	Estimate
r	Scale elasticity	1.11
σ	Substitution parameter	- 0.37
$1/(1-\sigma)$	Substitution elasticity	0.73
a	Distribution parameter for the factor labour	0.38
λ	Rate of technical progress	0.49 p.a.

Estimation period: 1971/I - 1994/I; enterprises excluding letting of dwellings.

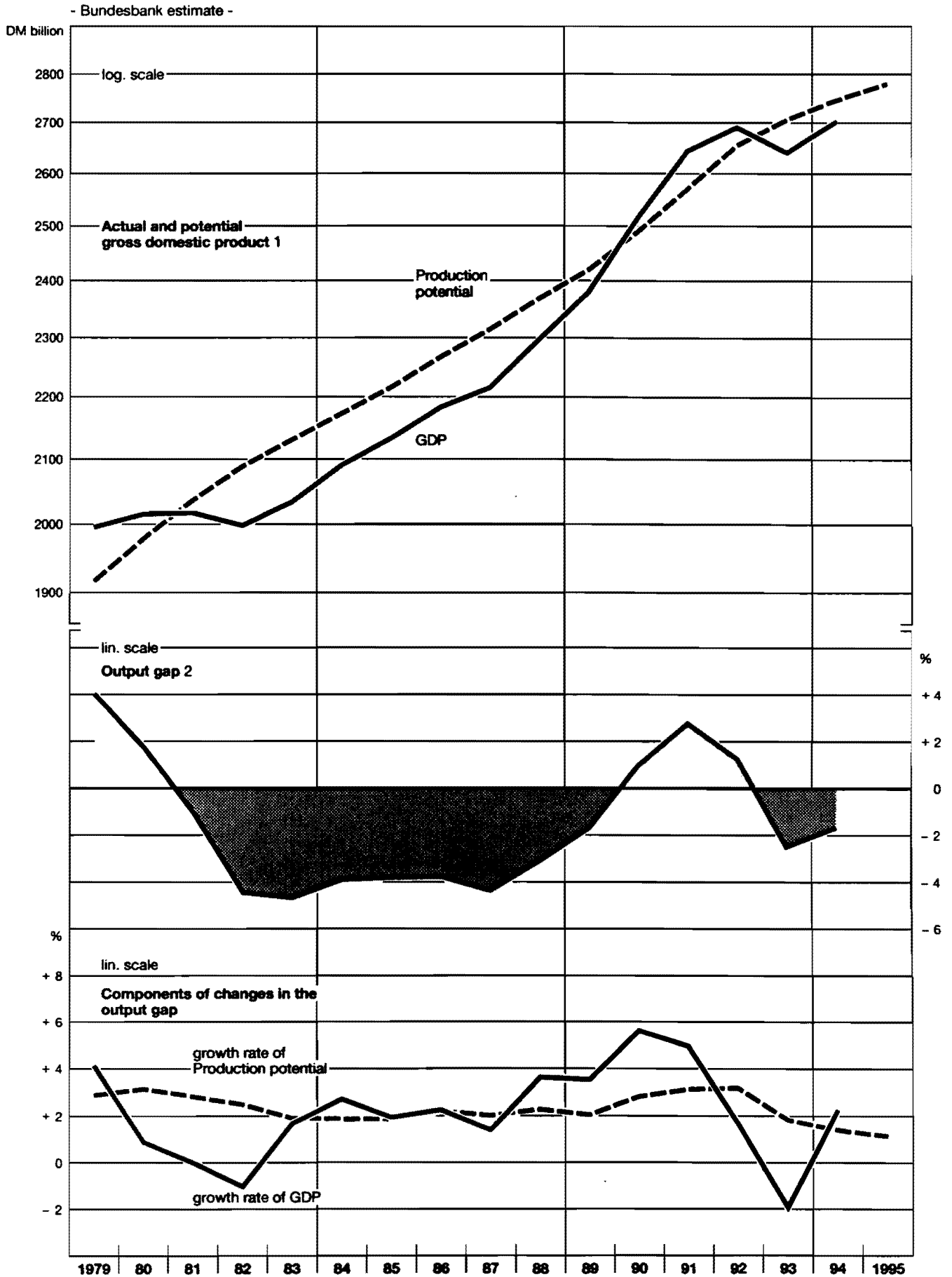
As can be seen from the adjacent graphical representation (figure 5), the Bundesbank's estimates of potential show considerable fluctuations in the degree of overall capacity utilisation (longer-term average about 3 ¼ percentage points). There are, however, some notable divergences from the theoretical "textbook ideal" of the economic cycle in respect of its length and amplitude. In all, the period from 1970 to 1994 comprises 2 ½ economic cycles in which the boom year 1970, with a (positive) output gap of 6 ½ %, marks the highest degree of utilisation so far, whereas the year 1983 shows the greatest negative output gap (- 4.5 %). It is striking that during the lengthy upswing which began in 1982 normal utilisation was regained only very late - a finding which is shared by alternative estimation methods.

Compared with the calculations of those institutions which traditionally publish adjusted financial balances for Germany (Council of Economic Experts, OECD, IMF, EU), there are significant estimation differences, too. From a methodological point of view production-theoretical approaches are now predominating, whereas until 1994 time-series-analytical approaches played an important role. For a long time the OECD relied on a log-linear trend approach, with constant growth rates for each economic cycle (so-called split time-trend method), but then it changed its calculation procedure to one using weighted moving averages according to the Hodrick-Prescott method (so-called HP filter).²⁰ Recently the estimates have been made on the basis of a two-factor output function of the Cobb-Douglas type (for the corporate sector). The HP filter is used as a smoothing technique for calculating the trend rate for total factor productivity (of currently 1 ¾ % p.a.). The potential labour supply, which is consistent with an inflation-

²⁰ See Giorno et al. (1995) and Barrell/Sefton (1995).

Capacity utilisation in Western Germany

Figure 5



1 At 1991 prices. - 2 % of production potential.

stable unemployment rate, is derived by the OECD from the estimated NAWRU (non-accelerating wage rate of unemployment); the figure currently obtained for Germany is 7 ¼ %.

A similar change in methods was made by the offices of the EU. Whereas until 1991 a log-linear trend approach and subsequently until 1994 the HP filter had been favoured, a CD function is now used as the theoretical basis. A special feature is that in the new EU approach total factor productivity is derived using the vintage idea for the capital stock which implies an embodied technical progress. An estimate of the natural full-employment rate is then determined via the NAIRU (non-accelerating inflation rate of unemployment) and a labour supply function.

The IMF approach is basically similar.²¹ Here, too, a stability-policy secondary criterion is included in the potential approach: "... *potential output represents the maximum level of output that can be sustained without generating an acceleration of prices*".²² The estimate itself is made on the basis of a conventional CD function with Hicks-neutral technical progress. The potential value added is derived from the variables of a standard degree of utilisation of the capital stock, an inflation-stable unemployment rate (NAIRU: about 6 ½ %) and the trend rate of technical progress. The HP filter is used as a smoothing method for the empirical figures of this "measure of our ignorance" and the labour supply. A specific feature is that the output elasticity for the factor labour is not estimated but predetermined by the functional distribution parameter wage ratio (at present: 0.6).

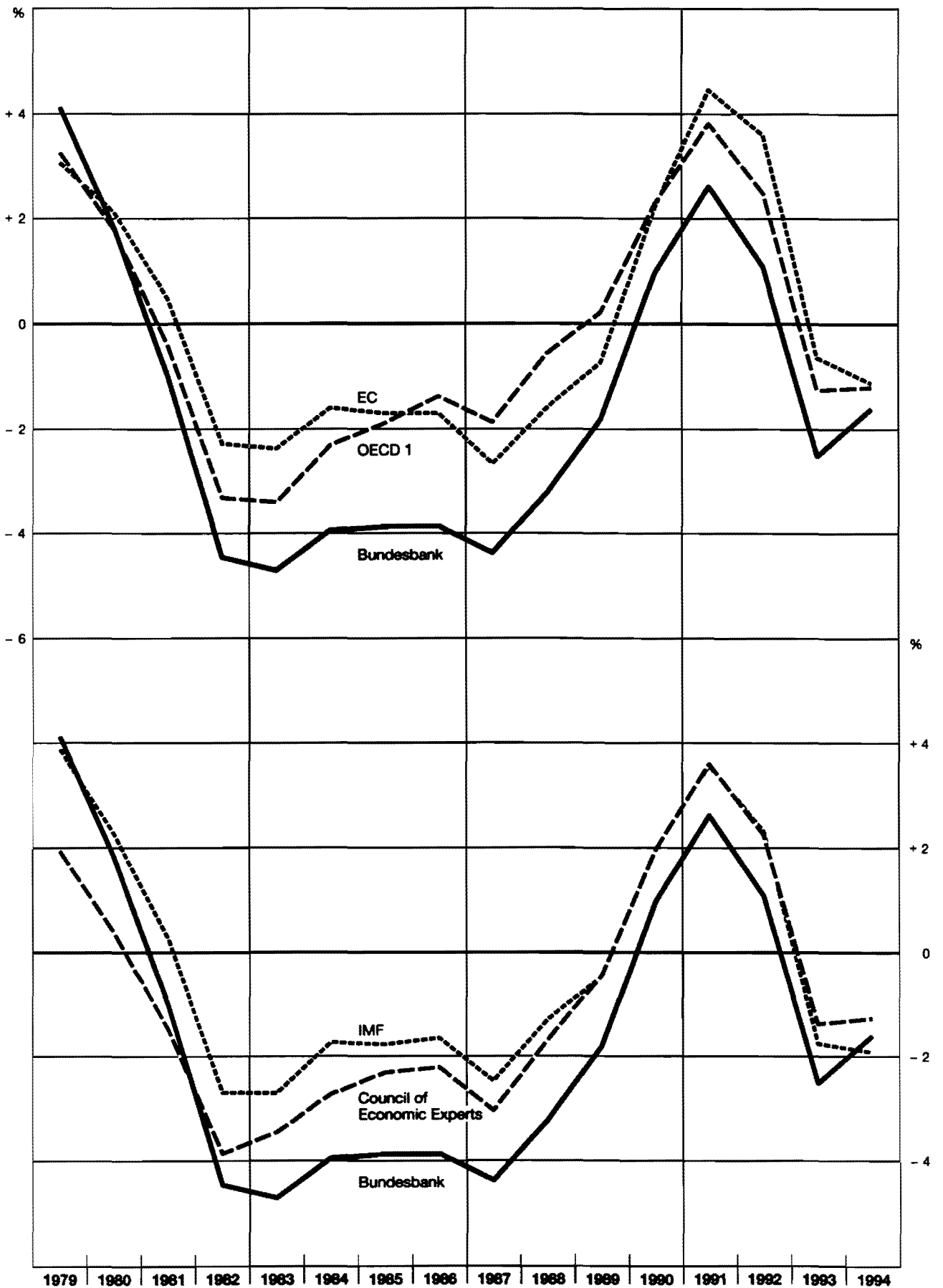
The Council of Economic Experts resorts to its capital stock-based one-factor approach in calculating the output gap, whereby the underlying tendency of the empirical capital productivity is estimated by means of a logarithmic trend function and the level is then revised upwards in a second step for determining the potential factor productivity.

If the potential estimates outlined above are compared with the Bundesbank approach no overly strong deviations are found at the current end of the series - as measured by the output gap (see figure 6 and table 2), although these, too, have a bearing on the result. Looking further back, however, substantial differences are apparent in some cases, particularly in the first half of the seventies and in the period from 1983 to 1987. It is remarkable that the output gap according to the Bundesbank approach has a greater "volatility" than in the other calculations whereas there is a high degree of consistency

21 The IMF is currently reviewing its estimate of potential for Germany. The results of the revision have not yet been published.

22 IMF (1991), p. 43.

Comparison of the output gap estimates
- Western Germany -



1 As from 1991, Germany as a whole.

Table 2: Estimates of the overall output gap

- A comparison -

Item	Bundesbank	Council of Economic Experts	IMF	OECD	EC
Regression approach					
Bundesbank production gap relative to ...					
- Coefficient/t-value) 1)	x	1.77 (3.79)	1.55 (1.98)	1.61 (2.51)	1.68 (3.16)
- R ² /(D.W.)	x	0.80 (0.5)	0.61 (0.18)	0.70 (0.28)	0.76 (0.5)
Spread					
- Maximum value/year	6.4 (1970)	3.6 (1991)	3.9 (1979)	3.9 (1991)	4.5 (1991)
- Minimum value/year	- 4.5 (1983)	- 4.0 (1975)	- 3.3 (1975)	- 3.5 (1975)	- 3.0 (1975)
Standard deviation					
1970 - 89	3.81	1.93	1.95	1.99	1.99
1970 - 79	2.13	1.84	1.89	1.86	1.89
1979 - 89	2.83	1.74	2.13	2.06	1.90
Output gap in periods of recession					
1981/82	- 2.62	- 2.64	- 1.18	- 1.84	- 0.88
1993/94	- 1.35	- 1.30	- 1.81	- 1.20	- 0.85
Output gap in periods of overutilisation					
1970/71	5.70	1.56	0.87	1.43	1.52
1978/79	3.56	1.09	2.98	2.32	2.00
1991/92	2.30	2.96	2.98	3.19	4.06

1) H (0): regression coefficient = 1 : period: 1970-89.

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between the alternative estimation methods as far as the cyclical turning points are concerned.

As a brief conclusion it can be said that a large part - and, as far as can be ascertained over a number of years, even the major part - of the differences in the calculations of the structural deficit are attributable to the methodological differences or differences in the estimation technique in determining the output gap.

IV. Determinants of the cyclical deficit

"... any automatic mechanism 'is set up by discretion. is abandoned by discretion and is interfered with by discretion' ..."

Paul A. Samuelson (1961)*

In the following sections, the cyclical deficit will be interpreted as a real economic phenomenon in the sense of the output gap - as described above; the price level and its changes are not (explicitly) considered. For the public sector the output gap has an influence in this context insofar as it causes an income and/or labour market gap. Any disequilibrium in the money market, which manifests itself in the so-called price gap,²³ is disregarded below because this is a monetary phenomenon - at least over the medium term.²⁴

Taking a conventional view and disregarding budgetary effects of temporary monetary disequilibria, the key term "cyclical" nevertheless requires a more precise definition. Here a grey area in terminological-methodological terms is encountered which permits one narrow and a number of broader definitions.

From the operational point of view, which has been given priority in this paper, a narrow variant is advisable. Only those receipts and expenditure variations are considered cyclical which respond automatically, so to speak, and directly to fluctuations in the degree of overall capacity utilisation (so-called passive flexibility of the budget). Discretionary action, even if it has a cyclical origin or motivation via the fiscal-policy response function, and behaviour determined by rules (for example, in the sense of

*Quoted in Blinder/Solow (1974), p. 38.

²³ See Issing/Tödter (1995) and Tödter/Reimers (1994).

²⁴ The price gap and the output gap as a rule show a negative correlation with the result that when taking an overall view (partly) compensatory effects on the budget balance are to be expected. An explicit inclusion of the price gap would be worth considering. It will therefore be left to a later study to determine to what extent this idea can be included conceptually in the calculations of the structural deficit.

formula flexibility) are excluded by definition. A number of fiscally relevant transactions with a cyclical background are no doubt excluded with this approach. If public investment is increased procyclically, for example, as a result of a cyclically favourable cash position, or if interest expenditure rises less sharply owing to a decrease in the cyclical primary balance, and if the classical wage substitutes are replaced by active labour market policy measures in response to the increasing hysteresis on the labour market, a "cyclical core" can always be identified. However, once one departs from the narrow "zone of passive budget flexibility", it is extremely difficult to reach the safe shore of an alternative, clearly defined operational concept.

1. Direct fiscal costs on the expenditure side

1.1 *Derivation of the Okun approach*

Situations of cyclical change have a considerable influence on the intensity, duration and extent of the labour input. The degree of correlation between fluctuations in output and employment is determined by the (expected) cost of adjustment in terms of intensity, time and quantity to changed sales positions and by the concrete institutional conditions in the regulating network of the labour market and the framework of the social security system (see the schematic representation).

An approach developed by Arthur M. Okun has proved useful for empirically examining the relationship between goods and labour markets.²⁵ This concerns the *ex post* regularity found in the early sixties for the United States according to which an output gap is less than proportionally manifested in a labour market gap. As a rule of thumb Okun at the time determined a "multiplier value" of three which under the conditions then prevailing was interpreted as follows: "*... each extra percentage point in the unemployment rate above 4 percent has been associated with about a 3 percent decrement in real GNP.*"²⁶

"Okun's law", interpreted in demand-theoretical terms, provides a quantitative idea of the average sensitivity of the unemployment rate to fluctuations in output. This can be easily demonstrated by means of the following short-term output function:

$$(1) \quad Y = A_x e^{\delta t} x E^{\beta}$$

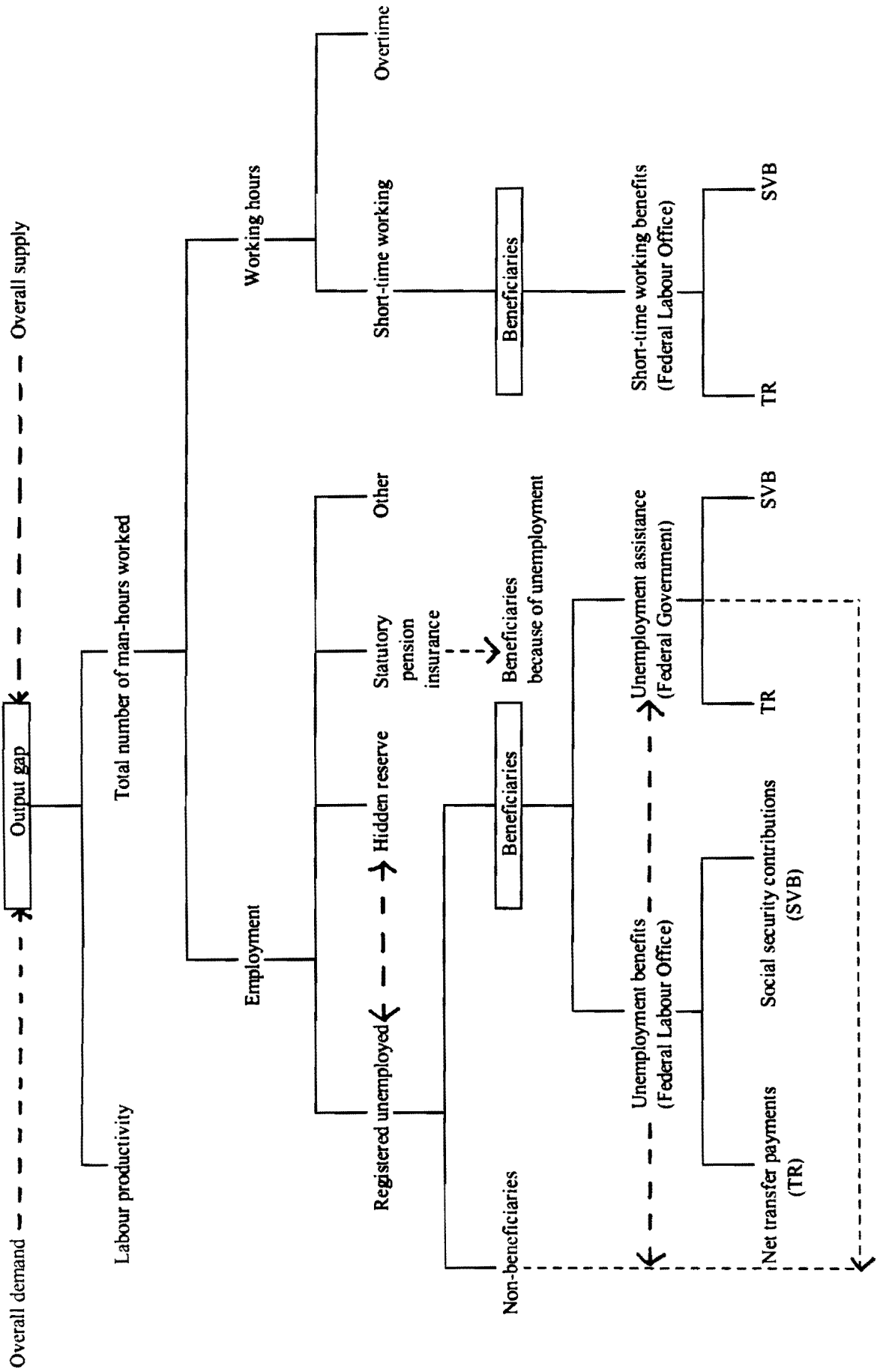
where

²⁵ See, for instance, Gordon (1984) and Cantor/Wenninger (1987).

²⁶ Okun (1962), reprinted in *ibid* (1970), p. 195.

Additional/lower expenditure due to cyclical under-/overemployment

- Schematic representation -



- Y = output
- A = levels parameter
- δ = rate of technical progress
- E = employment
- β = output elasticity of the factor labour

In logarithms, this gives::

$$\ln Y - \ln Y^* = \beta (\ln E - \ln E^*)$$

The following approximation holds for the unemployment rate (u):

$$u \approx \ln E^* - \ln E$$

An econometrically estimatable, rather neat formula for the cyclical relationship between the unemployment rate and overall economic developments is obtained if the unemployment rate given under conditions of full employment is regarded over the short term as a largely predetermined variable and potential growth is considered to be approximately stable. Under these (somewhat simplifying) assumptions the basic equation of the Okun approach is obtained in the usual difference form:

$(2) \quad \Delta \ln Y = a - \beta \Delta u$

Equation (2) postulates a linear functional correlation between the change in the unemployment rate and the growth rate of real GDP. A deceleration or acceleration of the growth of production potential is reflected in the shift parameter (a), whereas the cyclical component works through to the labour market in accordance with the inverse Okun multiplier ($1/\beta$).

Owing to the assumed invertibility of the output function the reciprocal output elasticity can be interpreted as a measure of the cyclical sensitivity of the labour market. The value ($-1/\beta$) provides information on the number of percentage points by which the unemployment rate is changed by a variation of 1 percentage point in the degree of utilisation of overall economic production potential.

1.2 *Empirical results and interpretation*

In the empirical examination of the Okun relation for the period from 1960 to 1994 it was important to bear in mind that potential growth in Germany basically decelerated during the early seventies owing to the deterioration in supply-side conditions which started at that time. Nor can the cyclical sensitivity of the labour market be considered a priori to be invariable over the longer term. It seems likely that the cyclical response pattern of the labour market has not remained constant owing to the increasing tertiarisation of the economy, the change in labour market regulations (including working time) and the sharp increase in active labour market policy measures. The estimated variants of the above basic equation support these hypotheses of a break in the trend.²⁷

For the period from 1960/I to 1994/IV the following statistically reliable correlation resulted for western Germany:

Subperiod 1960-73:

$$(3) \quad \Delta \ln Y_t = 4,6 - 3,6 \Delta u$$

Subperiod 1974-94:

$$(4) \quad \Delta \ln Y_t = 2,7 - 1,6 \Delta u$$

A comparison between (3) and (4) shows the marked deterioration of the growth performance in the shift variables. More important, however, is the value of the Okun multiplier. Whereas until 1973 a change in the degree of overall capacity utilisation of 1 percentage point was on average associated with a countermovement of the unemployment rate of nearly 0.3 percentage point (1/3.6), the response parameter in the ensuing period must be put about twice as high. The phenomenon of structural unemployment, which has grown in several surges during the past two decades, remains, of course, unaffected from these findings.

As a result of a new estimate of the Okun coefficient, the EU has recently revised its previous estimate of about 2.3 down to roughly 1.9. The response parameter for the labour market derived from this accordingly amounts to 0.44 or 0.52 (see table 3). By contrast, the OECD currently uses a parameter value of 3.3 or 0.3 in its calculations. In an older study for the period from 1963 to 1988 Chouraqui ascertained a coefficient of almost 2.2 or 0.46 using annual data.

²⁷ Schalk (1991) arrives at similar results.

Table 3: Cyclical sensitivity of public sector expenditure in alternative estimates

Institution	Output gap (1993)	Reaction parameter labour market 1)	Built-in stabiliser 2)	Cyclical additional expenditure as % of GDP 3)
<i>EC</i>				
- old	- 0.6	0.44	0.24	0.06
- new 4)	- 0.6	0.52	0.13	0.04
<i>OECD</i>	- 1.22	5) 0.30	0.2	0.07
<i>Council of Economic Experts</i>	- 1.35	n.a.	n.a.	0.35
<i>IMF</i>	- 1.72	n.a.	n.a.	n.a.
<i>G. Z.</i>	- 1.85	0.63	0.17	0.20

1) Change in the unemployment rate in percentage points as a result of an apposite change in the degree of utilisation of production potential of 1 percentage point.
2) Change in public sector expenditure as % of GDP as a result of a change in the unemployment rate of 1 percentage point.
3) New estimate 1995.
4) GDP for Germany as a whole.
5) Chouraqui et al. (1990): 0.46.

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Despite being point estimates, they can only serve as a rough benchmark for the cyclical sensitivity of the labour market. They are both based on the assumption of linearity and symmetry with regard to the cyclical starting position and the dynamics of economic developments. If in view of such "warning signs" a response parameter of just over ½ percentage point is assumed, this enables us to determine more closely the budgetary implications of the cyclically-induced labour market effects on the expenditure side of public sector budgets, as will be shown below.

1.3 *Transfer payments in the case of underemployment*

Apart from by the output gap and the (inverse) Okun coefficient the strength of the cyclical variations of public expenditure is determined by the construction principles of the transfer system with respect to the eligibility conditions and by the magnitude and duration of wage substitute payments. Owing to the repeated important interventions in the Labour Promotion Act, a "structuralised" approach is preferred below to the usual econometric estimation procedures. The structuralised approach uses additional information and has more analytical interpretative power. Temporary influences as reflected, for instance, in the composition of unemployed persons or the structure of beneficiaries can in this way be better distinguished from changes in the system due to discretionary measures.

The centre-piece is the statistics of current transfers compiled by the Federal Labour Office, as can be seen in a compressed form from table 4. It is found that the number of unemployed and the corresponding time trend is by no means identical to the number of beneficiaries. A (variable) portion of the unemployed does not meet the legal conditions for obtaining wage substitutes, either because the specified period of work experience required for claiming unemployment benefits has not been reached or because the means test for unemployment assistance produces a negative result (particularly often the case with double-income households). Because of the maximum period of entitlement to unemployment benefits, which is scaled according to age and the length of the previous period of employment, "less costly" unemployment assistance (and possibly social assistance) is often paid instead of the "more expensive" unemployment benefits for longer-term unemployment.

The average benefit rate per unemployed person, which was just over DM 18.500 in 1994, reflects these changes in the structural component as well as the adjustments in the "pure" price component. The latter result from the periodic adjustment of wage substitute payments in accordance with the previous trend in wages (dynamic factor) and

Table 4: Beneficiaries and unemployment relief

- Western Germany -

Year	Unemployed (annual average) Thousands	Beneficiaries as % of unemployed		Payment rate per beneficiary - gross - 1) per month in Deutsche Mark			Memo item Payment rate per unemployed as % of average remuneration 2)
		Unemployment benefits	Unemployment assistance	Unemployment benefits	Unemployment assistance	Average payment rate	
1970	148.9	64.3	11.5	566	351	534	30.0
1971	185.1	65.1	8.3	600	406	578	28.2
1972	246.5	63.7	8.2	682	472	658	28.6
1973	273.5	56.2	8.3	756	525	726	25.4
1974	582.5	60.4	6.9	842	628	820	26.8
1975	1,074.2	65.8	10.3	916	740	892	30.8
1976	1,060.4	58.0	15.5	935	781	903	28.0
1977	1,030.0	54.1	15.9	940	813	911	25.3
1978	993.0	52.0	15.8	1,012	879	981	25.0
1979	876.2	51.2	15.3	1,388	1,228	1,351	31.9
1980	888.9	51.1	13.7	1,488	1,304	1,449	31.2
1981	1,271.6	54.9	13.3	1,588	1,400	1,551	33.5
1982	1,833.3	50.5	15.9	1,622	1,438	1,578	31.8
1983	2,258.3	44.9	21.5	1,405	1,223	1,346	26.2
1984	2,265.6	37.9	26.4	1,372	1,215	1,308	23.8
1985	2,304.0	36.3	26.8	1,405	1,232	1,331	23.1
1986	2,228.0	35.9	27.0	1,465	1,270	1,382	23.1
1987	2,228.8	37.4	25.9	1,528	1,304	1,436	23.4
1988	2,241.6	42.2	23.6	1,589	1,332	1,497	24.6
1989	2,037.8	43.6	24.4	1,649	1,379	1,552	25.6
1990	1,883.2	45.5	23.0	1,768	1,461	1,665	26.5
1991	1,689.4	46.1	23.1	1,828	1,463	1,706	26.0
1992	1,808.3	49.8	22.8	1,959	1,541	1,823	27.4
1993	2,270.4	55.8	23.0	2,110	1,644	1,973	31.1
1994	2,556.0	52.8	24.5	2,167	1,646	2,001	30.1

1) Including social security contributions; rounded figures.

2) Average expenditure on wage substitutes per unemployed as % of average gross income per employee.

from the fiscal-policy amendments to material transfer law as were made in 1978/79, 1983 and 1994, in particular (discretionary factor).

Combining the statistically determined average benefit rate with the estimate for cyclical unemployment, derived from the Okun approach in conjunction with the output gap, enables us to obtain a numerical benchmark value for the extent of direct additional or lower expenditure on wage substitutes caused by fluctuations in the degree of overall capacity utilisation (see table 5). For comparison and control purposes, a simple regression equation was also estimated (see figure 7). Calculated as a long-term average, a change in the unemployment rate of 1 percentage point results in an increase/decrease in wage substitute payments of 0.17 % of GDP. According to the structuralised approach, the built-in stabiliser is not likely to average more than 0.20 % of GDP. Table 3 also provides information on the cyclical sensitivity of public sector expenditure in several budget concepts. According to the table the response parameter on the expenditure side (calculated per percentage point of the unemployment rate) lies within a margin of 0.13 to 0.24 % of GDP. In general - and this is confirmed by the calculations presented here - the cyclical sensitivity of public sector expenditure (in the sense of passive budget flexibility) can be regarded as fairly small in an overall economic context.

Under the simplifying assumption of a constant beneficiary ratio and a constant cost rate per beneficiary, expenditure by the Federal Labour Office (or the Federal Government) develops proportionately to the number of unemployed.

As a "rule of thumb" the following formula provides a quantitative guideline:

$$\Delta e \approx - \underbrace{e/u}_{\text{I.}} \times \underbrace{1/\beta}_{\text{II.}} \times \text{gap}$$

I.

II.

Table 5: Calculation of direct additional expenditure related to unemployment

- Western Germany -

Year	Cyclical unemployment Thousands	Average payment rate per unemployed 1) - annual basis, Deutsche Mark -			Additional/ lower expendi- ture on wage substitutes 2)	Memo item	
		Total	Net transfers	Social security contributions		DM billion	Share of total wage substitutes in public sector expenditure
1970	- 401	4,852	4,098	754	- 2.4	0.28	39.58
1971	- 320	5,099	4,355	744	- 2.0	0.34	41.08
1972	- 325	5,673	4,700	973	- 2.1	0.49	41.90
1973	- 365	5,633	4,694	940	- 2.5	0.41	42.61
1974	- 379	6,620	5,404	1,216	- 2.3	1.01	45.74
1975	135	8,144	6,437	1,708	2.8	2.13	50.12
1976	- 326	7,972	6,095	1,877	- 2.1	1.71	49.25
1977	- 401	7,656	5,862	1,794	- 3.0	1.44	49.23
1978	- 443	7,990	6,096	1,894	- 3.4	1.36	48.81
1979	- 642	10,775	6,360	4,415	- 7.1	1.44	48.67
1980	- 290	11,264	6,606	4,657	- 3.3	1.44	49.48
1981	157	12,696	7,508	5,188	2.8	2.26	50.34
1982	682	12,568	7,438	5,131	10.3	3.15	50.55
1983	719	10,728	7,243	3,486	10.3	3.32	49.36
1984	602	10,080	6,802	3,278	7.4	2.88	48.88
1985	607	10,066	6,714	3,353	6.8	2.77	48.41
1986	599	10,405	6,865	3,540	6.6	2.62	47.77
1987	701	10,895	7,180	3,714	8.4	2.67	48.09
1988	478	11,816	7,721	4,096	6.1	2.75	47.67
1989	236	12,639	8,264	4,375	2.9	2.55	46.17
1990	- 200	13,714	9,053	4,661	- 3.0	2.31	46.44
1991	- 511	14,230	9,539	4,691	- 7.3	1.88	48.97
1992	- 290	15,907	10,667	5,240	- 4.2	2.14	48.80
1993	325	18,672	12,426	6,246	8.9	3.13	49.83
1994	150	18,568	12,013	6,555	3.9	3.28	48.64

1) Rounded figures; payments for unemployment benefits and unemployment assistance weighted by the number of beneficiaries, relative to the total number of registered unemployed on an annual average.

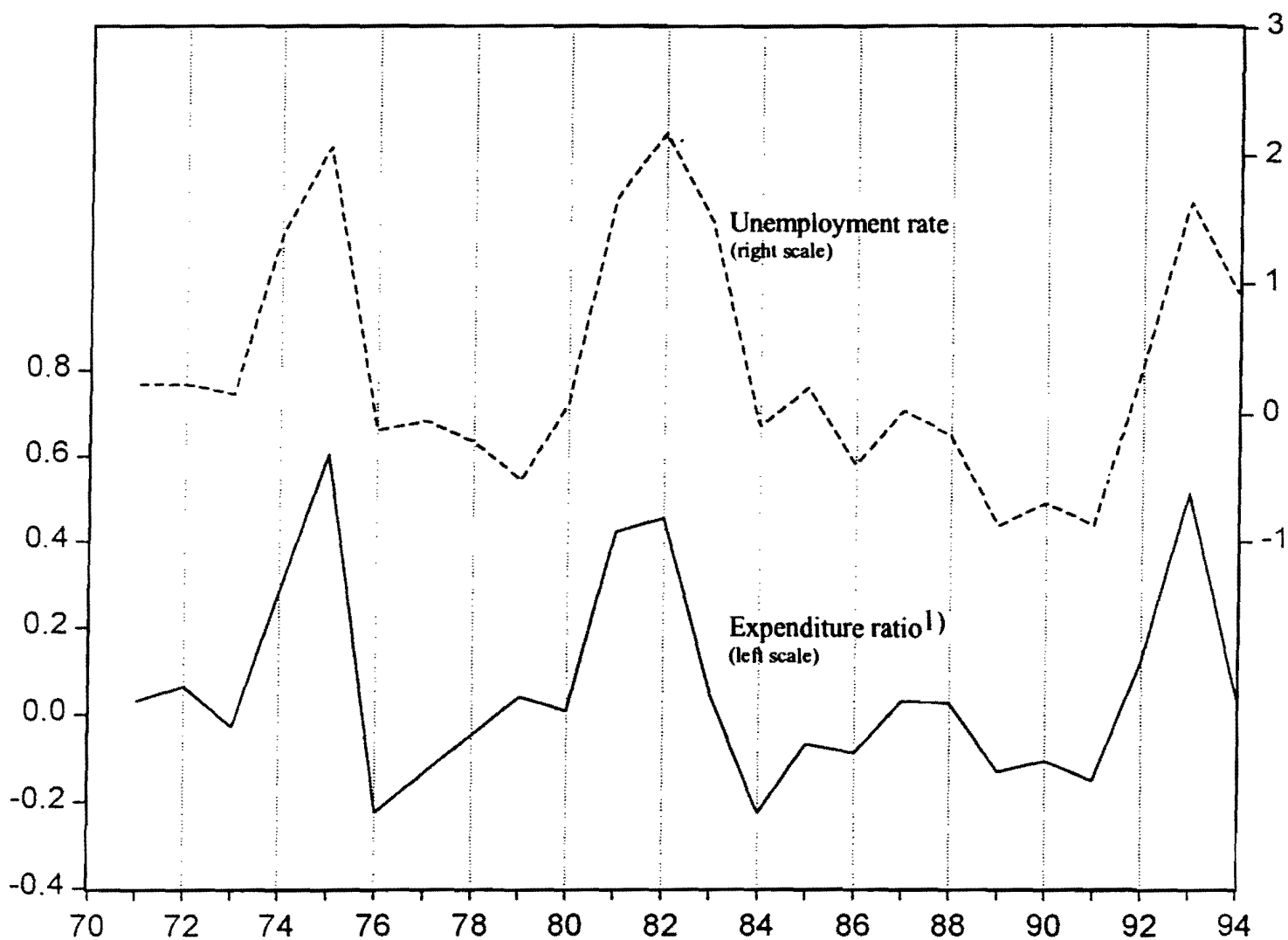
2) Unemployment benefits, unemployment assistance, short-time working benefits.

3) Expenditure of the public authorities and social security funds as % of nominal GDP.

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Figure 7

**Expenditure ratio for wage substitutes
and unemployment rate
- Change in percentage points -**



1) Unemployment benefits, unemployment assistance, short-time working benefits as % of GDP.

$\Delta(A/Y)_t = -0,001 + 0,27\Delta u_t - 0,10\Delta u_{t-1}$		
(0,07)	(11,2)	(4,1)
R ²	: 0,85	
D.W.	: 2,28	

where:

e	=	wage substitutes as % of GDP
Δe	=	change in the expenditure ratio in percentage points
u	=	unemployment rate
β	=	Okun multiplier
gap	=	output gap

Term I expresses the extent to which the expenditure ratio changes as a result of an increase or decrease in the unemployment rate of 1 percentage point. Term II reflects the response of the labour market (expressed in percentage points of the unemployment rate) as a result of a real disequilibrium (as measured by the output gap). If the government, for example, spent 2 % of GDP on unemployment relief, and given an unemployment rate of 8 % and a response parameter of $\frac{1}{2}$, the cyclical additional expenditure associated with a (negative) output gap of 3 % would amount to approximately near to 0.4 % of GDP.

2. Built-in flexibility of the tax system

2.1 *Adjustment of social security contributions*

For the cyclical adjustment of public revenue, a procedure analogous to that used for the expenditure side was selected for social security contributions. The drop or rise in revenue was derived from the difference between average gross wages and salaries per employee and the wage substitute. It needs to be borne in mind in this context that the individuals affected by unemployment, as a rule, previously drew a gross income below the statistical average, which reflects the fact that the risk of losing one's job is generally higher in the lower income groups. A reduction of 15 % of average gross income was assumed as a long-term empirical value. It was also necessary to take into account that some shortfalls in contributions, in particular, to the pension insurance scheme and to the statutory health insurance institutions, are reimbursed by the Federal Labour Office (see table 6). Whereas the wage substitute, derived from standardised net earnings, has been used as the assessment basis for the pension insurance scheme since 1983,²⁸ contributions to the statutory health insurance institutions are made on the basis of the gross income last drawn. The statutory pension insurance funds have thus so far been hit roughly twice as hard by unemployment as the collective health insurance system. The Federal Labour Office, however, feels the full impact of shortfalls in contributions.

²⁸ From the start of 1995 the pension insurance contribution for recipients of wage substitutes has been calculated on the basis of 80 % of the last gross income drawn.

Table 6: Cyclical additional/lower receipts of the social security funds

Period	Total gross wages and salaries per employee	Contribution rate (annual average) to social security funds 1)	Additional/lower receipts (balance) 2) per unemployed	Cyclical unemployment		Additional/lower receipts (-) (balance)
	DM/year	%	DM/year	Thousands		DM billion
1970	13,831	26.6	2,373	-	401	1.0
1971	15,399	26.5	2,725	-	320	0.9
1972	16,778	27.1	2,892	-	325	0.9
1973	18,626	28.9	3,635	-	365	1.3
1974	20,653	29.2	3,910	-	379	1.5
1975	21,931	30.4	3,959		135	- 0.5
1976	23,429	32.5	4,595	-	326	1.5
1977	25,019	32.5	5,117	-	401	2.1
1978	26,336	32.6	5,404	-	443	2.4
1979	27,821	32.4	3,247	-	642	2.1
1980	29,674	32.4	3,515	-	290	1.0
1981	31,107	33.3	3,617		157	- 0.6
1982	32,332	34.0	4,213		682	- 2.9
1983	33,354	34.6	6,312		719	- 4.5
1984	34,361	34.5	6,798		602	- 4.1
1985	35,361	35.0	7,173		607	- 4.4
1986	36,631	35.4	7,482		599	- 4.5
1987	37,784	35.6	7,719		701	- 5.4
1988	38,918	35.9	7,780		478	- 3.7
1989	40,086	35.9	7,857		236	- 1.9
1990	41,980	35.5	8,006	-	200	1.6
1991	44,520	36.3	9,055	-	511	4.6
1992	47,060	36.6	9,400	-	290	2.7
1993	48,421	37.4	9,147		325	- 3.0
1994	49,256	38.9	9,731		150	- 1.5

1) Employees' and employers' shares.

2) On the basis of revised average total gross wages and salaries and taking account of social security contributions paid by the Federal Labour Office.

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2.2 Tax elasticities: Definition, empirical findings and estimation problems

2.2.1 Tax revenue elasticity

The impact of cyclical movements on tax revenue may be described in an initial approximation as follows:

$$(1) \quad \Delta T / Y = t \times \phi \times E_g \times gap$$

Apart from the strength of the cyclical fluctuation as reflected in the output gap and technical tax-related factors, summarised here in a simplified form in the lag operator (ϕ), the sensitivity of the public sector budget to cyclical factors grows *ceteris paribus* with the overall average tax ratio (t) and the aggregate revenue elasticity of the tax system (E_g) and vice versa. The impact of cyclical fluctuations is therefore determined by the average tax burden and by the relative sensitivity of the respective types of taxes (T_i) to cyclical factors and their specific fiscal weights (a_i) in the overall system of public finance. The measure of sensitivity is the revenue elasticity, i.e. the ratio of the marginal tax rate to the average tax rate of a given type of taxation with respect to the overall activity variable:

$$(2) \quad E_{T,Y} = \frac{\Delta T / T}{\Delta Y / Y} = \frac{\Delta T}{T} / \frac{\Delta Y}{Y}$$

Ignoring the time-lags between the actual economic activity which establishes a tax liability and the receipt of the assessed tax funds by the tax authorities, the following therefore applies to the cyclical component:

$$(3) \quad \Delta T / Y = t \times \sum_{i=1}^n E_i \times a_i \times gap$$

The elasticity (E_i) of the individual taxes may in each case be broken down into two partial elasticities which give more detailed information on the degree of sensitivity to cyclical factors. The following generally applies (after differencing):²⁹

$$(4) \quad E_{T,Y} = (1 + E_{t,B}) \times E_{B,Y}$$

²⁹ Equation (4) is produced by the definition of tax elasticity in accordance with equation (2) and the derivation of the general tax as a function of Y:

$$T = t [B(Y)] \times B(Y)$$

where: $E_{T,B} = (1 + E_{t,B})$

The elasticity of the tax liability with respect to GDP is obtained from the sensitivity of tax revenue in relation to the statutory tax base, known as elasticity of tax rate ($E_{T,B}$) multiplied by the responsiveness of the tax base to changes in the overall level of economic activity, known as elasticity of yield base ($E_{B,Y}$).

The first elasticity, in turn, may be represented as a function of the average statutory tax rate (t). If the average burden of taxes rises (falls) with an increasing tax base, the statutory-rate formula is called progressive (regressive) and $E_{T,B}$ is greater (less) than one. Given a purely flat-rate structure, this elasticity would thus invariably be equal to one. In general, the tax rate elasticity is basically a policy parameter and reflects the degree of tax progressivity.

The second determinant, the base elasticity ($E_{B,Y}$), on the other hand, measures the positive or negative dependency of the tax base on national income. So $E_{B,Y}$ is widely an exogenous factor for tax policy (at least in a short term perspective). Given the German tax system, which is geared not only to nominal flows but also to stock and quantity yield bases and which over the years has accorded a sometimes greatly changing weight to progressive taxes and to the other (above all, indirect) taxes and public levies (see table 7), the cyclical fluctuations will have resulted in quite different shortfalls or increases in tax revenue.

2.2.2 The problems of estimating elasticity coefficients

Deriving valid empirical estimates of the elasticities for the respective types of taxation encounters a number of serious difficulties. The cash revenue received from public levies in any one period is, in reality, determined by a large number of factors, only some of which are connected with current cyclical activity and which, even if they do not eclipse the latter's influence completely, can still modify it substantially.

Shifts in the structure of aggregate final demand and in the distribution of national income have a direct impact on macroeconomic revenue elasticity. For example, in conformity with the destination principle, exports are not subject to domestic value-added tax, whereas capital spending on housing construction (in the absence of prior tax deduction) is generally liable to tax. An export-led upswing will therefore produce lower revenue than a process of recovery driven by domestic housing construction. By contrast, although a country that is ahead in the cycle, with a high degree of openness in terms of its goods markets, will, in the event of a negative swing in its current account balance, benefit from the turnover taxation on imports, but will, on the other hand, transfer a part of value added, and hence liable income, to countries abroad. Similar

Table 7: Trends and structure of tax revenue*

Tax type/Ratio	Share in cash tax revenue in %					
	1970	1975	1980	1985	1990	1994 1)
Total tax revenue (DM billion)	154.2	242.1	365.0	437.2	549.7	785.9
Direct taxes (share) of which	43.9	48.5	49.2	50.3	48.1	45.1
- Wage tax	22.7	29.4	30.6	33.8	32.3	33.9
- Assessed income tax	10.4	11.6	10.1	6.5	6.6	3.2
- Corporation tax	5.7	4.2	5.8	7.3	5.5	2.5
Indirect taxes (share) of which	56.1	51.5	50.8	49.7	51.9	54.9
- Turnover tax	24.7	22.3	25.6	25.1	26.8	30.0
- Other primarily consumption-related taxes	20.4	18.0	15.1	14.8	15.3	16.7
- Real taxes 2)	9.6	10.3	9.3	8.7	8.6	7.2
Memo item						
Overall tax ratio (% of GDP)	22.8	23.6	24.8	24.0	22.7	23.7
Overall levy ratio (% of GDP)	34.1	38.7	40.4	40.1	38.3	41.8

*) As defined in the financial statistics. - 1) Germany as a whole. - 2) Taxes on land and buildings and trade tax on returns and capital.

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applies in relation to the primary, functional distribution of income. Apart from the differing fiscal scope available to the taxpayer for establishing the tax base, profit-related incomes are generally subjected to a heavier burden by the tax authorities than the earnings of employees. Changes in the distribution of income between the production factors have an impact on the tax base, as do shifts in the incomes pyramid, and even given unchanged tax legislation, produce a fairly marked volatility of the measured elasticity coefficients relating to direct taxes. Measured by the standard deviation this was around 6 1/2 percentage points, as a long-term average, compared with just under 3 % for nominal GDP (see table 8). The intensity of the fluctuation was especially marked in the case of corporation tax, at 17 percentage points - this at a mean rate of growth far below the average of only 3 1/2 % annually.

The marked sensitivity of profits to cyclical factors and, following on from this, of corporation tax as well as of parts of assessed income tax and trade tax, also highlights the importance of the considered time period. Assuming for the sake of simplicity that the dividend payment and profit retention behaviour of enterprises is stable,³⁰ when observed over the entire cycle, the long-run revenue elasticity of the "residual incomes" would have to be estimated far below its short-run, cyclically formed counterpart, even with a linear taxation of profits.

On balance, the situation is scarcely different in the case of types of taxes where the fiscal revenue may be derived from arithmetically linear or semi-logarithmic tax functions. In the first case, for instance, the resulting short-run elasticity is below 1, whereas, in the limit, the elasticity in the long run converges to 1. A factor that remains not least difficult to calculate is the variable time difference between actual tax receipts and the incurrence of the tax liability, because of administrative, collection and technical payment-related factors as well as the current payment behaviour on the part of taxpayers.³¹ Simulation studies using the Bundesbank's econometric model for Germany which were conducted for this purpose confirm the dynamic character of the elasticity coefficients.

The "quality" of the cycle likewise forms part of the overall picture - principally for two reasons. Firstly, to the extent that tax revenue is derived primarily from value-based taxes, i.e. nominal variables, an inflationary component, or the "price gap", enters the picture in addition to the output gap. With a progressive income tax formula this leads to a "covert" tax increase on account of inflation-related "fiscal drag"; by contrast, in the case of quantity-based taxes, which are largely related to consumption, declining shares are recorded. The amount of revenue which the government can rely on depends, therefore, not only on the equilibrium condition of the goods market but also on the

³⁰ With a dividend distribution policy designed for continuity, which may often be observed, the weighted corporation tax rate increases during an upswing, for instance. Therefore, it is not only profits' marked susceptibility to cyclical factors which causes the revenue elasticity of corporation tax to shoot up in this phase.

³¹ For further details see Körner (1987).

Table 8: Selected ratios on the German tax system*

Item	Average rates of change from previous year in % (1970-94)				Elasticities (1970-94) 1)	
	Average	Extreme values		Standard deviation (percentage points)	Averages	Standard deviation
		Minimum	Maximum			
Tax revenue, total 2)	6.3	1.0	13.4	3.7	0.96	0.38
of which						
Income taxes, total 3)	7.3	- 3.9	20.4	6.4	1.05	0.76
- Wage tax	9.4	- 2.3	29.7	8.1	1.36	0.83
- Assessed income tax	2.4	- 23.3	26.2	11.2	- 0.29	3.22
- Corporation tax	3.6	- 34.2	42.1	17.1	0.17	3.37
Turnover taxes	7.9	- 0.6	17.9	4.9	1.31	1.10
Memo item					X	
Nominal GDP	6.7	1.5	13.1	2.9		
Total gross wages and salaries	6.5	0.5	17.9	4.1		
Entrepreneurial and property income	5.9	- 5.4	15.8	5.6		
Nominal private consumption	6.7	2.9	11.5	2.7		

*) Data, where available, for western Germany. - 1) Relative to nominal GDP. - 2) Data on western Germany available only until 1990. Elasticities as from 1991 for Germany as a whole. - 3) Including non-assessed taxes on earnings.

prevailing conditions in the money market. Although linked, the two obey different laws of motion; the price level is regarded as a typical lagging indicator.

Secondly, the intensity with which employment or average earnings react to ups and downs in the economy is of major significance. This fact is revealed in the case of wage tax, the tax source which yields the highest revenue, by the following conditional equations:

$$(5) \quad \Delta T / T \approx \Delta B / B + E_{K,L} \times \Delta w / w$$

$$(6) \quad \Delta L / L \approx \Delta B / B + \Delta w / w$$

where:

$\Delta T / T$:	Rate of change in wage tax revenue
$\Delta B / B$:	Rate of change in employment
$E_{K,L}$:	Per capita elasticity of income tax revenue with respect to gross wages
$\Delta w / w$:	Rate of change in actual average earnings per employee
$\Delta L / L$:	Rate of change in total gross wages and salaries

As the comparison shows, the elasticity of wage tax with respect to gross pay is dependent on the composition of the tax base. If this, for instance, increases exclusively through an increase in employment, wage tax grows proportionately to it; the tax elasticity in this case is thus equal to 1. If, instead, there is a rise in average earnings per employee, than this results in a more-than-proportionate increase of wage tax relative to its respective tax base. In a recession, which is accompanied by a marked reduction in employment, the revenue elasticity is therefore distorted upwards, and even more so because tax payers in the lower income classes are affected disproportionately by redundancies and the per capita elasticity is higher than usual because of shifts in the number of employed persons in the respective tax brackets.

For a number of a priori reasons alone, the assumption of constant or stable elasticity coefficients over time appears quite a restrictive one. This is all the more the case since, in addition to the "endogenous" factors mentioned, the numerous and major government interventions in the overall tax system over short intervals brought about significant estimation problems - particularly as changes in the overall tax burden were accompanied by structural shifts in types of taxation. A brief look back over the last ten years gives an impression of these structural "distortions". In addition to the major income tax reforms of 1986, 1988 and 1990, which lowered the tax burden and decreased revenue (in their third stage alone these were associated with estimated net losses of revenue of around DM 25 billion (roughly 1 % of GDP) in 1990 and were partly financed by broadening the tax base) there have been additional fiscal and unification-related burdens since 1991

involving a number of special excise taxes and an increase in value-added tax in 1993 by 1 percentage point (standard rate).³² Until 1994 there was also a "solidarity" income tax surcharge limited to 1991 and 1992 (of 7 1/2 % of tax payable). It remains debatable, whether the tax on interest income (of 30 % or 35 % with a simultaneous tenfold increase in the savers' allowance), which has been levied from 1993, has on balance raised the overall tax burden. Additional major tax changes were introduced by the Tax Amendment Act of 1992, which in particular introduced an increase in the tax allowance for children and brought about the first stage of the corporation tax reform. Then there was also the Location Promoting Act (Standortsicherungsgesetz) which (principally as a continuation of the corporation tax reform) reduced the corporation tax rate applying to (distributed) profits from 50 % to 45 % (36 % to 30 %) and lowered the maximum marginal tax burden for industrial earnings from 53 % to 47 %.

The overall volumes which are being discussed here are illustrated by comparative calculations. Compared with the medium-term tax estimate for the period 1991 to 1994 carried out in May 1990, i.e. before unification, almost DM 400 billion more in taxes were probably collected by the tax authorities in the united Germany. According to the ifo Institute, of this an estimated three-fifths may be ascribed to unification and the remaining part (which is not broken down further) to discretionary measures and to higher inflation and greater tax progression.³³

This impression is strengthened if one looks at the output elasticity of the overall tax system (see table 9). Without the changes in tax legislation, the estimated revenue elasticity in 1995 would amount to just under 1.2; including the changes (above all the introduction of a "solidarity surcharge" of 7 1/2 % on income and corporation tax), the estimated value is just over 1.7. A similarly wide divergence (around DM 5 billion or 0.14 % of GDP) is obtained when computing the budgetary effects of an additional percentage point in the growth rate of nominal GDP. This also shows that a notional computation based on a tax legislation which is assumed to be constant over time would lead to a bias problem in the estimation results.

Makeshift solutions have to be relied on for empirical studies. Thus for income tax the OECD (whose elasticity calculations have largely been adopted by the IMF and the EC, see table 10) employs a model-aided approach using "representative" types of households and assumptions concerning "normal" income distribution relationships. The coefficient of elasticity derived from this is stated as 1; earlier calculations on the structural deficit assumed a value of 1.4, whereas estimates based on simple regressions indicated a much higher sensitivity to cyclical factors (of 1.8).

³² For specific changes in tax legislation, see the Financial Reports of the Federal Government, current volumes.

³³ See Körner (1993), p. 13f.

Table 9: Indicators on the output elasticity of total tax revenue 1)

Ratios	1992		1993		1994 pe)		1995 e)	
	Changes in tax legislation ...							
	including	excluding 2)	including	excluding 2)	including	excluding 2)	including	excluding 2)
Tax receipts, total (DM billion)	731.7	741.0	749.1	782.6	786.2	827.5	852.4	
Revenue flexibility (DM billion)	0.314	0.111	0.208	0.257	0.227	0.277	0.410	
Average tax ratio (% of GDP) 3)	23.79	23.46	23.71	23.56	23.66	23.76	24.47	
Revenue elasticity	1.35	0.47	0.88	1.09	0.96	1.18	1.73	
Computed budgetary effect per additional percentage point of GDP growth								
Additional receipts (DM billion)	9.9	3.5	6.6	8.5	7.5	9.8	14.8	
Decrease in the deficit ratio (percentage points)	0.32	0.11	0.21	0.26	0.23	0.28	0.42	

1) Figures for Germany as a whole. - 2) Actual revenue adjusted for the cash effects of major tax policy measures in the year concerned on the basis of estimates by the Federal Ministry of Finance. - 3) Nominal GDP not adjusted for changes in tax legislation. - pe) Partly estimated. - e) Estimated (position: March 1995).

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**Table 10: Cyclical sensitivity of public sector levies
in alternative estimates**

Institution	Income tax	Corporation tax	Indirect taxes	Other taxes	Social security contributions	Total elasticity
OECD						
- old	1.4	2.5 1)	0.8	-	0.5	n.a.
- new	1.0	2.5 1)	1.0	-	0.7	n.a.
Memo item						
Simple regression	1.8	0.8	0.8	-	1.2	n. a.
IMF 2)	1.4	2.5 1)	0.8	1.0	0.7	0.91 3)
EC 2)						
- old	1.4	2.5	0.8	-	0.5	1.0 4)
- new	1.0	2.5	1.0	-	0.7	0.94 5)
Council of Economic Experts	n.a.	n.a.	n.a.	n.a.	1	1

1) The estimate of a tax collection lag did not yield any significant values.

2) Partial elasticities according the OECD estimate; for the IMF, for social security contributions and other taxes, IMF calculations.

3) Weighting of the partial elasticities with the average tax shares of the tax types in 1980-89.

4) Weighting of the partial elasticities with the average tax shares of the tax types in 1983-88.

5) Weighting of the partial elasticities with the average tax shares of the tax types in 1980-92.

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It is possible to verify how reliable or realistic constructs of this kind are by using computed values of the tax burden and social security contributions of selected groups of employees (see table 11). If, for purposes of simplification, constant legislation of 1990 relating to tax and social security contributions is assumed, and if the income tax splitting table for the so-called "benchmark family" of an average earner is applied, an income elasticity in the range 2.8 to 2.4 is arrived at between 1990 and 1995. On account of the sharp progression of income tax in the lower income ranges, someone on a low income with two-thirds of average earnings would exhibit a far higher elasticity; in the upper income groups, by contrast, the income tax elasticity with respect to gross pay may be stated at around 1.7.³⁴ Depending on the weighting scheme, it would be easily possible to derive very different aggregate coefficients of elasticity for the respective years even in this rough "three-class model".

It is scarcely possible to arrive at different conclusions if the other types of taxes are also taken into account. The Federal Statistical Office's "current family budget accounts" provide useful points of reference for a four-person household of employees on average income (in the old Länder):

As may be seen in detail in table 12, between 1990 and 1995 the overall statistical elasticity of taxes and levies (direct taxes, indirect taxes, social security contributions) for the above type of household (including tax increases) was on average 1 1/2 %; as a result of this the average burden of taxes and social security contributions rose from around 36 1/2 % of gross income in 1990 to just over 40 2/3 % in 1995.

The calculations presented here above all prove one thing: representative and stable coefficients of elasticity for certain types of taxes do not stand up to a close scrutiny.

As a makeshift it is nevertheless possible to fall back on the empirically corroborated finding that, viewed in the longer run, the elasticity of the overall tax system is approximately 1. Although there are significant temporary upward and downward "outliers" (see figures 8 and 9), it has not been possible to confirm a positive or negative trend in the aggregate figures. An overall elasticity for the tax system of 1 has been assumed for the further studies on the structural deficit. Provided that the "true" unknown elasticity lies in the range between 0.95 and 1.1, the margins of error remain within tolerable limits (see table 13). On these assumptions, with an average tax ratio of 24 % of GDP, the tax effect of an output gap of 1 % is between 0.23 % and 0.26 % of GDP. The statement that the German tax system's built-in stabiliser is in the order of 1/4 % of GDP thus appears to be quite justified.

³⁴ It is not possible to ascertain stable values, however, based on the tax legislation which actually applied in the respective years: rather, the computed elasticity, e.g. for a gross income that is twice as high as average earnings, fluctuates between - 1.4 (1993) and + 3.9 (1995).

Table 11: Hypothetical burden of taxes and social security contributions and computed income tax elasticities *

- Selected employee groups -

Gross remuneration/year - DM -	Wage tax/income tax 1)	Social security contri- butions	Average burden in %		Marginal burden in % 2)		Computed income elasticity	
			DM/year	Wage tax	Total	Wage tax	Total	Wage tax
1. Average earnings								
1990: 41,980	2,906	7,451	6.9	24.7	x	x	x	x
1991: 44,520	3,398	7,902	7.6	25.4	19.4	37.1	2.80	1.50
1992: 47,060	3,920	8,353	8.3	26.1	20.6	38.3	2.69	1.51
1993: 48,421	4,198	8,595	8.7	26.4	20.4	38.2	2.45	1.47
1994: p) 49,256	4,384	8,743	8.9	26.7	22.3	40.0	2.57	1.51
1995: e) 51,029	4,758	9,058	9.3	27.1	21.1	38.9	2.37	1.46
2. Two thirds of average earnings								
1990: 27,988	656	4,968	2.3	20.1	x	x	x	x
1991: 29,681	902	5,268	3.0	20.8	14.5	32.3	6.20	1.60
1992: 31,375	1,170	5,569	3.7	21.4	15.8	33.6	5.21	1.62
1993: 32,282	1,316	5,730	4.1	21.8	16.1	33.8	4.32	1.58
1994: p) 32,839	1,420	5,829	4.3	22.1	18.7	36.4	4.58	1.67
1995: e) 34,021	1,588	6,039	4.7	22.4	14.2	32.0	3.29	1.45
3. Twice the average earnings								
1990: 83,960	12,980	12,238	15.5	30.0	x	x	x	x
1991: 89,040	14,368	12,626	16.1	30.3	27.3	35.0	1.77	1.16
1992: 94,120	15,794	13,209	16.8	30.8	28.1	39.5	1.74	1.30
1993: 96,842	16,600	13,986	17.1	31.6	29.6	58.2	1.76	1.89
1994: p) 98,512	17,072	14,763	17.3	32.3	28.3	74.8	1.65	2.37
1995: e) 102,058	18,122	15,152	17.8	32.6	29.6	40.6	1.71	1.26

*) Figures for western Germany. Constant tax law in 1990; constant contribution rates to the social security funds in 1990; income limit for the assessment of contributions: actual amounts.

1) Tax class III/2 according the general wage tax scale or the income tax splitting scale. Excluding solidarity surcharges.

2) Compared with the previous year.

p) Provisional.

e) Estimated.

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Table 12: Elasticities and burden of taxes and levies for a middle-income four-person household*

Item	1990	1991	1992	1993	1994	1995
	- Computed elasticity 1) -					
Total taxes and levies		1.62	1.13	0.65	2.41	2.07
- Wage tax 2)		2.46	0.31	- 3.06	2.00	4.52
- Social security contributions		1.16	1.38	3.72	3.15	1.06
- Indirect taxes		1.21	2.17	0.43	1.32	0.07
Item	- Average burden as % of gross remuneration -					
Total taxes and levies	36.5	38.1	38.3	38.1	39.5	40.7
- Wage tax 2)	12.8	14.1	13.8	13.2	13.5	14.8
- Social security contributions	16.8	17.0	17.3	17.8	18.7	18.8
- Indirect taxes	6.9	7.0	7.2	7.2	7.3	7.1

* Results on the basis of the current family budgets for the old Länder on a monthly basis. Basic data from Bundestag printed matter 13/890 of March 24, 1995.

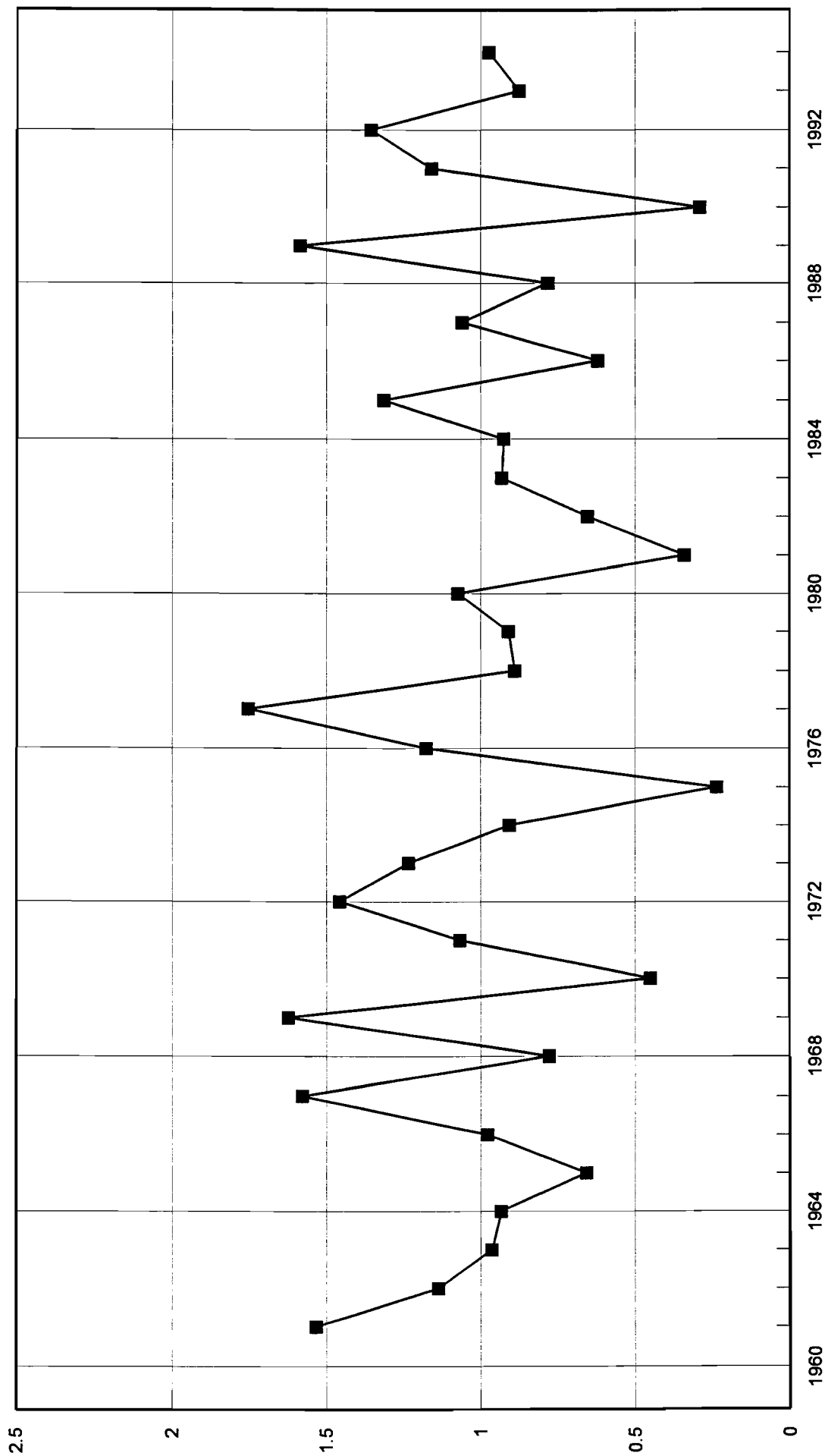
1) Relative to gross remuneration.

2) Including solidarity surcharge in 1991, 1992 and 1995.

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Figure 8

Output elasticity of total tax revenue *)



*) As from 1991, for Germany as a whole

Output elasticity of selected types of taxation

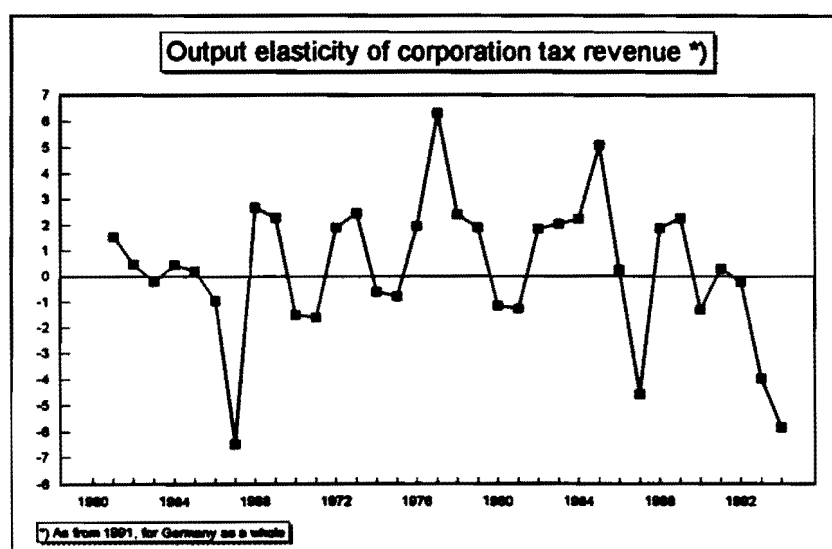
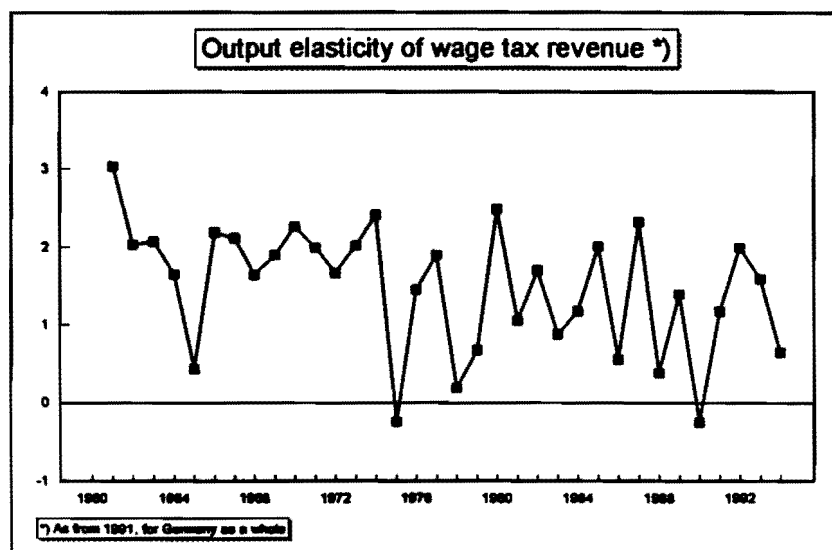
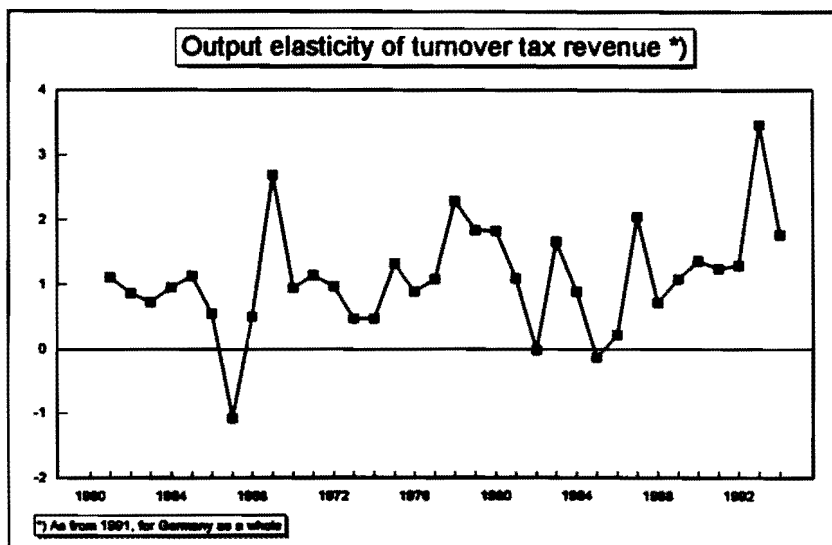


Table 13: Computed cyclical tax effect

	Average tax ratio											
	t = 0.23			t = 0.24			t = 0.25					
	0.95	1.00	1.05	1.10	0.95	1.00	1.05	1.10	0.95	1.00	1.05	1.10
Output gap/tax effect												
Output gap: 1 %												
- Tax effect in DM billion 1)	6.5	6.8	7.2	7.5	6.8	7.1	7.5	7.9	7.1	7.4	7.8	8.2
- Tax effect as % of GDP	0.22	0.23	0.24	0.25	0.23	0.24	0.25	0.26	0.24	0.25	0.26	0.28
Output gap: 2 %												
- Tax effect in DM billion 1)	13.0	13.7	14.4	15.1	13.6	14.3	15.0	15.7	14.1	14.9	15.6	16.4
- Tax effect as % of GDP	0.44	0.46	0.48	0.51	0.46	0.48	0.51	0.53	0.48	0.50	0.53	0.55

1) Relative to 1994; excluding time-lags in cash revenue and overall economic feedback effects.
Rounded figures.

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3. Cyclical financial balance: a tentative conclusion

Summarising the results of the cyclical adjustment of the budget so far, it becomes apparent that revenue has a distinctly greater weight compared with expenditure (insofar as it is considered here) - a statement which also applies to the other western industrial countries.³⁵ As a general rule of thumb (in relation to the recent past in western Germany) it may be stated as a "consensus" conclusion that fluctuations in the overall degree of capacity utilisation of 1 percentage point are on average reflected in a change of around 1/2 per cent of GDP in the public sector budgets (see also table 14). More than two-thirds of the overall effect can be attributed to the cyclical fluctuations of the tax system.

Assuming an output gap of - 4 % as an empirical value for the lowest point of a recession, the additional cyclical burdens (given constant taxation and transfer regulations) would probably not exceed 2 % of GNP. If the Maastricht deficit criterion is to be met even in this extreme cyclical situation, only a total scope of 1 % of GDP would be left for the structural deficit component and additional temporary payments, i.e. the lower limit of what the German Economic Advisory Council at the Federal Ministry of Economics has proposed for the "normal situation". In general, it is possible to say, however, that the Council's recommendation to limit the structural deficit ratio to between 1 % and 1.5 % of GDP definitely leaves room for the built-in stabilisers to become effective without violating the Maastricht deficit criterion.

This does not apply without qualification, however, to other EU countries as they (like the Federal Republic and unlike, in particular, the United States and Japan) by no means generally belong to the low-tax, low-benefit countries. Their respective susceptibility to cyclical factors must also be taken into account. Countries which have a real economy with a sound constitution and a healthy financial system are able to cope with or assimilate shocks far better, and this results in correspondingly smaller fluctuations in the output gap.

Lowering the public sector spending ratio would in every case, also within the context of the Maastricht criterion, be superior to consolidation by tightening the "tax screw". The risk of temporarily exceeding the deficit limit would increase considerably, especially if the screw were to be tightened "in favour" of direct taxation.

A fiscal policy that accepts cyclical financial balances has - by itself - a stabilising effect on the economic process. It is quite possible to justify this with the "tax smoothing" argument on the supply side, too. A fiscal policy geared to stabilisation is also, in principle, quite compatible with a monetary policy geared to the medium term. Both behave in accordance with production potential; the one by virtue of its stability-oriented

³⁵ See OECD (1993), pp.37-44.

Table 14: Cyclical adjustment of the budget balance

Year	Output gap		Addition/lower receipts (-)		Cyclical deficit		Financial deficit (national accounts)	Cyclically adjusted financial deficit
			Taxes	Social security contributions				
	%	Additional/lower expenditure (-)	DM billion		DM billion	% of GDP	% of GDP	
1980	+ 1.86	- 3.3	6.8	1.0	- 11.1	- 0.8	2.9	3.7
1981	- 1.00	2.8	- 3.7	- 0.6	7.1	0.5	3.7	3.2
1982	- 4.25	10.3	- 16.1	- 2.9	29.3	1.8	3.3	1.5
1983	- 4.47	10.3	- 17.7	- 4.5	32.5	1.9	2.6	0.6
1984	- 3.73	7.4	- 15.4	- 4.1	26.9	1.5	1.9	0.4
1985	- 3.73	6.8	- 16.3	- 4.4	27.5	1.5	1.2	- 0.4
1986	- 3.64	6.6	- 16.5	- 4.5	27.6	1.4	1.3	- 0.1
1987	- 4.22	8.4	- 19.8	- 5.4	33.6	1.7	1.9	0.2
1988	- 2.85	6.1	- 13.9	- 3.7	23.7	1.1	2.2	1.0
1989	- 1.40	2.9	- 7.5	- 1.9	12.3	0.6	- 0.1	- 0.7
1990	+ 1.16	- 3.0	6.4	1.6	- 11.0	- 0.5	2.1	2.5
1991	+ 2.94	- 3.7	18.1	4.6	- 26.4	- 0.9	3.3	4.2
1992	+ 1.65	- 4.2	19.2	2.7	- 26.1	- 0.8	2.9	3.8
1993	- 1.85	8.9	- 12.5	- 3.0	24.4	0.8	3.3	2.6
1994	- 0.97	3.9	- 6.0	- 1.5	11.4	0.3	2.5	2.2

w:tab2-3\950809S5

monetary targeting, which as a "side-effect" produces cyclical stabilising effects through the velocity of circulation of money; the other by virtue of a fiscal management strategy that offsets cyclical variations in the current budget balance by borrowing.

In terms of demand theory, the macro-effects of the built-in stabilisers are not fundamentally different in their effect from those of discretionary measures. A tight capital market or one in which confidence has been impaired, or an economy with a high degree of openness give rise to expectations of only a fairly small built-in stabiliser, even if it has a marked built-in flexibility. Compared with discretionary flexibility there is nevertheless the advantage that the dangers of asymmetrical behaviour are ruled out from the outset and that the risk of false timing or of gauging too high is probably lower.

In all of this it is nevertheless important to note that the higher a country's structural budget deficits and level of debt are, and the more its credibility has already suffered, the lower is the effectiveness of the built-in stabilisers to be judged. Contrary to textbook wisdom, it would not be appropriate in such a situation to exempt from the outset those types of revenue and expenditure that are susceptible to cyclical factors from an examination of the need to consolidate.

V. From the cyclically adjusted fiscal balance to the deficit needing consolidation

"It is ... not primarily the estimation risks which explain the dispute concerning the level of the structural deficit (i.e. one requiring consolidation: the author) of the public sector".

Council of Experts (1981/82)

After eliminating the cyclical influences (and other kinds of temporary factors) there remains that part of the public sector deficit which by its very nature is permanent. This by no means answers the question of the size of the consolidation task, however. In the long and no less multifaceted debate on public debt, six levels of argument can be distinguished:

- the "real" deficit (operational deficit)
- the thesis of "normal indebtedness"
- the traditional approach of the "golden rule" or "pay as you use" condition
- the Ricardian equivalence theorem
- intergeneration accounting or the "fiscal balance rule"³⁶
- sustainability or the solvency criterion

Although each aspect is worth separate discussion, this would go beyond the scope of the present discussion paper. The concept of an "operational deficit" will be dealt with first below because it still has many advocates outside Germany and it cannot be denied a certain economic rationale.³⁷ The thesis of normal indebtedness, developed and propagated, in particular, by the German Council of Experts, and the "golden rule" approach, however, are considered only to the extent that they have been incorporated into the Council of Experts' new approach on the calculation of structural deficits. The premises and implications of the Barro-Ricardo theorem of ex ante crowding-out or the "indifference" of taxes and public borrowing have now been largely analysed and its empirical viability frequently been tested.³⁸ The theory of neutrality developed and popularised by Barro is not dealt with in further detail in this paper as it is not, in the author's opinion, able to claim any great explanatory value. *"At least one will not be able to deny the Barro approach an analytical-didactic value (however) in that it sharpens one's awareness of the fact that public debt is neutral compared with the effects of tax financed public sector budgets only under a quite specific "heroic" set of premises".*³⁹

Instead, it seems more productive to examine the solvency condition for public sector budgets (which was introduced with the so-called sustainability criterion and which has recently been studied in detail) in terms of its possible applicability.

1. The "real" budget balance

1.1 *The economic rationale of inflation adjustment*

Inflation accounting's criticism of the budget balance as measured in the conventional way is of a fundamental nature and is generally levelled at the customary concept of saving in the system of national accounts which defines saving as the differential between current revenue and consumption. If, on the other hand, saving is interpreted as the growth of the market value of real assets and if the inflationary component in the (nominal) rate of return is understood as compensation for the inflation-induced devaluation of assets, this has far-reaching consequences - firstly, for that part of the deficit that requires consolidation and, secondly, for the interpretation of the "golden

³⁶ See note on p. 12.

³⁷ See, for example, Eisner/Pieper (1984); OECD (1988); European Commission (1993).

³⁸ See, for instance, Nicoletti (1988); de Haan/Zelhorst (1988); Seater (1993).

³⁹ Schlesinger et al. (1993), p. 201.

rule". If one follows the OECD calculations on the inflation-adjusted budget balance, for instance, Germany's financial deficit in the system of national accounts in the past five years would have to be adjusted downwards by an average 3/4 percentage points (table 15); the current balance - which represents the yardstick for the golden rule of fiscal policy - would show a corresponding improvement.

The value of public debt generally changes as a result of valuation effects and transaction activities (flow effects: new borrowing, redemption).⁴⁰ Valuation effects generally comprise capital gains and capital losses due to changes in interest rates, inflation and exchange rates. In formal terms this means:⁴¹

$$(1) D_{M,r}(t) = i_0 [\bar{D}_H + w(t) * \bar{D}_A] / [i(t) * P(t)]$$

With a given nominal level of debt (D) where liabilities are denominated in domestic currency (D_H) and in foreign currency (D_A), the change in the real market value ($\Delta D_{M,r}$) is determined as a function of the interest rate level (i), the exchange rate (w) and the price level (P) as follows:

$$(2) \Delta D_{M,r} = -\Delta i/i [i_0 * \bar{D}_H + i_0 * w * \bar{D}_A] / (i * P) - \Delta P/P [i_0 * \bar{D}_H] / (i * P) \\ + (\Delta w/w - \Delta P/P) [i_0 * w * \bar{D}_A] / (i * P)$$

If one focuses, for the sake of simplicity, only on the inflationary aspect, equation (2), taking into account current (net) new borrowing (B), is reduced to an expression of a combined, inflation-related stock and flow effect:

$$(3) \Delta D_r = B/P - \Delta P/P * D_r - (\Delta P/P) * (B/P)$$

The change in the real level of debt corresponds to the real budget deficit (B/P), reduced to the level of debt and new borrowing by subtracting the inflation-related rate of repayment. The real level of debt would thus remain constant given a nominal budget balance the size of the repayment rate. The adjustment rule for the nominal budget balance is thus:

$$(4) B_{br} = B - (\Delta P/P) * (D + B)$$

Taking explicit account of the primary deficit (total deficit less that part which is due to interest payments), the adjusted deficit ratio (b_w) assumes the following form:

⁴⁰ To this may be added debt assumption and debt relief.

⁴¹ For the sake of simplicity, the case of a perpetual security has been assumed. The results stand, in principle, for finite periods, too. See also Heller et al. (1986).

Table 15: Adjustment of public-sector financial balances for inflation

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
Financial balance as % of GDP (1)															
United States	- 1.3	- 1.0	- 3.4	- 4.1	- 2.9	- 3.1	- 3.4	- 2.5	- 2.0	- 1.5	- 2.5	- 3.4	- 4.5	- 3.6	- 2.7
Japan	- 4.4	- 3.8	- 3.6	- 3.6	- 2.1	- 0.8	- 0.9	0.5	1.5	2.5	2.9	3.0	0.7	- 1.0	- 2.0
Germany	- 2.9	- 3.7	- 3.3	- 2.5	- 1.9	- 1.1	- 1.3	- 1.9	- 2.2	- 0.1	- 2.1	- 3.2	- 2.6	- 4.0	- 3.5
France	0.0	- 1.9	- 2.8	- 3.2	- 2.8	- 2.9	- 2.7	- 1.9	- 1.7	- 1.3	- 1.5	- 2.1	- 3.9	- 6.0	- 6.0
Italy	- 8.6	- 11.6	- 11.3	- 10.7	- 11.6	- 12.6	- 11.6	- 11.0	- 10.7	- 9.9	- 10.9	- 10.2	- 9.5	- 9.7	- 8.7
United Kingdom	- 3.4	- 2.6	- 2.5	- 3.3	- 3.9	- 2.9	- 2.4	- 1.3	- 1.0	- 0.9	- 1.3	- 2.7	- 6.2	- 8.2	- 7.4
Canada	- 2.8	- 1.5	- 5.9	- 6.9	- 6.5	- 6.8	- 5.4	- 3.8	- 2.5	- 2.9	- 4.1	- 6.3	- 6.6	- 7.0	- 5.4
Adjusted financial balance as % of GDP (2)															
United States	0.1	0.2	- 2.6	- 3.2	- 2.1	- 2.3	- 2.7	- 1.5	- 1.0	- 0.4	- 1.3	- 2.4	- 3.6	- 2.8	- 1.9
Japan	- 3.2	- 3.0	- 3.0	- 3.1	- 1.4	- 0.2	- 0.8	0.5	1.5	2.8	3.2	3.2	0.8	- 1.0	- 2.0
Germany	- 2.3	- 2.9	- 2.6	- 2.0	- 1.5	- 0.8	- 1.4	- 1.8	- 1.9	0.7	- 1.5	- 2.5	- 1.6	- 3.1	- 2.6
France	1.7	- 0.2	- 1.1	- 1.6	- 1.4	- 1.7	- 2.1	- 1.1	- 1.0	- 0.4	- 0.8	- 1.3	- 3.3	- 5.3	- 5.3
Italy	1.7	- 2.5	- 2.0	- 1.7	- 3.5	- 5.9	- 6.6	- 6.4	- 5.7	- 4.2	- 5.2	- 3.8	- 4.1	- 5.0	- 4.2
United Kingdom	2.8	1.8	1.0	- 1.4	- 1.9	- 0.7	- 0.6	0.3	2.7	2.5	0.1	- 1.1	- 4.9	- 7.1	- 6.2
Canada	- 2.8	- 1.6	- 5.9	- 6.6	- 6.1	- 6.3	- 4.8	- 3.1	- 1.8	- 2.0	- 3.2	- 5.1	- 6.3	- 6.4	- 4.7
Difference in percentage points (1) - (2)															
United States	- 1.4	- 1.2	- 0.8	- 0.9	- 0.8	- 0.8	- 0.7	- 1.0	- 1.0	- 1.1	- 1.2	- 1.0	- 0.9	- 0.8	- 0.8
Japan	- 1.2	- 0.8	- 0.6	- 0.5	- 0.7	- 0.6	- 0.1	0.0	0.0	- 0.3	- 0.3	- 0.2	- 0.1	0.0	0.0
Germany	- 0.6	- 0.8	- 0.7	- 0.5	- 0.4	- 0.3	+ 0.1	- 0.1	- 0.3	0.8	- 0.6	- 0.7	- 1.0	- 0.9	- 0.9
France	- 1.7	- 1.7	- 1.7	- 1.6	- 1.4	- 1.2	- 0.6	- 0.8	- 0.7	- 0.9	- 0.7	- 0.8	- 0.6	- 0.7	- 0.7
Italy	- 10.3	- 9.1	- 9.3	- 9.0	- 8.1	- 6.7	- 5.0	- 4.6	- 5.0	- 5.7	- 5.7	- 6.4	- 5.4	- 4.7	- 4.5
United Kingdom	- 6.2	- 4.4	- 3.5	- 1.9	- 2.0	- 2.2	- 1.8	- 1.6	- 1.7	- 1.6	- 1.2	- 1.6	- 1.3	- 1.1	- 1.2
Canada	0.0	+ 0.1	0.0	- 0.3	- 0.4	- 0.5	- 0.6	- 0.7	- 0.7	- 0.9	- 0.9	- 1.2	- 0.3	- 0.6	- 0.7

Data on the basis of the national accounts.

Source: OECD (1994), WP No. 144.

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$$(5) \quad b_{br} = p + [(i-\pi)/(1+g)] d_{t-1} - \pi b$$

There p stands for the primary deficit ratio and π for the inflation rate ($\Delta P/P$). The inflation adjustment - taking into account the (simplified) Fisher theorem - therefore amounts in effect to regarding only the "real rate of interest" on the public debt as a relevant factor in the (nominal) deficit ratio instead of the nominal interest rate. The neutrality theory associated with this states in essence that real (domestic and foreign) demand for public securities is independent of inflationary processes; the (measured) private saving ratio is in part only a statistical artefact that correlates positively with the level of the inflation rate. The fiscal policy implication is obvious; interest rate, exchange rate or demand effects and so on can be generated only by the operational budget balance. The fiscal policy message is clear, (at most) the cyclically and inflation adjusted part of the (primary) financial deficit requires consolidation.

1.2 *Theoretical and empirical objections*

A closer examination of this budgetary concept brings to light considerable doubts, however, concerning the soundness of its premises and its applicability.⁴² Fundamentally, this is because it is based on a model world free of operational costs in which there are fully anticipated inflation rates in a long-run steady state. Undoubtedly, inflation no longer has any "sting" in this theoretical framework; the inflationary "veil" merely conceals our view of the real essence. In this sense the Fisher theorem is to be construed in the first place only as a long-run equilibrium condition which loses the triviality of an arithmetical rule only by the introduction of a behavioural hypothesis to explain how expectations are formed.

If one leaves this model world and returns to more realistic territory, however, it is highly unlikely that, faced with the longer-run experience of remarkable different trends in the purchasing power of money, the nominal interest rate would (due to the inflation premium) securely and adequately protect the rights of ownership of savers or investors in government securities (who always aspire to preserve the real value of their assets). Assuming a constant inflation rate is just as unrealistic as the assumption that monetary erosion would make no impression on individuals' saving and portfolio behaviour. This has little to do with "money illusion", which is based on the private sector's reaction to a change in the price level that has occurred but not, however, on the degree of anticipation of uncertain, future price changes.

42 See also Jump (1980); Tanzi et al. (1987); Tullio (1987); Leslie (1993), pp. 26-30.

The extent to which the portfolio of financial assets, in general, and different types of public debt, in particular, are affected by this is determined (with a given inflation rate term structure) by the average remaining maturity, the yield level and the coupon as well as the extent of indexation. These considerations apply initially only to domestic investors; for foreign investors - who at present hold around one third of all German outstanding public debt - the response of the exchange rate and the size of the debt portion denominated in foreign currency are crucial. If the exchange rate merely reflected differences in the "inflation levels" of the individual countries (or currency areas) and if all types of debt were denominated in domestic currency, this would lead to a depreciation of the debtor country's currency and to a capital loss on the part of the foreign debt-holders via the exchange rate mechanism.

Given deviations from purchasing power parity, which are to be anticipated at least over short and medium-run periods and for a number of currencies,⁴³ or "split" inflationary expectations and a different currency mix of public debt, the inflation and exchange rate risks would, on the other hand, be non-equivalent phenomena which would have to be discussed separately.

A detailed knowledge of the structure of public debt represents only one set of necessary conditions for "accurate" inflation adjustment. Another factor that would need to be taken into account is that the real rate of interest itself would not remain constant on account of an inflation-related risk premium plus an increment for the inflation-related taxation effect (given the validity of the nominal value principle). Apart from this, even a fully anticipated inflationary impulse implies a front-loaded redemption profile; i.e. compared with a situation of price stability there is - depending on the maturity - a premature debt repayment and thus a temporal and, to that extent, temporary interpersonal redistribution of the debt service burden.⁴⁴

A standardised adjustment procedure would not least encourage misinterpretation of the operational deficit as it only tackles the symptom of inflation without probing into the causes. To the extent, for example, that an expansionary budgetary policy is partly responsible for a (growing) monetary erosion, an inflation-adjusted perspective would even reward the government's indiscipline; what has driven inflation *ex ante* appears *ex post* as a restrictive process. If savers were judged, more or less convincingly, to be not fully compensated, the inflation process would offer the politicians an alibi for a

⁴³ See Deutsche Bundesbank (1993), pp. 41-60.

⁴⁴ If money and real capital are close substitutes, an anticipated inflation rate would raise the opportunity costs of monetary holdings and, to that extent, cause an additional demand for existing and new real capital. The Fisher effect would come into effect only incompletely because of the falling real rate of interest. This so-called Tobin effect is probably of hardly any significance, if only by virtue of the small amount of outside money compared with the capital stock. In addition, any positive output effect would be of quite doubtful value as it could only be bought at the price of welfare losses on the part of the money holders.

"compensatory" expansionary fiscal policy which maintains inflationary pressure on the demand side.⁴⁵

To sum up: for these reasons this paper shall make no use of the inflation adjustment of budget balances in the following. Admittedly, anyone who tends to be well disposed towards or is more indifferent to public indebtedness will take a more "liberal" attitude towards the inflation adjustment of budget balances.⁴⁶

2. The Council of Experts' new view to structural deficits

Since the start of the conceptual investigation and empirical measurement of cyclical budget balances in 1967/68, the German Council of Economic Experts has modified or expanded its methodological approach - the "cyclically neutral budget" - several times, in particular in 1975 through its calculations on the structural deficit. As a result of German reunification such calculations were discontinued, however, on the grounds of structural breaks in the statistics caused by unification or - as in 1993 - replaced by ad hoc estimates. The Council ended this interim phase with its annual report for 1994/95 and put up for discussion a new variation of its budgetary approach.

It was by no means the Council's intention to completely abandon the traditional version; rather, tried and tested components were to be adopted and combined with new elements to form a new whole. In rethinking its concept the Council - as it had already done for some considerable time - focused its attention mainly on the aspect of (quantitative) consolidation.

The structural deficit is logically the theoretical point of departure for these considerations - the structural deficit now not (or no longer) construed as a measurement concept but as a target concept with normative elements. Included in it is not only that part of the overall budget deficit which is attributed neither to cyclical factors nor to temporary statutory measures, but also new borrowing which is considered "unobjectionable in the medium term" and thus acceptable.

2.1 *Permanent indebtedness not requiring consolidation*

The term "investment-oriented indebtedness" (which has been newly created by the Council) is of far greater significance conceptually and quantitatively than the cyclical adjustment procedures - which will not be explored further. In conjunction with the

45 A compensatory measure justified in this way would in any case only be internally consistent if private consumption were dependent on wealth and the transfer of wealth caused by "inflation tax" were not regarded as a short-term phenomenon. See also Miller (1985) on the question of the relevant concept of income in the inflation adjustment of budget balances.

46 Even the term "inflation adjustment" promises more than it can deliver. What the situation really is with regard to the budget balance in the absence of inflation remains a very open question.

second "innovation", i.e. the criterion of sustainability, it forms the kernel of the structural deficit concept (table 16). The Council is thus at the same time countering the criticism, voiced for many years in various quarters, which was aroused, in particular, by the notion of cyclically neutral normal borrowing that the Council developed at the end of the sixties.⁴⁷ Tempering the criticism, the "five wise men" had adopted a rather more differentiated stance in the past, stressing that the theory of normal borrowing (derived from the concept of the cyclically neutral budget or the cyclical impact) is substantiated by a habit type and thus behavioural argument, whereas in assessing that part of the public sector deficit which requires consolidation a "value-related" decision has also to be taken.⁴⁸ Taking this basic idea further and with a view to the worsening age structure of the population which has been evident for some considerable time, the Council in its 1990/91 Report even argued the case for a complete elimination of new borrowing by the year 2000.⁴⁹

Judged by the new proposal, the restriction on government borrowing is far less rigorous; compared with the legal status quo the constraints on borrowing are, nevertheless, stated more rigidly. As mentioned above, in addition to the cyclical deficit component and other temporary budgetary burdens (in particular, those due to limited-duration countercyclical measures), the "investment-oriented" component of new debt is to be regarded as not requiring consolidation and, to that extent, acceptable. This new label covers two aspects which are the subject of intense discussion in the literature; a growth policy aspect, in the shape of the "golden rule", and - supplementary to this - a budgetary aspect in the form of the sustainability criterion. Stated in general terms, public sector borrowing is non-objectionable as long as it is balanced by productive government expenditure of at least the same level and the long-term freedom of fiscal policy action is not put at risk. As a practical implementation of these two fiscal policy norms, the Council advocates that the annual (net) new borrowing of the central, regional and local authorities should not exceed the actual net capital expenditure (i. e. nominal expenditure on construction projects less consumption of fixed capital as defined in the national accounts). This prescription for action (known as the primary criterion) applies as long as the debt-to-GDP ratio does not rise (so-called secondary criterion).

The concept of investment, which has always been the sore point in the golden rule, is thus much more narrowly defined than is implied in the relevant constitutional and budgetary regulations.⁵⁰ In particular, the Council's approach excludes lending and investment promotion measures, which are questionable from the point of view of regulatory, subsidy and monetary policy. The definition is also narrower compared with the Maastricht Treaty insofar as public sector investment in machinery and equipment (which does not carry a great deal of weight in Germany), depreciation and the social

47 See, for instance, Andel (1990), pp. 377-395 and Krause-Junk (1982 and 1983).

48 See Council of Experts (1981/82), p. 124 and Schmidt (1984).

49 See Council of Experts (1990/91), p. 188.

50 See, in particular, Schlesinger et al. (1993), pp. 209-216.

Table 16: Derivation of the structural deficit

- Comparison between previous and new concept of the Council of Economic Experts -

(DM billion)

No.	Item	Old calculation 1)		New calculation 2)	
		1993	1994	1993	1994
(1)	Financial deficit of the public authorities (according to the financial statistics)	160	180	137.3	137
(1a)	do. excluding ERP Special Fund	(150.5)	n.a.	135.8	132
(2)	- Cyclical component	31.5	59.5	20.9	28 ½
	(a) Lower receipts	23.0 3)	42.0 3)	9.8 4)	9 ½ 4)
	(b) Additional expenditure 5)	8.5	17.5	11.1	19
(3)	= Cyclically adjusted deficit	128.5	120.5	114.9/116.4 6)	103.5/108.5 6)
(4)	- Countercyclical measures	-	-	-	-
(5)	- Other portion not requiring consolidation				
(5a)	(a) Normal borrowing	46.5	48.0	-	-
(5b)	(b) Investment-oriented borrowing	-	-	46.7	44 ½
(6)	- Correction factor Bundesbank profit	-	-	0.7	1 ½
(7)	= Structural deficit	82.0	72.5	67.5	57 ½
	Old: (1) - (2) - (5a)				
	New: (1a) - (2) - (4) - (5b) - (6)				
	<i>Memo item</i>				
(8)	Cyclically neutral deficit	-	-	42.9	46 ½
(9)	Cyclical impulse	-	-	72.8	60 ½
	Old: no data for 1993-4				
	New: (1) - (2) - (6) - (8)				

1) Annual Report 1993/94. - 2) Annual Report 1994/95. - 3) Taxes and social security contributions. - 4) Taxes and contributions of the Federal Labour Office. - 5) Unemployment benefits, short-time working benefits, unemployment assistance (by the Federal Government). - 6) Relevant deficit for deriving the cyclical impulse.

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security sector are not included. A general expansion of the government ratio by way of credit-based "advance financing" is incompatible at least with the main criterion. The extent to which the capping proviso introduced with the secondary criterion is actually effective depends on the precise specification of the sustainability condition and on the underlying economic conditions.

2.2 Critical assessment

In the absence of the need for consolidation, the interaction of the two borrowing ceilings may be represented as follows:⁵¹

$$\underbrace{[g/(1+g)]d_{t-1}}_{\text{Auxiliary criterion}} \geq (B/Y)_t \leq \underbrace{(I_B^n/Y)_t}_{\text{Main criterion}}$$

Auxiliary criterion

Main criterion

where

g : nominal aggregate growth rate

d_{t-1} : debt ratio at the end of the previous year

$(B/Y)_t$: deficit ratio in the year concerned

$(I_B^n/Y)_t$: ratio of net capital formation for public sector construction in the year concerned

Several equivalent expressions may be used for the auxiliary debt condition in the formula above:

⁵¹ See section V.3. for the formal derivation and a detailed discussion of the sustainability criterion.

(1a)	$[g/(1+g)] d_{t-1} \geq b_t$
(1b)	$\Delta d_t \leq 0$
(1c)	$g \geq \Delta D / D$
(1d)	$d_{t-1} \geq \Delta D / \Delta Y$

In the form (1d), for instance, the said rule demands that marginal indebtedness should not be greater than average indebtedness, i.e.

Elasticity of indebtedness ≤ 1

This condition - as demonstrated as long ago as by Domar⁵² - is always satisfied in the long run because:

$$\lim_{t \rightarrow \infty} d_t = \frac{b(1+g)}{g} \quad ; \quad g > 0$$

Provided there is sustained economic growth, the long-run elasticity of indebtedness can be neither greater nor less than 1! The auxiliary criterion is therefore redundant in the long run.

The Council of Experts' sustainability condition provides no guarantee that the government will have permanent additional budgetary room for manoeuvre as a result of its indebtedness. It is well known that the long-run interest expenditure ratio (z) exceeds the borrowing ratio (k) if the interest rate (i) is greater than the rate of growth (g):

$$\lim_{t \rightarrow \infty} z_t = \frac{k \cdot i}{g}$$

In that case compensatory expenditure cuts in non-capital expenditure are necessary or (alternatively) the increase in the government ratio caused by the growing interest burden must be financed by taxes.

⁵² See Domar (1944).

The critical comment should also be made that the criterion of sustainability as stated here is dependent on the existing public debt ratio and on current real growth of GDP and the aggregate rate of inflation (see equation 1a). The higher the "debt mountain", the faster the pace of inflation, the greater the increase in aggregate demand, the weaker is the auxiliary condition. A conflict with a monetary policy strictly oriented to stability cannot be ruled out. Assuming annual real economic growth of around 2 1/2 % and given an inflation rate of 3 % and a public debt ratio of 60 % of GDP, the critical value for the deficit ratio would be 3.2 % of GDP; given a rate of inflation half as high (1 1/2 %), the critical value would be 2.3 % of GDP. The same applies to the long-term relationships. Without specifying the stability target it is not possible to establish whether a given deficit ratio is permanently compatible with given target values or tolerance margins for the public debt ratio.

Significantly, the auxiliary budgetary criterion in reality generated virtually no restrictive pressure in terms of fiscal policy in the period between 1974 and 1994 analysed by the Council. What, however, is the practical benefit - the interested reader might ask - of a sustainability criterion that does not effectively counteract the rise in the public sector interest burden ratio (which the Council also laments) even in the critical phases of a sharp increase in the burden? And why does the Council fail to specify an inflation rate consistent with stabilisation policy requirements, in view of the need - as the body itself pointed out on several occasions - to take a normative approach in deriving the structural deficit? The great care with which the Council devotes itself to the adjustment of the Bundesbank profit,⁵³ is not matched in the case of the far more significant elements of its new budgetary concept.

It would be quite possible and proper to give the "paper tiger" more claws. One possibility would be to specify a target debt ratio. The Council is well aware of this "open flank" in its line of reasoning but, without giving more detailed grounds, refrains from deriving an "optimum" or "tolerable" debt ratio. A positive debt ratio is scarcely compatible with a dynamically efficient economy. It can be legitimised when viewed in terms of allocation theory only in the absence of capital stock or if there is an overaccumulation of fixed assets or - for want of a better alternative (which would have to be justified) - if the market-distorting effects of taxation can be eliminated or reduced by using the public debt. The extent to which the general phenomenon of uncertainty or of the imperfection of the (capital) markets justifies a positive debt ratio is at least very doubtful.⁵⁴ The argument, finally, of endowing the public debt with a "productive" charm

⁵³ Since its 1981/82 Report, the Council has separated the Bundesbank profit into a permanent contribution margin and an irregular part. What is new about the present method is, firstly, that the "yield" of the central bank money stock is adjusted for the differential between the actual rate of change of the BIP-deflator and the rate that was still just acceptable in deriving the monetary target, and that subsequently a long-run average of the years 1986 to 1992 is formed. The long-run, inflation-adjusted yield is then applied to the central bank money stock which would have resulted if the target path had been realised.

⁵⁴ See Schlesinger et al. (1993) and Huber (1990).

by tying borrowing to investment is only really convincing in the event of a sharp surge in public sector investment and if their urgency allows no delay.⁵⁵ From the point of view of portfolio theory it would be the change in the debt ratio which would have to be focused on; in this case, the pace at which the public debt develops in relation to the money stock would also be crucial, as would the degree of liquidity of these forms of debt. In short: it is crucial whether the debt ratio is regarded as relevant only in terms of its budgetary consequences or whether, above and beyond that, permanent macroeconomic effects are also ascribed to it. It should be stated expressly at this point that monetary relationships (which otherwise tend rather to be neglected in the budgetary concepts) also play a part, although this argument is probably not unfamiliar in itself: *"The monetary effect of debt outlasts the deficits that produced it and their temporary fiscal effects. It endures as long as the debt itself".*⁵⁶

It would likewise be easy to give reasons for a price stability norm - in the shape, say, of the "cyclically neutral" inflation rate suspended by the Council or on the basis of the macro-economic benchmark figures used in deriving a non-inflationary monetary target. The permanent borrowing which is operationalised in this way may, in addition, be subject to strong cyclical movements if the traditionally procyclical capital formation of local government and the cyclical response pattern of the general price level are considered. For that reason consideration would have to be given to how far a smoothed ratio of capital formation covering a longer period could introduce greater continuity into the public debt policy rule.

3. Sustainability and the intertemporal budget constraint

3.1 *Basic relationships of debt dynamics*

The budget identity for the public sector in any given budgetary period forms the notional point of departure for fiscal sustainability. According to this, the financial balance or the resulting (absolute) change in the outstanding nominal level of debt are a product of the so-called primary deficit (budget balance excluding interest payments) and the secondary deficit (the spending requirement due to interest service).⁵⁷

⁵⁵ In substantiating this, the extent to which such an investment and borrowing requirement was or was not predictable would also have to be demonstrated.

⁵⁶ Tobin (1963), p. 146.

⁵⁷ In empirical studies it is often not possible to produce complete consistency between the movements of the "public debt" stock variable, the "budget balance" flow variable, and other factors. The numerical gap in breaking down the debt ratio is then closed technically by introducing a "stock-flow adjustment" item.

Relative to the output variable (Y) which is assumed to develop in line with the rate of growth (g), i.e. $Y_t = (1 + g) Y_{t-1}$, the following equation holds:⁵⁸

$$(1) \quad d_t = p_t + [(1 + i)/(1 + g)] d_{t-1}$$

The debt ratio (d_t) may thus be split into the primary deficit ratio (p_t) and the interest burden component for the debt ratio up to that point, the symbol (i) standing for the average effective rate of interest for the public debt.

The change in the debt ratio ($d_t - d_{t-1} = \Delta d_t$) is thus:⁵⁹

$$(2) \quad \Delta d_t = p_t + [(i-g)/(1+g)] d_{t-1}$$

According to (2), the development of the debt ratio is determined by the size of the primary deficit ratio, the difference between the interest rate level and the growth rate⁶⁰ and by the "inherited" debt ratio.

After repeated insertion we obtain the following solution for the (difference) equation (1):

$$(3) \quad d_T = \sum_{t=1}^T p_t * a^{T-t} + d_0 * a^T, \quad \text{where: } a = (1+i)/(1+g)$$

The continuous time version is:

$$(3') \quad d_T = \int_0^T p(t) * e^{(i-g)(T-t)} dt + d_0 * e^{(i-g)T}$$

Equations (3) and (3') reflect the fact - which is as elementary as it is fundamental - that the debt ratio at the end of the period T is the sum (the integral) of the primary deficits, together with the debt service to be made on them, and the initial debt, on which interest

⁵⁸ For what follows see also: Chouraqui et al. (1990); Blanchard et al. (1990); IMF (1990) and (1989), pp. 74-79; OECD (1990), pp. 14-20; Weale (1994); Mückl (1981); European Commission (1993); Buiter/Kletzer (1992).

⁵⁹ If, instead of the discrete time analysis, a continuous presentation is chosen (as is customary in the relevant literature but is not always practical for empirical studies), equation (2) is reduced to (2a): (2a) $\delta d = p + (i-g) d$.

⁶⁰ In the theoretical models it generally makes no difference whether the nominal growth rate and the nominal interest rate are used or the real growth rate and the real rate of interest. The two approaches are fully equivalent, however, only if the same price index is chosen for both variables, the "real rate of interest" is calculated in the conventional way and a continuous analysis is made in the period.

likewise has to be paid. In this context, the growth-adjusted effective average rate of interest is taken as the relevant interest rate.

Assuming a constant primary deficit ratio, (3) simplifies to the following debt-dynamic basic formula:

$$(4) \quad d_T = p \cdot \frac{1+g}{i-g} \cdot \left[\left(\frac{1+i}{1+g} \right)^T - 1 \right] + d_0 \cdot \left(\frac{1+i}{1+g} \right)^T$$

In continuous time, (4) translates into (4') which is handier for theoretical studies:

$$(4') \quad d_T = \frac{p}{i-g} \left[e^{(i-g)T} - 1 \right] + d_0 \cdot e^{(i-g)T}$$

or its equivalent:

$$(4'') \quad d_T = \left[d_0 - \frac{p}{g-i} \right] e^{-(g-i)T} + \frac{p}{g-i}$$

A number of different combinations of parameters should be differentiated:

(a) $g = i!$

For the discrete version - the variant that is more suitable for practical, empirical studies - it holds that:

$$d_T = p \cdot T + d_0$$

i.e. a time-linear slope of the debt ratio!

(b) $g > i!$

$$\lim_{t \rightarrow \infty} d_T = p \cdot (1+g)/(g-i)$$

i.e. a long-term constant debt ratio!

(c) $g < i!$; $d > 0$; $p > 0$;

$$\lim_{t \rightarrow \infty} d_T = \infty$$

i.e. a permanently rising debt ratio (see figure 10)!

For the growth rate of the debt level, i.e.

$$(5) \quad \Delta D/D = p(1+g)/d_T + i$$

it thus applies in the limit case:

$$(5a) \quad \lim_{t \rightarrow \infty} \Delta D/D = \max [g ; i]$$

3.2 *Solvency conditions and the primary budget gap*

Several criteria come into consideration as a yardstick of sustainability. The criterion represented most frequently in the recent literature on debt theory is that which ensures that the intertemporal budget constraint is observed.⁶¹ According to this, a debt level policy is sustainable in the long run as long as the level of debt grows less quickly than the matching level of interest rates or the debt ratio develops below the rate $(i-g)/(1+g)$, which is (for good reasons) assumed to be positive. In other words, a deficit policy which "finances" interest payments by new borrowing (so-called roll-over policy) is thereby ruled out (No-Ponzi-Game condition). A solvency criterion of this kind consequently implies only very weak restraint; it requires merely that the present value of the primary budget surpluses must in the long run match initial indebtedness. The government's net financial assets discounted by the factor $(i-g)/(1+g)$ would thus be zero.

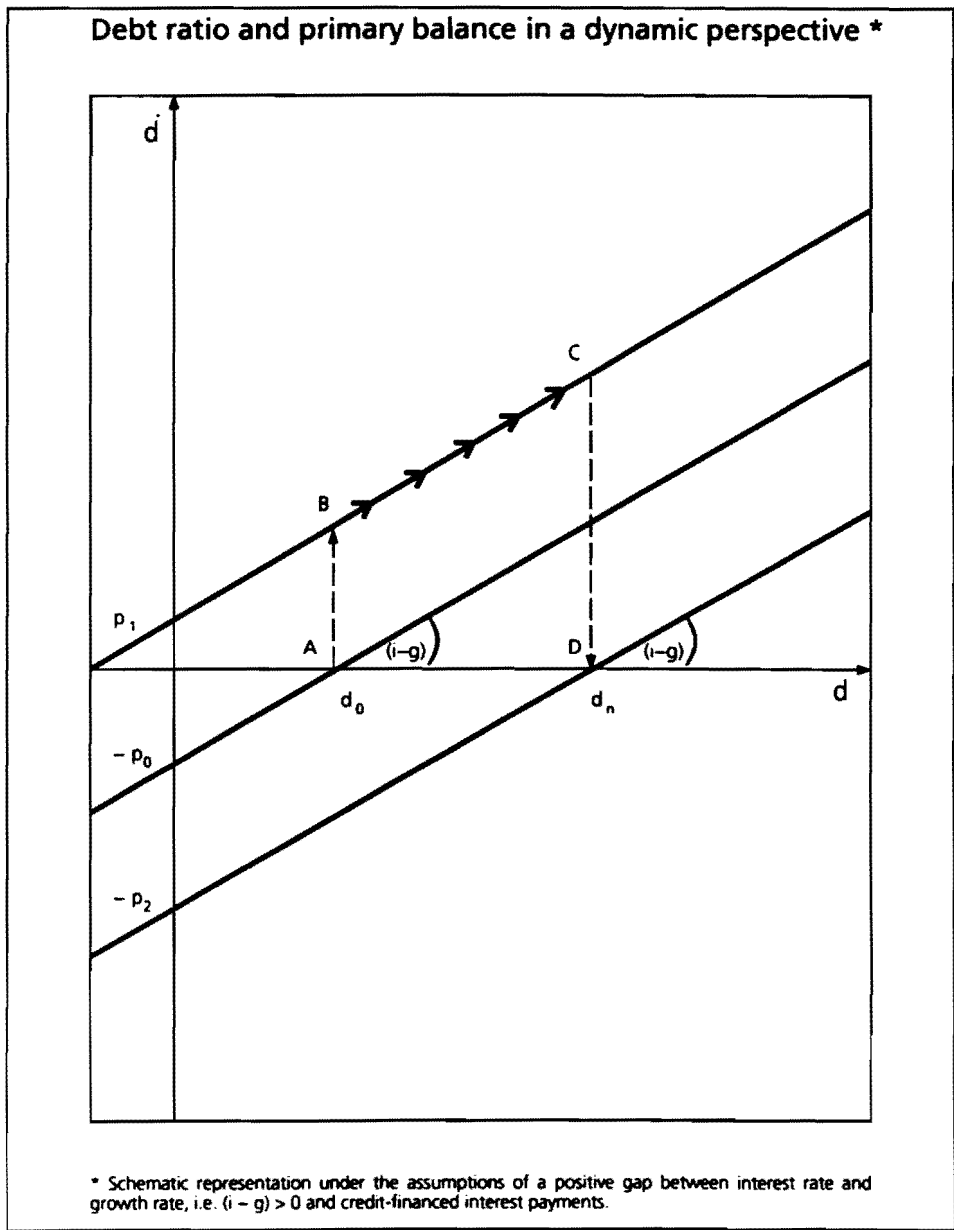
$$(6) \quad \lim_{t \rightarrow \infty} d_T [(1+i)/(1+g)]^{-T} = 0 \quad \text{or} \quad d_0 = - \sum_{i=1}^{\infty} p_i * a^{-i}; \quad i > g$$

It should be noted that the criterion specified in this way does not - as is often misinterpreted - make it a condition that the debt ratio ultimately "reconverges" to its original level although this goal is compatible with the solvency criterion. It is obvious that this general budgetary condition is inadequate for practical purposes, if only because it completely screens out the fiscal policy credibility aspect because of its "end-time analysis" and minimises the problem of the debt which has already accumulated. Furthermore, the criterion in its broad definition is compatible with a permanently rising interest burden ratio so that in reality the limits of public sector indebtedness are defined much more narrowly than the general solvency condition requires.

61 The "government budget constraint" was used analytically as early as by Wicksell and Ohlin, and later "rediscovered" by Ott and Ott (1965), Christ (1968) and Silber (1970). A good account of the concomitant model implications in the IS-LM paradigm may be found in Turnovsky (1977), pp.36-85. See, above all, Buiter (1985) on the "second renaissance".

Figure 10

$$\dot{d} = p + (i - g) d$$



The conspicuous lack of operationality and practicability can, nevertheless, be rectified. Thus in line with the theoretical construct of the intertemporal budget constraint, the stricter requirement could be made that the debt ratio reached at the end of the (finite) period T returns to its initial level.⁶² Three specifications are to be looked at in greater detail here by way of illustration:

Assuming that d_T^* is the debt ratio to be realised at time T, then in accordance with equation (4) a permanent (!) primary budget balance (as a percentage of GDP) at the level of p^* is required:

$$(7) \quad p^* = (1-a)d_0 + (d_T^* - d_0)/s_n$$

$$\text{where:} \quad a = (1+i)/(1+g) \\ s_n = (a^T - 1)/(a - 1)$$

If this requirement is compared with the actual initial fiscal policy starting position, a measure is obtained of the sustainability gap (Ψ) in the primary budget:

$$\psi = p - p^*$$

In a somewhat modified formulation, the (primary) budget gap also supplies information on how the tax burden must be varied, given a specified time path of primary spending (h_t), in order to obtain that level of the debt ratio at the end of the planning period which corresponds to the status quo. With this variant the required overall tax ratio (t^*) is:

$$(8) \quad t^* = \frac{i-g}{1+g} \left[\left(1 - \frac{1}{a^T} \right)^{-1} \sum_{t=1}^T h_t \cdot a^{-t} + d_0 \right]$$

The tax adjustment requirement is thus:

$$\psi = t^* - t$$

By contrast, if a given debt ratio (owing, for example, to the exhaustion of investor confidence on the national and international credit markets) were judged as sustainable only to the extent that it has been falling for a considerable length of time, this condition

⁶² The associated sustainability variants were discussed in detail for the first time in Blanchard (1990) and Blanchard et al. (1990). See in this connection also Buiter et al. (1992).

-given a positive interest-growth differential ($i - g > 0$) - would be met only if the following set of circumstances were achieved:⁶³

$$(9) \quad - p^* > (i - g) d_0$$

The primary budget gap ($\Psi = p - p^*$) would, however, still remain indeterminate to the extent that the pace of the falling debt ratio has not also been defined. In that respect the (inequality)equation (9) only determines a lower limit for the surplus considered to be desirable in the primary budget. If the interest rate exceeds the rate of growth by two percentage points, for instance, a positive primary balance of at least (!) 1.2 % of GDP per annum would be required given an initial debt ratio of 60 %.

A "swing" of more than 3.2 percentage points of GDP would thus have to be brought about given an actual primary deficit of 2 %, for example. Given a government ratio of 50 % of GDP, the minimum adjustment requirement would amount to roughly 6 1/2 % of overall expenditure. Faced with a consolidation requirement of this scale, the question of gradualism versus "cold turkey" would surely have to be settled in favour of a medium-term process of consolidation. A small debt adjustment model is able to provide useful assistance in this.

3.3 *A linear adjustment model of public debt*

The following analytical framework would seem to be useful for simulation purposes and for reviewing the consolidation and convergence programmes, particularly in view of the second budgetary criterion for limiting the debt ratio to a maximum 60 % of GDP laid down in the Maastricht Treaty.

Assuming d^*_T is the debt ratio to be realised at a future point in time T, and that the favoured consolidation strategy prescribes a linear process of adjustment in the operational area of the budget⁶⁴, i.e. the primary balance, the periodic consolidation requirement (β) for the phase of deficit reduction may be determined as follows:

$$(10) \quad d_T = p_0 * \frac{a^T - 1}{a - 1} + \beta \sum_{t=1}^T a^{T-t} * t + a^T d_0$$

The budgetary adjustment parameter to be derived from this is:

⁶³ The condition (9) results from the derivation of equation (4') with respect to time.

⁶⁴ In this connection see also Blanchard (1984) and Amann/Jäger (1989).

$$(11) \quad \beta = \frac{d_T^* - d_0^* a^T - p_0^* s_n}{s_n + \frac{1}{a-1}(s_n - T)}$$

with the factor: $s_n = (a^T - 1)/(a - 1)$

For the special case of an immediate, complete stabilisation of the debt ratio it follows from (11) that:

$$(11a) \quad \beta = (1-a)d_0 - p_0$$

If this requirement is compared with the actual fiscal policy situation, the primary deficit considered to be desirable (p^*) is:

$$(12) \quad p^* = (1-a)d_0$$

The budget gap (Ψ) to be closed is:

$$\begin{aligned} \text{generally:} \quad & \psi = p - p^* \\ \text{specifically:} \quad & \psi = p + [(i - g)/(1 + g)] d_0 \end{aligned}$$

In other words, with this consolidation strategy, the primary budget gap matches the (absolute) change in the projected debt ratio.

There would, of course, be no discretionary budget adjustment requirement in the case of growth-induced autoconsolidation of an expansionary deficit policy. As may be seen from (2), given an assumed debt ratio of 50 %, a permanent increase of the government expenditure ratio or a lowering of the government levy ratio by 1 percentage point would only then not result in a higher debt ratio if economic growth could be accelerated by around two percentage points annually.

The small debt adjustment model presented here has some limitations. It is important to note that it is not incorporated into an overall economic framework. The interest rate level and the growth rate are regarded as exogenous variables. Any feedback to the borrowing process is thus not taken into account. The criterion of sustainability of government indebtedness, as measured by the budget gap, needs to be substantiated separately. The same applies to the manner and the pace of a necessary process of consolidation. This approach is, however, open to a large number of enhancements and specifications; when employed correctly, it represents a useful supplement to the traditional array of analytical instruments and offers a flexible model framework not least for issues of budgetary consolidation (see table 17 for various adjustment scenarios).

Table 17: Hypothetical debt-policy adjustment scenarios

- % of GDP -

Item		Overall economic benchmark variables					
		I		II		III	
		i = 7 %	g = 6 %	i = 7 %	g = 5 %	i = 5 %	g = 7 %
Target: $d^* = 60\%$; $T = 5$	A	Fiscal policy starting position: d(o) = 70 % $\beta^* = - 1.55$ p(o) = 2 % p(T) = - 5.75 b(o) = 6.44 % b(T) = - 1.45 z(o) = 4.44 % z(T) = 4.30		$\beta^* = - 1.78$ p(T) = - 6.88 b(T) = - 2.50 z(T) = 4.38		$\beta^* = - 1.00$ p(T) = - 2.56 b(T) = 0.42 z(T) = 2.98	
	Status quo d(T) : debt level 83.6 p(T) : primary deficit 2.0 b(T) : total deficit 7.3 z(T) : interest burden ratio 5.3		87.3 2.0 7.6 5.6		73.3 2.0 5.4 3.4		
Target: $d^* = 40\%$; $T = 5$	B	Fiscal policy starting position: d(o) = 55 % $\beta^* = - 1.00$ p(o) = - 0.5 % p(T) = - 5.47 b(o) = 2.5 % b(T) = - 2.50 z(o) = 3.0 % z(T) = 2.97		$\beta^* = - 1.20$ p(T) = - 6.30 b(T) = - 3.27 z(T) = 3.03		$\beta^* = - 0.05$ p(T) = - 3.10 b(T) = - 1.10 z(T) = 2.10	
	Status quo d(T) : debt level 55.1 p(T) : primary deficit - 0.5 b(T) : total deficit 3.1 z(T) : interest burden ratio 3.6		57.8 - 0.5 3.3 3.8		47.6 - 0.5 1.8 2.3		

* The adjustment parameter (β) indicates by how many percentage points the primary deficit ratio per year must be revised under the assumed overall economic conditions in order to achieve the set quantitative and temporal consolidation target given the respective fiscal policy starting position.

w:tab2-3\950809S8

In addition, it is possible without further complication to integrate the calculations on the cyclical or structural budget balance into the context of debt dynamics and to use them for medium-run projections. The cyclical parameter δ serves as a supplementary component; this states by how many percentage points the primary deficit ratio varies given a change of 1 percentage point in the utilisation of production potential:

$$(13) \quad \Delta p = \beta - \delta \Delta \text{gap};$$

$$(14) \quad \Delta d_t = p^s + \beta t - \delta * \text{gap} + [(i-g)/(1+g)] d_{t-1}$$

where

- p^s : structural (cyclically adjusted) primary deficit
- β : discretionary component of the budget balance
- $\delta * \text{gap}$: cyclical part of the budget balance

Consolidation requirements and cyclical factors may thus be separated in terms of the significance of their impact on debt dynamics and, given a specification of growth rates for real GDP and output potential, can be studied separately for their debt effects in sensitivity analyses.

VI. Summary

The public authorities' financial balance has always played a prominent role when monitoring, interpreting and assessing budget policy decisions and developments. The Maastricht Treaty on European Union and the provisions contained therein on budgetary criteria and reference values gave rise to an additional demand for informative and comparable budget indicators. The financial balance that can be taken from the various statistics is initially only a conglomerate collated to a single numerical variable from a combination of trend-related, cyclical and transitory external influences, on the one hand, and the interaction of basic fiscal policy decisions on the public receipts and expenditure system and discretionary measures of current budget policy, on the other. Different cyclical positions, in particular, often conceal or distort the picture of basic financial tendencies in public sector budgets.

Perceptions of the fiscal weight of the structural deficit and, even more so, of that part of the core deficit requiring consolidation measures as well as the restructuring course to be adopted diverge considerably; the individual reasons for this often remain vague and unclear. Budgetary concepts can be of help in this context, albeit with various provisos.

Seen as gauges, they help to determine the budgetary position of the public sector. They provide quantitative guidance - comparable to rules of thumb - and constitute a compromise between the complexity of the object to be examined and the general need for handy summary variables which are readily available and simple to calculate.⁶⁵

The present analysis is concerned primarily with the methodological and technical foundations of summary indicators of the fiscal deficit. Generally speaking, three construction steps are identified:

- choice of the statistical "raw" balance,
- determination of the so-called output gap,
- estimate of the quantitative weight of built-in stabilisers.

The question which real and/or financial transactions or which valuation and stock effects the financial balance is to measure must be considered carefully by weighing up the specific advantages and disadvantages of various statistics (above all cash accounts, financial statistics, national accounts). The system of national accounts, which is preferred in this analysis, enables, firstly, a better comparison with the budget calculations of international organisations and, secondly, conforms with the method of calculation for the deficit criterion stipulated in the Maastricht Treaty.

The national account balance is the preformed raw material from which the structural core must be extracted by removing the cyclical shell (and possibly other temporary distortions). The cyclical deficit can be seen in a simplified approach as a linear function of the output gap where the latter is considered to be a real economic disequilibrium phenomenon of the overall goods market. In the IMF's parlance, the link between the two is the cyclical response parameter which constitutes the yardstick for the sensitivity of public budgets to fluctuations in the overall degree of capacity utilisation. The size of cyclically induced financial balances consequently shows an indirect, proportional causal connection with the "law of motion" of the business cycle. Estimates of production potential are therefore at the macroeconomic "heart" of budgetary approaches. The results presented here are based on the Deutsche Bundesbank's calculations of production potential; a CES function whose parameters (for western Germany) were determined by means of a multi-stage procedure for the period from 1971 to 1994 serves as a production-theoretical approach. A comparison shows that most of the discrepancies in the calculations relative to the structural deficit can be attributed to methodological differences or different estimating techniques in determining production potential.

In this context, the output gap is of importance for public authorities insofar as it manifests itself in an income and/or a labour market gap. Only those variations in public

⁶⁵ Apart from estimates it is above all the narrow analytical view caused by the focus on the balance which must be borne in mind.

receipts and expenditure are regarded as cyclical which respond automatically and directly to fluctuations in income and in the labour market (so-called passive budget flexibility). The relation between goods and labour markets can be checked empirically by means of the Okun approach. According to the estimates, a change in the output gap of 1 percentage point is on average reflected in a change of just over 1/2 percentage point in the unemployment rate. The transfer payments which this triggers are calculated on the basis of the statistics of current transfers, compiled by the Federal Labour Office.

The financial implications for the inflow of contributions to the social security funds was derived on the basis of the difference between average pay and wage substitutes. Examination of the sensitivity of tax receipts to cyclical factors did not produce any stable, reliable elasticity coefficients at a disaggregated level. On the other hand, for aggregate tax revenue, an output elasticity of about 1 was found over the longer term though with in some cases substantial "outliers" from year to year.

As a key result, the present analysis produces the following general formula: fluctuations in the overall degree of capacity utilisation of 1 percentage point are on average reflected in a change of almost 1/2 % of GDP in the general government financial balance, mainly on the receipts side. Limiting the structural deficit ratio to between 1 % and 1 1/2 % of GDP would therefore leave enough room for the built-in stabilisers to take effect, without infringing the deficit criterion of Maastricht. The extent to which the built-in flexibility of the public sector budget can in actual fact exert a stabilising influence must be decided according to the prevailing situation. In terms of demand theory, the impact of the associated macroeffects does not basically differ from that of discretionary measures.

The determination of cyclically adjusted financial balances is, of course, only a first, indispensable step towards ascertaining budgetary consolidation requirements. Examination of the necessity for an adjustment of the balance for inflation (as has often been called for), in addition to the adjustment for cyclical influences, did not provide sufficiently convincing arguments. The "investment-oriented borrowing" recently raised in the discussion by the German Council of Economic Experts, which - apart from the primary criterion based on growth theory considerations - incorporates a special version of the sustainability condition of debt processes as a secondary budget policy criterion, does not appear to be "fully developed", despite some positive approaches. The suitability of the general sustainability restriction in the sense of a solvency condition derived from the intertemporal budget equation, which is dealt with in the final section of this paper, as a touchstone for deficit policy in practice, is likewise restricted because it is formulated too "softly"; nevertheless, the so-called primary budget gap derived from it is open to a number of interesting modifications. For longer term financial projections and fiscal consolidation, in particular, even small adjustment models of public debt may be useful.

Annex

The new OECD approach to the structural deficit

- formal presentation -

The new OECD approach to calculating the structural budget deficit is based on the following tax and expenditure functions in the general formulation:

$$(1) \quad T = a \cdot Y^\varepsilon$$

or

$$(2) \quad G = b \cdot Y^\eta$$

The parameters ε and η denote the elasticity of government revenue or spending in relation to the output variable.

For tax revenue given normal capacity utilisation (T^*) or for the corresponding government expenditure (G^*) it immediately follows that:⁶⁶

$$(1a) \quad T^* = T (Y^* / Y)^\varepsilon ; \varepsilon \geq 0$$

or

$$(2a) \quad G^* = G (Y^* / Y)^\eta ; \eta \leq 0$$

⁶⁶ In earlier versions the OECD used the following approximation formula for the above representation:

$$T^* = T(1 + \varepsilon \cdot gap)$$

For a better comparison, equation (1a) may be written as:

$$T^* = T(1 + gap)^\varepsilon$$

(1a) and (2a) produce the following statement for the structural budget balance (B^*):

$$(3) \quad B^* = \sum_{i=1}^4 T_i (Y^* / Y)^{\epsilon_i} - G_i (Y^* / Y)^{\eta} - G_k$$

The tax revenue is broken down into four categories on the revenue side:

- income tax
- corporation tax
- social security contributions
- indirect taxes

A bipartition is made on the expenditure side:

- current expenditure (G_i)
- capital spending (G_k) which is regarded as non-cyclical.

The new IMF approach to the structural deficit

- formal representation -

The IMF's estimation approach takes as its direct starting point the deficit ratio (b = financial balance as a % of GDP) and estimates "cyclical response parameters" (α) for the government levy ratio (t) and the government spending ratio (h) as an expression of the cyclical sensitivity of the revenue and expenditure sides. The government levy and spending ratios are each broken down into a structural and a cyclical component, so that:

$$t = t^* + t^c$$
$$h = h^* + h^c$$

In a second step the IMF makes use of the idea that it is possible to describe the (absolute) change in the tax ratio or in the spending ratio over time as follows (g = GDP growth rate):

$$\Delta t = t \cdot (\varepsilon - 1) \cdot g / (1 + g)$$

or

$$\Delta h = h \cdot (\eta - 1) \cdot g / (1 + g)$$

With a static interpretation and relative to the output gap ($gap = (Y - Y^*)/Y^*$), it follows for the cyclical balance components that:

$$t^c = \alpha_r \cdot gap$$

$$\alpha_r = t(\varepsilon - 1)$$

or

$$h^c = \alpha_h \cdot gap$$

$$\alpha_h = h(\eta - 1)$$

In summary the disaggregation of the components for the deficit ratio (b) is represented as follows:

$$b = t - h$$

$$b = (t^* + t^c) - (h^* + h^c)$$

$$b = [t^* + \alpha_r \text{ gap}] - [h^* + \alpha_h \text{ gap}]$$

$$b = [t^* + t(\varepsilon - 1)\text{gap}] - [h^* + h(\eta - 1)\text{gap}]$$

The cyclical deficit ratio is thus:

$$b^c = (\alpha_r - \alpha_h) \times \text{gap}$$

The IMF assumes the following (summarised) response parameters ($\alpha_r - \alpha_h$) for the major industrial countries:

Country	Response parameter
United States	0,36
Japan	0,37
Germany	0,56
France	0,48
Italy	0,49
United Kingdom	0,50
Canada	0,60
G-7	0,42

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