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Fiscal Affairs Department

A Note on the Concept of the Public Sector Deficit in
Stabilization Analysis for High-Inflation Countries

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I. Introduction

In this paper the conventional fiscal deficit 1/ is compared with the operational deficit--a concept which has at times been advanced as the appropriate deficit concept for fiscal analysis in high-inflation countries. Briefly, while the conventional deficit measures the imbalance between revenue (excluding borrowing proceeds) and expenditure (excluding amortization), the operational deficit additionally excludes from the above-the-line components that part of nominal interest payments which is considered inflation-induced. 2/ In comparing the two deficit concepts, the focus in this paper is on their suitability as overall indicators of the fiscal contribution to stabilization and hence to adjustment over time, particularly under high inflation rates and in the context of stabilization objectives such as those which might be incorporated into a Fund-supported program. 3/

The analysis starts with a discussion of the purpose of the fiscal deficit concept as a macroeconomic indicator, and the relationship between the fiscal deficit and the balance of payments (Chapter II). The conventional and operational deficit concepts are outlined in Chapter III. This is followed by a discussion of the impact on the budget of inflation and indexation under alternative assumptions, while the adequacy of the alternative deficit concepts as indicators of income and demand expansion is assessed in Chapter V. Problems in quantifying the operational deficit are outlined in Chapter VI. This discussion is followed by a review of the usefulness of the two alternative deficit concepts in financial programming under inflation (Chapter VII). Conclusions are presented in Chapter VIII, and the appendix contains, in a simple model, an algebraic analysis of the responses of the operational and conventional deficits to inflation.

1/ The terms "fiscal," "government," or "government sector" are used interchangeably with public sector in this paper as the analysis applies equally to the wider and narrower public sector concepts. Furthermore, although the analysis applies equally to the public sector balance, whether in surplus or in deficit, the more usual (and hence significant) case is that of a country in deficit. The use of the term "public sector deficit"--in lieu of "balance"--merely underscores this significance.

2/ The two concepts are discussed in more detail in Chapter 3.

3/ The focus on the overall financial consequences of fiscal operations contrasts with methodologies which employ special indicators in the examination of fiscal policy under a variety of particular assumptions. An example of this latter group is the cyclically adjusted budget deficit, in which a measure is created of the impact of fiscal policy in the absence of the business cycle.

II. The Purpose of the Fiscal Deficit as a Macroeconomic Indicator

In broad terms, the analytical usefulness of the overall fiscal balance is as the principal measure of the pressure on aggregate supply emanating from the government or the public sector (see Chelliah (1973)). At its most fundamental level, this view of the deficit is based on the following propositions: (1) the receipt of revenue curtails demand; whereas (2) expenditure adds to aggregate demand, while (3) financing the expenditure/revenue imbalance (the government deficit) normally will not reduce demand as does revenue, and in any event requires separate analysis in the context of other policies (principally monetary and balance of payments policies). ^{1/} Whereas the overall fiscal deficit measures the demand pressure from government, other sectors may adjust, or be forced to adjust (for example through crowding out) to a change in the government's pressure on resources, reinforcing or offsetting the economic impact of government operations. Such effects are, however, most appropriately analyzed within the context of developments in the sectors concerned when assessing performance of the economy as a whole.

In national income accounting the government deficit is the measure of resources which the government sector must attract from other sectors--domestic or foreign--in order to finance its operations. In the framework of government finance statistics, the government deficit should present comprehensively "the government's overall financial position and ... its impact, in most circumstances, upon monetary conditions and the balance of payments. The precise government impact upon monetary conditions, however, is left to a final analysis of the components of financing and their relevance in particular conditions." (International Monetary Fund (1974, p. 133)). With this purpose in mind the deficit is defined conventionally from "above the line" as revenue (usually plus grants) less expenditure for goods and services (including interest payments) and net lending. Net lending comprises all loans and financial investments made by the government for policy purposes (that is, for reasons other than liquidity management) less repayment of such past loans. The corresponding definition from "below the line" of the deficit financing items is gross borrowing less amortization together with the increase or decrease in cash holdings.

In a closed economy, the government deficit measures the surplus which the private sector must generate to finance the government. Thus, it measures both the government sector's contribution to demand pressure and the adjustment in other sectors necessary to finance

^{1/} Whether this pressure is inappropriate in a particular case will, of course, depend on a variety of cyclical and structural factors.

the government deficit. Financing occurs either directly by bond placements or indirectly by competition with the private sector for available funds from the banking system. This process of sectoral competition may be reflected in changes in interest rates, which will ensure that the financing needed by government is released by the private sector. Alternatively, the interest rate mechanism may be replaced by direct allocation of credit, at least in the short term. If highly expansionary monetary policies are pursued (perhaps in part to finance the government deficit) such that excess demand conditions are created, the inflationary process will play a role in curtailing private sector demand. In any event, the private sector will be forced to release resources to the government, thereby registering an equivalent sectoral surplus.

In an open economy, the deficit points to the government's contribution to the domestic supply gap--the excess of domestic demand over supply--separate from the compensatory adjustments in other sectors (see Milne (1977) and Kelly (1982)). In the open economy, the equality between domestic supply and demand no longer holds. The government's potential sources of financing are augmented by the availability of external financing and, in the short run, by the possibility of expansionary bank financing compensated for by a reduction in net international reserves. The extent of the domestic supply gap is evidenced in the current account of the balance of payments and reflects the private sector's less than full adjustment to the government's deficit position.

In the open economy, therefore, the assessment of the overall impact of the government per se on the domestic supply gap must be supplemented by an analysis of the corresponding changes induced in the private sector demand/supply relationships. In the evaluation of such changes, it is an important consideration that different mixes in financing the fiscal deficit may affect the private sector's spending patterns and portfolio decisions differently. Thus, whereas the macroeconomic impact of fiscal policy is analyzed through the overall fiscal deficit and deficit financing flows, shifts in the private sector's demand curve in reaction to a change in the government deficit must be taken into account when assessing macroeconomic developments in the whole economy. Barring a completely offsetting private sector demand shift (such as maintenance of private sector demand in the face of a tax increase), a reduction in the government's deficit relative to nominal activity will lead, *ceteris paribus*, to an improvement in the current account of the balance of payments. ^{1/} This reasoning forms the basis for the emphasis on fiscal policies in stabilization programs.

^{1/} Kelly (1982) points to the interdependence of the sectoral deficits and notes that an improvement in the fiscal deficit may be effected by policy instruments that change the private sector's deficit (e.g., tax rates, government expenditure) or may be the result of policies that change the private sector balance.

III. The Concepts of Conventional and Operational Deficit

Conventionally, the government deficit has been defined for economic analysis from above the line as revenue (i.e., excluding gross borrowing proceeds) less expenditure (i.e., excluding amortization), and is financed through the below-the-line items of gross borrowing less amortization (International Monetary Fund (1974)). It is generally agreed that in the absence of inflation this overall budgetary balance, rather than any component such as the government's current account balance, is the relevant concept for assessing the overall impact of government operations on the remainder of the economy and the balance of payments. The financing of the overall deficit clearly points to its monetary implications and highlights the fact that the short-term monetary and demand effects of borrowing for different types of expenditure are different only to the extent that different expenditure categories contain different import proportions.

The above deficit definition measures the government's net overall need for borrowed financial resources. Among other things, it implies that (1) amortization payments are different in nature from above-the-line expenditure items; (2) the demand impact of government amortization payments is equal but opposite to that of new borrowing by the government; and (3) such payments consequently can be offset against new borrowing by government. As an indicator of the government's contribution to the domestic resource gap, the fiscal deficit is often measured relative to nominal gross domestic product (GDP).

Recently, it has been advocated that under conditions of high inflation a different concept of fiscal deficit would express more adequately the government's contribution to demand pressure. The proposed concept--the operational deficit--differs from the conventional deficit only in its treatment of nominal interest. The part of interest transfer payments, which by institutional arrangement or by assumption can be considered inflation-induced (often referred to as the "monetary correction"), is in effect excluded from the deficit-determining items (i.e., revenue and expenditure) and thus implicitly included in the deficit-financing items (i.e., below the line) as equivalent to amortization. ^{1/} The rationale for this exclusion is

^{1/} The problems of identifying the inflation-induced component of the interest payments, both with and without indexation, are explored in more detail in Chapter VI below. When indexation is institutionalized, the lack of an ideal inflation measure, lags, and imperfections in indexation will be reflected in an inaccurate measurement of the part of the deficit that is induced by inflation and in corresponding inaccuracies in the measurement of the interest component of the operational deficit. When indexation is not institutionalized, estimation of the operational deficit requires a separation between "real" and inflation-induced interest payments, and this separation raises problems regarding the true inflation rate on which the calculation should be based.

on the one hand, that it is real (rather than nominal) interest which affects the real national income and expenditure streams and, on the other hand, that only changes in the "real" (rather than nominal) stock of debt are relevant. ^{1/} While this view is discussed further below, it may be noted here that indexation payments affect the debt stock differently from nominal amortization payments. Whereas an amortization payment financed by borrowing is reflected in an unchanged nominal debt stock (and in the presence of inflation, in a fall in the real debt stock), financing the inflation adjustment or indexation payment by borrowing results in an equal increase in the nominal debt stock. For example, amortization of \$10 million on a \$50 million debt stock would reduce outstanding debt to \$40 million, but if the amortization payments were financed by borrowing of \$10 million the net effect of the amortization transactions would be an unchanged nominal stock of debt. By contrast indexation of 20 percent on a \$50 million debt stock which was also financed by borrowing would raise the government's liability to the holders of debt by \$10 million to \$60 million.

To demonstrate the relationship between the two concepts, a hypothetical calculation of quarterly operational and conventional deficits for a given year is shown in Table 1. In the example, it is assumed that all public debt is subject to "monetary correction" every quarter for inflation occurring in the previous quarter: that the quarterly fixed real interest rate is 1 1/2 percent; ^{2/} and that real revenue and real noninterest expenditure are unchanged while nominal revenue and noninterest expenditure increase in each quarter to reflect inflation in the same quarter. Table 1 lists real quarterly revenue and expenditure assumptions, together with the quarterly inflation assumption. As indicated in the table, the operational deficit is less than the conventional deficit, and over time the difference between the two measures increases both in nominal and relative terms. A more rigorous derivation of the differences between the two concepts is contained in the Appendix, which forms the basis for the analysis in Chapter IV.

IV. Inflation and the Government Deficit Concept

The sensitivity of alternative deficit concepts to changes in the inflation rate is analyzed in a comparative static framework in the Appendix, in a model in which it is assumed that a price rise

^{1/} See, for example, Buiter, (1980) and Miller, (1982). Eisner and Pieper (1984) adopt this approach, analyzing fiscal policy in the United States by deriving "real" budget deficits from real debt series, "to avoid the cardinal sin of money illusion" (p. 11).

^{2/} In this paper real interest payments denote the payments corresponding to a fixed real rate of interest paid on the outstanding nominal debt stock. Consequently, these payments will vary with inflation--as evidenced in Table 1 and the Appendix--because the real rate of interest is applied to an indexed principal.

Table 1. Calculation of Operational and Conventional Government Deficit

(In millions of national currency units)

	Year t				Total
	I	II	III	IV	
Revenue	8,202	9,842	13,765	22,038	53,847
Operational expenditure	8,980	10,751	14,943	23,741	58,415
Noninterest	8,605	10,327	14,442	23,122	56,496
Interest	375	424	501	619	1,919
Operational deficit	-778	-909	-1,178	-1,703	-4,568
Monetary correction <u>1/</u>	2,500	4,242	6,685	16,517	29,944
Conventional deficit (or public sector borrowing requirement, PSBR)	-3,278	-5,151	-7,863	-18,220	-34,512
<u>Memorandum items:</u>					
Operational deficit in					
percent of conventional deficit	23.7	17.6	15.0	9.3	13.2
Inflation, quarterly (percent) <u>2/</u>	15	20	40	60	N/A
Real revenue, quarterly <u>3/</u>	7,132	7,132	7,132	7,132	N/A
Real expenditure, quarterly (excluding monetary correction) <u>3/</u>	7,483	7,483	7,483	7,483	N/A
End of period debt <u>4/</u>	28,278	33,429	41,292	59,512	59,512

1/ In principle, monetary correction in any period measures the inflation-induced increase in the value of public debt, whether or not this gives rise to an actual cash outlay on the part of the public sector. As shown in the text, the increased value of outstanding government bonds--rather than the associated cash expenditure in any period--is the relevant variable for demand as well as debt management.

2/ Last quarter of year t-1 = 10 percent.

3/ In prices at last quarter of year t-1.

4/ Outstanding debt as of December 31 in year t-1 = \$25,000 million.

Note: Each quarterly calculation proceeds as follows: Nominal revenue and non-interest expenditure are calculated by applying the cumulative current inflation to real revenue and noninterest expenditure. Real interest expenditure is calculated on nominal stock of debt at the beginning of period. The stock of debt at the beginning of period is revalued by the previous quarter's inflation factor to calculate the monetary correction, and the new stock of debt is determined. With an end-year t-1 debt stock of 25 billion units, real interest payments in the first quarter of year t are 375 million units, which when added to noninterest expenditure in the first quarter of year t yields the operational deficit of 778 million units. Additionally, however, the inflation adjustment (monetary correction) on the stock of debt in the first quarter was 10 percent or 2.5 billion units, so that the overall deficit (or PSBR) was 3.278 billion units in the first quarter. Proceeding from the new debt stock, the second, third, and fourth quarter operational balances and overall deficits can be calculated.

(measured by a single index) in period t is reflected fully in both revenue and noninterest expenditure in period t ; that real interest on nominal debt outstanding at the end of period $t-1$ is paid in period t at a fixed rate; that monetary correction during any period is applied to the stock of debt outstanding at the end of the previous period; and that nominal GDP growth reflects a real component as well as an inflation component identical to the price rise that affects revenue, noninterest expenditure, monetary correction, and the outstanding stock of debt. Clearly these restrictive, simplifying assumptions are not applicable in the real world, but they do demonstrate the relationships between the two deficit concepts and, as noted below, the principal conclusions regarding the sensitivity of the alternative deficit concepts to inflation do not depend on these restrictive assumptions. The results of the analysis, which shows that changes in inflation, real revenue, and expenditure result in very different movements in the two deficit measures, are summarized in Table 2.

As shown in Table 2, the two deficit concepts cannot be considered substitutes as indicators of the impact of the government's operations on the domestic supply gap because they exhibit such a wide difference in their sensitivity to movements in the inflation rate. The conventional deficit is much more sensitive to changes in the inflation rate than the operational deficit, both in nominal terms and when measured relative to GDP. In some cases, the same movements of revenue and noninterest expenditure may be reflected in changes in the ratio of the operational deficit to GDP in the direction opposite to that of the conventional fiscal deficit.

Three cases from Table 2 (cases 3, 6, and 7) are simulated over time, as they are of particular interest, with the results of the simulation shown in Chart 1. The assumptions for the simulations are shown in Table 3. Two of these cases (cases 3 and 6) demonstrate that identical movements in revenue or expenditure, including monetary correction, may result in opposite movements in the two deficit measures, depending on the path of inflation. In case 3 (case 6) an increase (decline) in real revenue or a decline (increase) in real expenditure (excluding monetary correction) relative to real GDP results in opposite movements (movements in the same direction) of the ratio of the two deficits to GDP under rising inflation and movements in the same direction (opposite direction) when inflation declines. The remaining simulation (case 7) maintains equal growth of real revenue and real expenditure (excluding monetary correction). Thus the ratio of the operational deficit relative to GDP is independent of inflation, resulting in a constant ratio. However, the corresponding ratio for the conventional deficit rises (falls) with accelerating (decelerating) inflation.

With less restrictive assumptions on the effect of inflation on both revenue and expenditure, the sensitivity to inflation of both the operational and the conventional balance concepts will vary from the position outlined above. However, both balance concepts will be

Table 2. Ratios of Operational and Conventional Deficits to GDP:
Impact of Real Revenue and Expenditure Measures
under Different Inflation Assumptions 1/
(Comparative Statics Analysis)

Cases	<u>With Increasing Inflation</u>		<u>With Declining Inflation</u>	
	Operational Balance	Conventional Balance	Operational Balance	Conventional Balance
Real revenue increase/real expenditure decline <u>2/</u>				
1. $\Delta R > MC$	Improvement	Improvement	Improvement	Improvement
2. $\Delta R = MC$	Improvement	Constant	Improvement	Improvement
3. $\Delta R < MC$	Improvement	Deterioration	Improvement	Improvement
Real expenditure increase/ real revenue decline <u>2/</u>				
4. $\Delta G > MC$	Deterioration	Deterioration	Deterioration	Deterioration
5. $\Delta G = MC$	Deterioration	Deterioration	Deterioration	Constant
6. $\Delta G < MC$	Deterioration	Deterioration	Deterioration	Improvement
Real revenue and expenditure				
7. Constant <u>2/</u>	Constant	Deterioration	Constant	Improvement

1/ The term improvement (deterioration) means a reduction (increase) in the deficit relative to GDP.

2/ Relative to real GDP.

ΔR is nominal revenue increase.

ΔG is nominal expenditure increase, excluding monetary correction outlays.

MC is Monetary correction in any given period (for more detail, see the Appendix).

CHART 1

SENSITIVITY OF OPERATIONAL AND CONVENTIONAL DEFICIT TO INFLATION

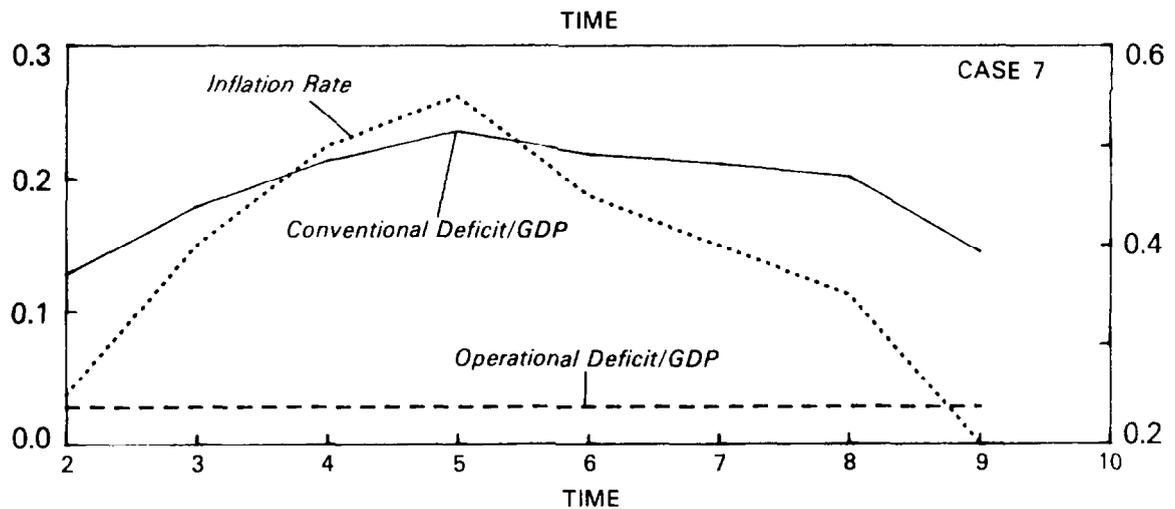
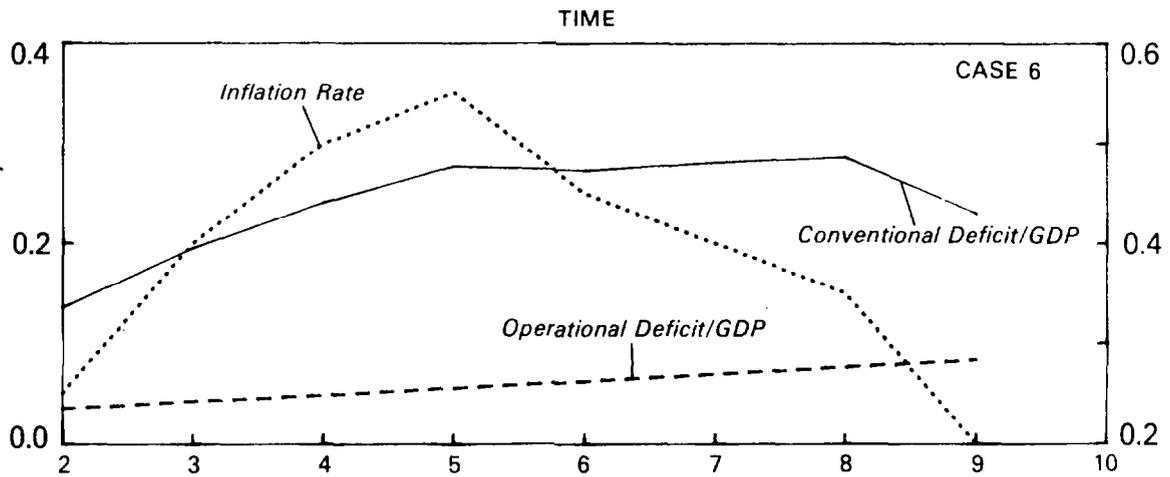
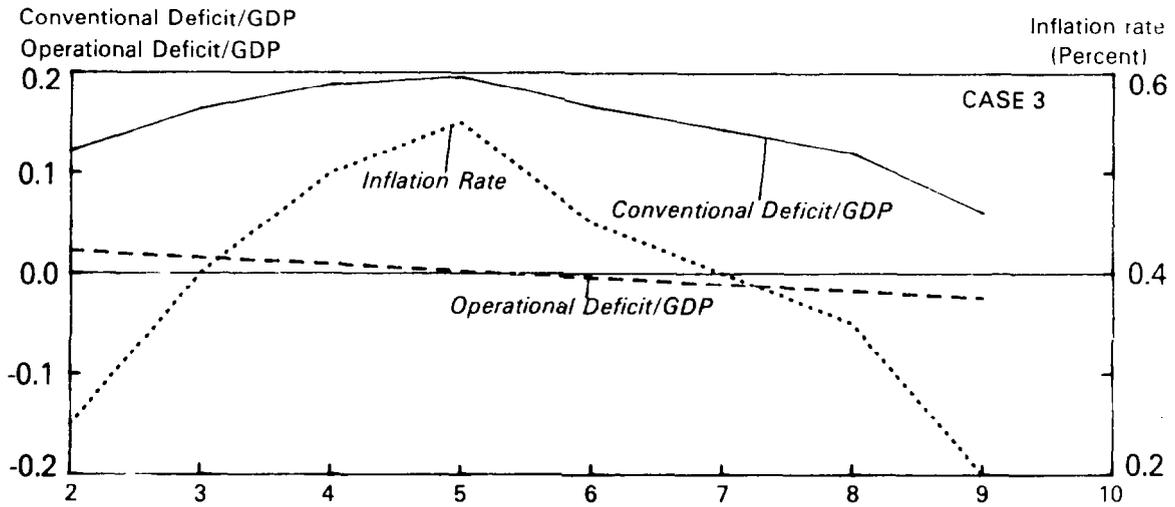




Table 3. Principal Assumptions for Simulations, Cases 3, 6, and 7

(In percent)

	Quarter								
	1	2	3	4	5	6	7	8	9
<u>Case 3</u>									
Inflation rate	25.0	25.0	40.0	50.0	55.0	45.0	40.0	35.0	20.0
Real revenue growth rate	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Real expenditure growth (excluding monetary correction)	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5
Real noninterest expenditure growth	...	...	-0.582	-0.561	-0.539	-0.517	-0.494	-0.471	-0.447
Nominal GDP growth rate	...	25.0	40.0	50.0	55.0	45.0	40.0	35.0	20.0
Real interest rate	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Monetary correction factor	25.0	25.0	40.0	50.0	55.0	45.0	40.0	35.0	20.0
<u>Case 6</u>									
Inflation rate	25.0	25.0	40.0	50.0	55.0	45.0	40.0	35.0	20.0
Real revenue growth rate	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5
Real expenditure growth (excluding monetary correction)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Real noninterest expenditure growth	...	...	0.9	0.88	0.86	0.841	0.822	0.804	0.786
Nominal GDP growth rate	...	25.0	40.0	50.0	55.0	45.0	40.0	35.0	20.0
Real interest rate	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Monetary correction factor	25.0	25.0	40.0	50.0	55.0	45.0	40.0	35.0	20.0
<u>Case 7</u>									
Inflation rate	25.0	25.0	40.0	50.0	55.0	45.0	40.0	35.0	20.0
Real revenue growth rate	--	--	--	--	--	--	--	--	--
Real expenditure growth (excluding monetary correction)	--	--	--	--	--	--	--	--	--
Real noninterest expenditure growth	...	...	-0.096	-0.096	-0.096	-0.096	-0.096	-0.096	-0.096
Nominal GDP growth rate	...	25.0	40.0	50.0	55.0	45.0	40.0	35.0	20.0
Real interest rate	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.51
Monetary correction factor	25.0	25.0	40.0	50.0	55.0	45.0	40.0	35.0	20.0

affected similarly by a change in assumptions to reflect a lag in adjustment of revenue and/or nonmonetary correction expenditure to inflation, or a nonuniform response to inflation of different components of expenditure and revenue. Consequently, while a more complex model might derive quantitatively different responses of the two balance concepts to changes in inflation, the basic conclusion would remain: because of the difference in their sensitivity to inflation, the two deficit measures cannot be considered substitutes as indicators of the impact of government policy on any imbalance between aggregate supply and demand.

V. Inflation, Indexation, and the Government Deficit

In this section the adequacy of the two deficit concepts for measuring the government's need for financing from other sectors, and its contribution to domestic demand pressures is examined. The difference between the two deficit concepts is highlighted when inflation is rapid and consequently the monetary correction factor is large. As inflation approaches zero, the two deficit measures merge. For this reason the analysis below is of particular importance for high-inflation countries. It highlights the focus of the conventional fiscal deficit concept on the demand effects and parallel balance of payments and monetary implications of the nominal deficit and the government's nominal resource need. This focus is in contrast to the implicit assumption underlying the operational deficit concept, i.e., that only changes in the government's real debt or real resource need have demand effects and monetary policy implications.

1. Perfect and imperfect indexation and inflation

In a fully and instantaneously indexed economy (including indexed money) with perfect knowledge, real and nominal macroeconomic variables would reach some measure of equivalence as indicators of performance, principally because with all economic agents adjusting totally to inflation, price increases have neutral consequences for resource allocation and thus the rate of inflation need no longer be a concern of policymakers. Such an economy would require a system of instantaneous taxation (or fully indexed payments) on instantaneously indexed income, profits, assets, and other nominal values: an indexed exchange rate; debt indexation; and a total absence of money illusion. Full and perfect indexation implies either that all prices of items in the price index increase at the same rate, or that the price movement of one good is used as the basis for instantaneously adjusting prices of all other goods. Only in this idealized case of perfect indexation would a ratio of the real deficit to real GDP be potentially as useful as the ratio of the corresponding nominal variables in providing an indication of the government's contribution to the economy's supply gap. However, even here this solely would be because, by assumption inflation is neutral, i.e., the rise in nominal interest payments due to indexation would be offset entirely by the private

sector's willingness to hold the increased nominal debt. There are many reasons, however, why inflation is nonneutral in the real world. Instantaneous adjustment cannot be achieved, and indexation is always substantially less than perfect because its measurement is based on the average price movements of a basket of goods, each with a different price increase. Furthermore, neutrality of inflation requires perfect knowledge by all entities in the system, an unfulfillable requirement. The tax system may also contribute to the nonneutrality of inflation. For example, real tax revenue may increase or decrease as a result of inflation, reflecting the effect of administrative lags, progressivity or regressivity in the tax system, and different types of taxes (see Tanzi (1977a)). Depending on movements in other revenue items, the impact on expenditure components of inflation and the reaction of expenditure policies to inflation, the government's nominal deficit will change (see Heller (1980)). Even with no policy change, however, the postinflation real deficit will only accidentally reflect the preinflation real deficit. Furthermore, with less than perfect indexation there will be changes in the private sector's disposable income and changes in its distribution in both nominal and real terms, together with changes in its spending patterns and (of particular interest) its desired asset portfolio. ^{1/} These changes will occur because the private sector will, as discussed further below, adjust its spending and asset portfolio decisions to reflect the presence of inflation, including the differing inflation protection offered by different assets. It is under these conditions that the validity of the deficit concepts as indicators of demand management needs to be judged.

The argument advanced in support of the use of the operational deficit concept centers on the private sector's real wealth or permanent income as a determinant of its real spending pattern and portfolio investment choice. Accordingly, the monetary correction (or alternatively, the inflation-induced interest payment) is considered a government outlay which restores to the private sector an inflation-induced loss sustained during the period on its past lending to government. Because such indexation maintains rather than increases the private sector's real wealth, the argument continues, the private sector will wish to hold the nominally increased amount of government debt, and will not let the increase affect its overall real spending decisions. On this basis, since the nominal increase in bond holdings does not affect the private sector's expenditure pattern, it has no overall demand effect and consequently no balance of payments impact. On the same argument, indexation payments on bonds do not affect the

^{1/} Tanzi (1977 b) demonstrates that inflation cannot be neutral when income taxes are levied at progressive rates and interest income is subject to income tax. This is because the adjustment of interest rates, which will compensate for inflation and income taxation, depends on income levels and is therefore no longer the same for all individuals. Consequently, no market rate could leave all lenders and/or borrowers in the same situation that existed before inflation.

private sector's real portfolio choice. Accordingly, the rise in nominal bonds outstanding is seen to have no monetary or aggregate demand consequences. ^{1/} Financial market balance can be analyzed without including the effect of the rise in nominal bond supply (which results from the indexation) on the size and composition of the private sector's income and wealth and corresponding changes in its spending and portfolio decisions.

2. Inflation, desired wealth, and indexed bond holdings

A principal problem with the argument underlying the operational deficit concept is that it ignores the effect of inflation on the desired size and composition of the private sector's asset portfolio. If, as a consequence of inflation, the private sector's desired real bond holdings change, clearly indexation which restores the pre-inflation real holdings creates a disequilibrium. ^{2/} Furthermore, even if inflation does not result in a changed desired stock of government bonds in the private sector's portfolio, but affects total real wealth or desired total real wealth, the volume of private real wealth available for financing private investment has changed as a result of inflation. In the absence of offsetting changes (for example, in expected real interest rates) this will have real demand effects.

In the following analysis the case will be made that because of income and wealth effects, inflation does not result in an unchanged real demand for indexed government bonds and that consequently indexation to restore the private sector's real preinflation bond holdings has demand consequences. On these grounds, indexation expenditure cannot be excluded from government expenditure and the government deficit.

A simplifying assumption in this analysis is that the government's entire deficit is domestically financed and that the private sector has no access to foreign assets. This assumption is relaxed subsequently. Accordingly, government deficit financing takes the form of borrowing from domestic banks or placement of bonds and securities with the nonbank private sector. The private sector's demand for government debt instruments is the result of individual spending and savings

^{1/} This argument is based fundamentally on the assumption that interest rates are not constrained. In circumstances where interest rates are constrained and the major source of domestic financing is from captive institutions, the principal assumption of the operational deficit concept (that the private sector will be willing to hold an unchanged stock of real debt) is unlikely to be fulfilled.

^{2/} The analysis in this subsection is for simplicity based on the assumption of an unchanged real debt stock or, alternatively, an operational deficit of zero. In some senses this is a favorable case for the operational deficit concept: a nonzero operational deficit implies that at least some change in private sector holdings of real government debt is required.

decisions to achieve a desired distribution of consumption and wealth among financial assets (indexed and nonindexed bonds and money) and real capital or consumer assets. In the absence of inflation (and uncertainty) individual consumption will rise with disposable income and wealth and will decline with a rise in the interest rate on financial and real assets. Whereas saving is directly related to disposable income, wealth, and interest rates on financial and real assets, individual asset preferences depend on the rates of return on the available assets.

When inflation is introduced--and assuming that individuals are free of money illusion--all nominal variables in individual demand functions are replaced by the corresponding real variables. However, inflation is not neutral in its impact on income, wealth, and real investment yields and indeed cannot be neutral for the reasons noted above. Consequently, neither individual nor aggregate demand functions are homogeneous in prices, and inflation affects both individual and aggregate private sector real consumption and portfolio choice. Furthermore, uncertainty about inflation may lead to sub-optimal real consumption and portfolio patterns.

Indexing of bond values with a specific price index, and thus payment of monetary correction, reduces the uncertainty associated with inflation as it adjusts the nominal values. ^{1/} The attraction of indexation lies in the protection it affords against inflation-induced losses in real values and real interest rates. To some extent, real assets (in the form of goods or equity) also offer a hedge against inflation. No such protection is offered by nonindexed bonds or money. The individual's portfolio choice is based on the calculation of real expected yields of different assets. Furthermore, transaction costs, individual liquidity needs, the variability of inflation and inflationary expectations, and the prospects for future adjustment in the structure of interest rates all argue for maintaining some degree of portfolio diversification.

Rapid inflation therefore results in uneven changes in the real value of the individual's "real" assets (equity, etc.), nonindexed financial asset holdings (money and nonindexed bonds), and income. Furthermore, nominal and real interest rates or rates of return on the above assets will be affected unevenly by inflation and inflationary expectations. While all of the above changes would tend to be reflected in changes in individual desired real wealth and real wealth composition, indexation endeavors to maintain the status quo in one

^{1/} It is assumed that monetary correction on government bonds is complete, although in practice as discussed in Chapter VI it is likely to result in over- or undercompensation for inflation-induced loss of real value.

dimension--the real value of the individual's indexed bond holdings. However, in view of the changes in the determinants of the individual's real portfolio structure, there is no reason why the individual's desired real holdings of indexed bonds should remain constant.

The magnitude of the change in desired portfolio composition will depend clearly on the extent of the nonneutrality of inflation; i.e., on the disparate movements of the real determinants of the portfolio. A decline in private sector real income and wealth, although not in real interest rates, is a likely outcome. An increase in inflation will certainly reduce the real value of nonindexed income and fixed interest assets, while indexation, even if ideal, will only maintain the real value of indexed income and assets. Consequently, in the absence of complete and perfect indexation throughout the economy, real income and assets decline, and a changed distribution will occur. For the private sector as a whole, then, the decline of real income and assets can only be ruled out if increased inflation induces gains in real income and assets sufficient to offset the probable widespread losses. A decline in real wealth, income, and interest rates would be reflected in a reduction in desired total real wealth and a switch out of assets which afford less inflation protection while the desired share of indexed assets (or other assets seen as protecting the real value of investments) in total wealth would increase. The portfolio shift toward indexed assets would be unlikely, however, to result in unchanged desired real holdings of such assets. As noted, to a greater or lesser extent the switch out of nonindexed assets might also be in favor of a few inflation hedges other than indexed bonds, insofar as such hedges are seen as providing a higher estimated real yield than the indexed bonds. An example of such an asset might be basic, easily stored consumer goods for which future scarcity is anticipated, and the price of which is consequently expected to rise faster than any general price index to which bond value is tied. Urban property is also often considered a safe shelter from inflation. Even in the absence of such a switch, however, the individual's real holdings of indexed assets would differ from desired real holdings, unless the factors leading to a change in desired real holdings (e.g., a decline in real wealth and real income) would be offset exactly by a switch in desired real asset composition from non-indexed to indexed assets that is induced by the change in the structure of interest rates. Since the magnitude of these forces will depend on the relative effects of inflation on a range of different variables, and since the relevant price indices may also vary between individuals, there is no a priori reason to assume that the private sector's desired real holdings of indexed bonds will remain unchanged under rapid inflation. Consequently, indexation to restore private sector bond holdings to their preinflation real level is likely to produce a disequilibrium in the private sector's portfolio composition. This disequilibrium clearly will have implications for aggregate demand. An expansionary demand impact would result from excess holdings

of indexed assets. This would be brought about under inflation and indexation if the income and wealth effects on desired indexed assets more than outweighed the real interest effect as described above. Clearly, the relative strengths of these effects need to be analyzed in the context of private sector portfolio choice. Such analysis, however, needs to be seen as determining the private sector's reaction to a fiscal deficit outcome, rather than as modifying that deficit outcome.

Moreover, even if the private sector's desired real demand for indexed government bonds were to remain constant (or rise) should there be a decline in private sector real wealth and desired real wealth, the share of the private sector's real savings available for financing of the government would still have increased as a result of inflation and indexation. In the absence of adjustments in the real interest rates offered by the private sector on lesser inflation hedges, this shift in saving toward the government sector would have real effects as it would affect adversely the real nonindexed investment of the private sector. In a closed economy this would lead to a crowding out of the private sector, as the government would pre-empt an increasing share of savings, similar to what would occur if any other expenditure had been financed by domestic borrowing.

When the private sector has among its portfolio choices assets denominated in foreign currency, introduction of indexation on government bonds may be a means of eliminating or reducing the exchange rate risk for holders of bonds denominated in domestic currency, thereby enabling a larger share of private sector savings to be retained in the domestic economy and, perhaps, attracting foreign savings. To the extent that the government's increased demand for resources is met by a reduction in private capital outflows (or a rise in capital inflows), the government's increased premium for funds would not affect adversely the private sector but would instead raise aggregate demand and impact on the current account of the balance of payments. The success of such a policy would depend to a large degree on the exchange system. When the exchange rate is linked to the same price index as bonds and is adjusted as frequently as bond values, investment denominated in foreign currency would act as an inflation hedge in a way identical to indexed bonds denominated in domestic currency. With a different exchange system, however, foreign currency assets may be held in anticipation of a larger gain than that which can be obtained from domestic investments--e.g., from a devaluation. In such a case indexation of government bonds might have very limited success in reducing capital flight.

3. Inflation, desired bond holdings, financial markets, and aggregate demand

As demonstrated above, under circumstances of high inflation there is no a priori reason to assume that the private sector's desired real holdings of government bonds would remain constant. On the contrary, it can be expected that the private sector's demand for government bonds will in the real world be affected by the uneven, inflation-induced changes in the size and composition of its income and wealth. Where the private sector's real demand for government bond holdings declines as a result of inflation, indexation to restore their real value will leave the private sector with higher than desired bond holdings. Private sector action to reduce these holdings to the desired level inevitably will lead to an accommodating credit policy (unless real interest rates are allowed to rise), which in turn will lead to a deterioration in the balance of payments or higher inflation or both. ^{1/} This process will be evident particularly in, although not restricted to, cases in which the indexed bonds are short-term or an active secondary market exists.

Such conditions would facilitate the sale of excess bond holdings at any time. Furthermore, to the extent that indexed bonds become generally salable they have an advantage relative to currency and demand deposits which are not indexed, and consequently will tend to be held to a great extent as a substitute for money. Indeed, it could be argued that such bonds are better than money, because they can be viewed as indexed bank notes. When indexation creates excess holdings of government bonds which either can be traded easily in a secondary market or accepted in payment for goods or services (including existing assets), indexation has the same effect on aggregate demand and on financial markets as that of any government expenditure financed by recourse to domestic bank credit and money creation. Under these conditions, open market operations to attempt to reduce inflation by controlling the money supply would clearly be ineffective. What would be accomplished in a closed economy would be a switch from non-interest-bearing, nonindexed money to interest-bearing indexed money, accompanied by a rise in real interest rates to ensure that the private sector would hold the increased value of bonds. This would lead effectively to crowding out and private sector spending and investment decisions would change. In an open economy the adverse impact on private sector activity of the government's increased financing needs can be reduced to the extent that the indexation premium attracts funds which otherwise have been invested abroad (see section 2 above). Thus, if the nonneutrality of inflation leads, as can be expected, to

^{1/} Alternatively, should the balance of forces between the wealth, income, and interest effects of inflation be such that the private sector's real demand for government bonds increases, real interest rates will fall in the absence of a significant tightening of credit policy.

a change in the private sector's desired real holdings of government bonds, spending and portfolio decisions--and therefore aggregate demand--will be affected by indexation or any other mechanism which endeavors to maintain those real holdings.

In a parallel argument it is also clear that indexation of domestic bank credit extended to the government has both monetary and demand implications to the extent that the indexation leads to maintenance of the real value of such bank credit when market forces, in the absence of indexation, would have produced a change in the real value of the stock of government credit. In such circumstances monetary correction or indexation affects demand and the financial markets. Similar results would occur if, for example, the government paid its suppliers of goods and services by issuing government paper which is readily discountable, rather than paying by bank draft or check.

4. Indexation, aggregate demand, and the government deficit

It follows from the above that since inflation in the real world has a differential effect on individual prices and values, including different budget components and the size and composition of individual income and wealth, indexation is likely to change the magnitude and the composition of demand and supply in both real and nominal terms. Because of these nonneutral and structural effects, therefore, the effect of inflation cannot be ignored, and its control is appropriately a matter of concern for policymakers. Consequently, indexation payments on government debt, or monetary correction, cannot be excluded from the analysis of the impact of government operations. Given the analytical purpose of the fiscal deficit measures (Chapter II), the deficit concept under high or low inflation should reflect all the pressures on aggregate supply which emanate from the government sector, including those caused by indexation. Indexation payments should therefore be included as an expenditure item contributing to the government deficit, as in the conventional deficit or public sector borrowing requirement (PSBR). While it has been demonstrated that, a priori, changes in the private sector's desired bond holdings can be expected, any such nonpassive private sector reaction to the impact of government operations is, as previously noted, most appropriately analyzed within the context of the sector concerned in forming conclusions for the economy as a whole. This is preferable to assuming a particular, somewhat restrictive, private sector reaction (e.g., unchanged real desire to hold a particular absolute level of government bonds) and building it into a particular deficit measure, as is done with the operational deficit. The fact that inflation is nonneutral points to the need to maintain the sectoral demand/supply analysis including the effects of indexation. Under these circumstances, an inflation-induced rise in expenditure for the purchase of goods and services, the wage bill, or indexation has a real as well as nominal demand impact and therefore cannot be excluded

when assessing the impact of fiscal operations. Thus, inflation-induced interest (or the equivalent indexation) must be considered when assessing the aggregate demand implications of fiscal policy.

Since the conventional overall deficit includes monetary correction above the line, from the viewpoint of economic analysis it is the appropriate deficit measure of the government's direct contribution to domestic demand. However, as discussed, it needs to be recognized that there may be offsetting adjustments in other sectors which must be analyzed within the sectoral context. The financing mix of the conventional deficit will in part determine other sectors' supply and demand responses, which must be combined with that of the government sector to gain a complete appreciation of the aggregate demand and supply conditions in the economy.

VI. Problems in the Measurement of the Operational Deficit

While the operational deficit is in principle well defined, there are a number of statistical problems in its measurement additional to those evident in measuring the conventional deficit or PSBR. Whereas the conventional deficit essentially requires measurement of financial flows, estimation of the operational deficit additionally requires an imputed separation of nominal interest payments into real and inflation-induced components. This is certainly the case where nominal interest is paid and, as explained below, is highly likely to be the case where monetary correction is paid in addition to a "real" interest payment.

With no ideal inflation measure available, a central problem is the choice of an appropriate price index. Because individual price movements will vary widely in a given time period, the chosen price index may not accurately reflect the "true" rate of inflation or, alternatively, the nominal increase in the value of other assets. Under- or overcompensation for inflation is therefore probable, particularly under conditions of rapid inflation, with consequent inaccuracies in estimating the operational deficit. Equally important, because of less than perfect knowledge, some bondholders may feel undercompensated and others overcompensated for inflation even when compensation in objective terms has been identical among individuals. This perception will affect their willingness to hold government bonds.

Under the more widespread system in which nominal interest payments are made, separation of interest payments into inflation adjustment and real interest components requires either the imputation of monetary correction, with real interest payments the balance, or vice versa. If monetary correction is imputed from the stock of outstanding debt, there is the possibility that the estimated "real" interest component will be negative. This may result from using an inappropriate price index or debt stock, thereby overestimating imputed

monetary correction, or it may result because interest rates are constrained and the principal source of domestic financing is from captive institutions. Imputation problems will also be apparent with debt instruments, such as Treasury bills in some systems, which do not carry an interest rate but are sold at a discount. The problem with such instruments will also be apparent in the estimation of the operational deficit in systems with formal debt indexation.

For systems in which monetary correction and real interest are paid, several statistical problems may be evident in addition to the uncertainty associated with a particular price index. The unavoidable lag in indexation will result in over- or underindexation in each particular time period. The use of anticipated price increases (rather than past actual increases) to overcome the effects of lags will introduce other estimation problems, which will also cause a deviation from the operational deficit concept. Indexation by less than the full increase in the price index will result in an overstatement of the operational deficit if the "real" interest rate, and hence payments, adjusts to reflect this partial indexation. Moreover, if the partial indexation proportion varies over time, the operational deficit so derived will not be comparable between the periods. Even in systems in which debt indexation is institutionalized, therefore, the operational deficit corresponding to the chosen indexation mechanism may vary significantly from the operational deficit concept. Equally, if only part of the debt stock is indexed, or if a variety of indexation rates apply to different debt issues, the estimated operational deficit will not conform to the concept definition. If bank credit is extended to the government, it can prove difficult to distinguish the monetary correction component from the credit obtained to finance the operational deficit, and the authorities may not be able to verify independently or to calculate the monetary correction due.

The range of problems likely to be encountered in estimating the operational deficit clearly is large and, under conditions of rapid inflation, likely to be intractable. Given these limitations, the estimated operational deficit is likely to vary significantly from the idealized concept. Although at first sight it may appear that measurement of the operational deficit would be easier in countries where indexation has been institutionalized, as shown above this is not necessarily the case. Institutionalizing indexation may also have the unintended consequence of increasing the severity of the adjustment problems by increasing nominal interest outlays.

VII. Deficit Concepts and Financial Programming under Inflation

Programs supported by the Fund invariably have as one important focus the reduction of imbalances between domestic supply and demand as indicated by the deficit on the current account of the balance of payments and the inflation rate. A reduction in the government's

overall deficit or PSBR is usually one major component of the corrective policies to bring about this improvement. This emphasis has evolved in part because rising government deficits, so defined, are linked directly to rising external and internal disequilibria, and in part because the government deficit can be controlled more directly by policy instruments than can the surplus or deficit of the private sector.

Evaluation of alternative deficit concepts for programming purposes centers on their adequacy as indicators of the fiscal contribution to the adjustment process and stabilization. ^{1/} Measurement of fiscal performance by the yardstick of the operational deficit is, as has been shown, subject to a number of statistical difficulties. More important, however, it also ignores the impact of inflation on part of the budget and, furthermore, ignores the impact on aggregate demand (and consequently on future inflation and the current account of the balance of payments) of financing inflation-induced interest payments. As outlined above, only in the case of complete and instantaneous indexation can inflation be disregarded, because only then will real and nominal variables coincide as indicators of macroeconomic developments. Even in such a case, however, the implication would be that because of perfect indexation, inflation can be ignored because it is neutral, and hence policies to reduce inflation--including fiscal stabilization policies--would not form an appropriate focus of a program. By contrast, because inflation is in fact never neutral, cannot be adjusted for instantaneously, and carries important structural distortionary and distributional consequences, Fund-supported stabilization programs in high-inflation countries focus on inflation as a major indicator of an imbalance between domestic supply and demand. Consequently, Fund-supported programs have emphasized the need for policies--including fiscal policies--which reduce inflation. Among these, policies to reduce the fiscal deficit or PSBR are often central. This approach has recognized, as has been shown above, that expenditure financed by borrowing contributes to demand pressure, whether the borrowing need originates in indexed wage expenditure or in indexation payments on the government debt. When debt issues originating from the need to finance debt indexation are excluded from the statistics on which government policy is evaluated, the government's contribution to demand, and thus to inflationary and balance of payments pressures, is understated.

^{1/} On the assumption that an improvement in the public sector performance is not offset by a deterioration in the performance of the private sector, an improvement in the fiscal deficit will be reflected in a decline in the deficit on the current account of the balance of payments.

With bond indexation recognized as a source of demand pressure, it follows that a level of inflation above a program target will become self-perpetuating if the government's conventional deficit target is revised upward passively in reflection of inflation-induced indexation (or interest payments) that is higher than programmed and if no policy action is taken to reduce the deficit to the programmed level. A rise in inflation indicates that the overall program policies, which had among other targets the achievement of a certain inflation rate, were not successful at least in this respect. In the attempt to bring the program back on track, the government accounts should not be adjusted passively, rather, along with other policies, measures should be taken to bring about the desired reduction in nominal demand.

Whereas this analysis points to the shortcomings of the operational deficit as an indicator of the macroeconomic impact of government operations, it also points to a definable relationship between the operational and conventional deficits (PSBR). This relationship can make the operational deficit of some use in financial programming once the overall deficit objective has been established. Although the operational deficit does not in principle separate the discretionary and autonomous components of the government budget, it does contain the elements over which the authorities have the most direct control in cases where a legal commitment to index debt has been made and must be continued. Consequently, in such cases improvement in the overall deficit or PSBR will be reflected in the operational balance because policies affecting its components will be the principal fiscal tools available to the authorities. When inflation cannot be programmed with any degree of certainty, the link between the operational balance and the PSBR becomes uncertain in size. In such circumstances, in addition to the target on the PSBR, a secondary target on the operational balance may have some advantage. Should inflation increase beyond the programmed level, necessitating higher than programmed monetary correction, the PSBR would be the limiting constraint indicating the need for further adjustment measures by the authorities--including, perhaps, de-indexing or less than full indexation of debt for inflation. Conversely, if inflation is below the level programmed, the use of a target for the operational balance would act to restrain increases in discretionary expenditure or revenue cuts. In some programming circumstances this has been considered desirable. Thus, although the operational balance is not a substitute for the PSBR in macroeconomic analysis, it has been used as a programming tool.

VIII. Conclusions

The principal conclusion from this analysis is that the conventional deficit concept is the appropriate macroeconomic concept and indicator for assessing the stabilization role of fiscal policy. In summary, this is because the conventional deficit concept measures the effects of the government's overall demand changes, including all those caused by inflation, and in turn measures the government's role in intensifying or reducing inflationary and balance of payments pressures. In contrast, the operational deficit concept ignores an important element of government outlays--the effect of inflation on the government's debt service payments--which, under conditions of rapid inflation, will be a significant component of the government's total outlays. Viewed alternatively, the operational deficit concept includes the assumption that the private sector's desired real holdings of government debt are not affected by inflation, an assumption which has been demonstrated to be inadequate. As a consequence, the operational deficit is not a fully comprehensive and adequate indicator of fiscal policy and its impact on the balance of payments and the future inflation process. Inflation-induced demand--and in turn the effects of such demand on inflation--needs to be taken into account fully in framing stabilization policy.

Nevertheless, although the overall deficit is the appropriate macroeconomic concept, the operational deficit has been used in financial programming under certain circumstances. In conditions where a significant degree of uncertainty is attached to the future course of inflation, establishing a secondary target on the operational deficit or some equivalent (consistent with the desired overall deficit target) can act as a safeguard.

Sensitivity of Conventional and Operational Deficits to Inflation

In this appendix the sensitivity of the conventional deficit and the operational deficit to inflation is examined using the following assumptions: (1) revenue, noninterest expenditure, and GDP fully reflect price rises in period t; (2) revenue, noninterest expenditure, and GDP are affected equally by price changes in period t; (3) real interest is paid in period t on debt outstanding at the end of period t-1 at a fixed real rate; and (4) monetary correction paid during period t is applied to the stock of debt outstanding at the end of period t-1. Variables are defined as follows:

CBAL	Conventional balance
D_t	Stock of debt outstanding at end of period
E	Nominal noninterest expenditure
$\frac{E}{p}$	Real noninterest expenditure
$\dot{e} = \frac{de}{dt} / e$	The proportional rate of real change in noninterest expenditure
i	Real rate of interest
OPBAL	Operational balance
p	Price level
$\dot{p} = \frac{dp}{dt} / p$	The percentage inflation rate
R	Nominal revenue
$\frac{R}{p} = r$	Real revenue
$\dot{r} = \frac{dr}{dt} / r$	The proportional rate of real change in revenue
GDP	Gross domestic product

subscript t refers to period t

The conventional deficit in period t is defined by

$$(1+\dot{p})[R_{t-1}(1+\dot{r}) - E_{t-1}(1+\dot{e})] - (1+\dot{p})iD_{t-1} - \dot{p}D_{t-1} = \text{CBAL} = -\text{PSRR}. \quad (1)$$

Differentiating, Equation (1) allows the effect of a change in the rate of inflation on the conventional balance to be written as

$$R_{t-1}(1+\dot{r}) - E_{t-1}(1+\dot{e}) - i D_{t-1} - D_{t-1} = \frac{d\text{CBAL}}{d\dot{p}} \quad (2)$$

where if

$$\frac{d\text{CBAL}}{d\dot{p}} = 0, \text{ then } \frac{(1+\dot{r})R_{t-1} - E_{t-1}(1+\dot{e})}{1+i} = D_{t-1}; \quad (2a)$$

$$\frac{d\text{CBAL}}{d\dot{p}} > 0, \text{ then } \frac{(1+\dot{r})R_{t-1} - E_{t-1}(1+\dot{e})}{1+i} > D_{t-1}; \quad (2b)$$

$$\frac{d\text{CBAL}}{d\dot{p}} < 0, \text{ then } \frac{(1+\dot{r})R_{t-1} - E_{t-1}(1+\dot{e})}{1+i} < D_{t-1} \quad (2c)$$

Equation (2b) implies that a rise in inflation is reflected in a rise in the conventional balance only when revenue exceeds noninterest expenditure, i.e., $(1+\dot{r})R_{t-1} - E_{t-1}(1+\dot{e}) > 0$. Equations (2a) through (2c) show that the impact of inflation on the conventional balance will, for a given real interest rate, depend on the relative magnitudes of the stock of debt (being indexed for inflation) and on the real balance of revenue and noninterest expenditure in period t. When the real balance of "other revenue and expenditure"--defined as total revenue less noninterest and monetary correction expenditure in period t--is less than the debt stock subject to monetary correction plus the real interest payable on it, a rise (decline) in inflation leads to a deterioration (improvement) in the conventional balance. If the real balance of other revenue and expenditure is larger than the debt plus the real interest payable on it, then a rise (decline) in inflation is reflected in an improvement (deterioration) in the conventional balance.

The operational balance is defined as the first two terms of Equation (1) i.e.,

$$(1+\dot{p})[R_{t-1}(1+\dot{r}) - E_{t-1}(1+\dot{e})] - (1+\dot{p})iD_{t-1} = \text{OPBAL} \quad (3)$$

from which we have

$$\frac{dOPBAL}{d\dot{p}} = 0 \quad \text{for } (1+\dot{r})R_{t-1} - E_{t-1}(1+\dot{e}) = iD_{t-1} \quad (3a)$$

$$\text{which implies } (1+\dot{r})R_{t-1} - E_{t-1}(1+\dot{e}) > 0$$

$$\frac{dOPBAL}{d\dot{p}} > 0 \quad \text{for } (1+\dot{r})R_{t-1} - E_{t-1}(1+\dot{e}) > iD_{t-1} \quad (3b)$$

$$\frac{dOPBAL}{d\dot{p}} < 0 \quad \text{for } (1+\dot{r})R_{t-1} - E_{t-1}(1+\dot{e}) < iD_{t-1} \quad (3c)$$

Equations (3a) through (3c) show that the impact on the operational balance of a change in inflation is different from the impact of such a change on the conventional balance.

When the real balance of other revenue and other expenditure exceeds the real interest payments on the indexed debt, the increase (decline) in inflation is reflected in an improvement (deterioration) in the operational balance. When the real balance of other revenue and expenditure in period t is less than the real interest payments on the indexed debt, then an increase (decline) in inflation is reflected in a deterioration (improvement) in the operational balance.

Comparison of the impact of inflation on the conventional and operational balances in Equations (2a) through (2c) and (3a) through (3c) leads to the conclusions that (1) the conventional balance is more sensitive to inflation than the operational balance, and that (2) the two balance concepts have different "break-even points," i.e., points where inflation is neutral.

With respect to the sensitivity of the balance concepts to inflation, the higher sensitivity of the conventional balance than the operational balance is indicated by the comparison of $dCBAL/d\dot{p}$ to $dOPBAL/d\dot{p}$ (Equations (2b) and (3b), and (2c) and (3c), respectively.)

Furthermore, for a range of values for $(1+\dot{r})R_{t-1} - E_{t-1}(1+\dot{e})$, a change in inflation affects the conventional and the operational deficits in opposite directions. This is evident from Equations (2a) through (2c) and (3a) through (3c), the results of which, in this respect, are depicted in Chart 2. Accordingly, for

$$iD_{t-1} < (1+\dot{r})R_{t-1} - E_{t-1}(1+\dot{e}) < (1+i)D_{t-1} \quad (4)$$

a change in inflation will be reflected in a move in opposite directions of the two measures. When $(1+r)R_{t-1} - E_{t-1}(1+e) > (1+i)D_{t-1}$ and when $(1+r)R_{t-1} - E_{t-1}(1+e) < iD_{t-1}$, the two balances will move in the same direction, although the magnitude of their response to inflation will differ.

In most Fund programs the magnitude of the fiscal adjustment effort is measured by the ratio of the deficit to GDP. On this measure the two deficit concepts also respond differently to inflation:

$$\frac{CBAL}{(1+\dot{y})GDP_{t-1}(1+\dot{p})} = \frac{[(R_{t-1}(1+r) - E_{t-1}(1+e))(1+\dot{p}) - (1+\dot{p})i D_{t-1} - \dot{p} D_{t-1}]}{(1+\dot{y})GDP_{t-1}(1+\dot{p})} \quad (5)$$

and, denoting

$$\frac{CBAL}{(1+\dot{y})GDP_{t-1}(1+\dot{p})} \quad \text{by } CBALY$$

$$\frac{dCBALY}{d\dot{p}} = \frac{- D_{t-1}}{GDP_{t-1}(1+\dot{y})(1+\dot{p})^2} < 0. \quad (6)$$

The operational balance consists of the first two terms in Equation (5), which are not sensitive to inflation; accordingly

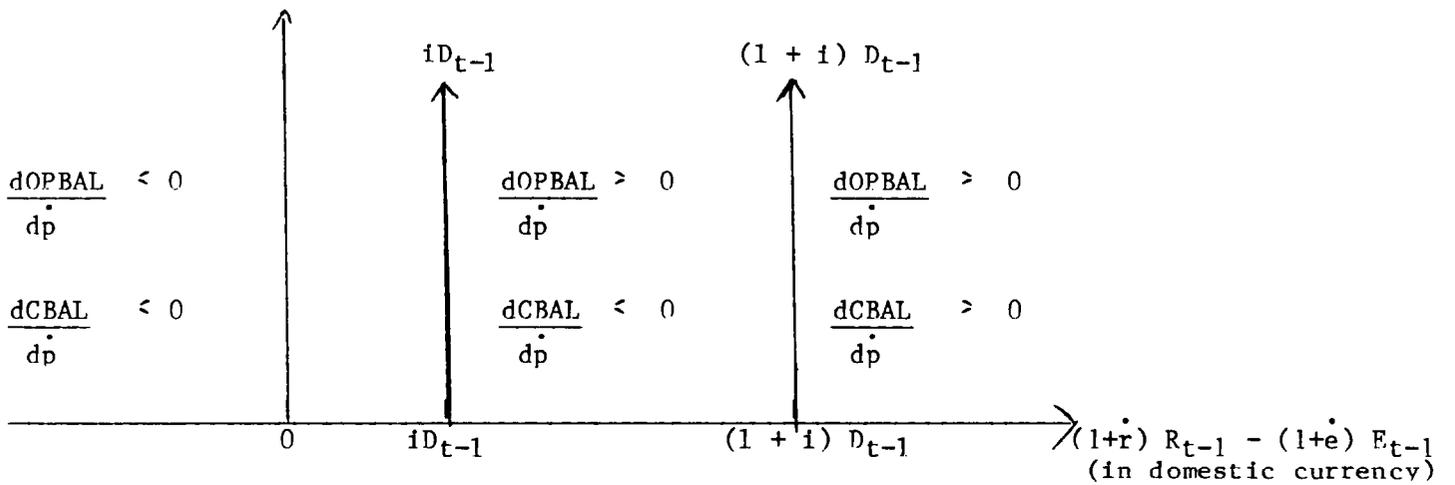
$$\frac{dOPBALY}{d\dot{p}} = 0. \quad (7)$$

Because of this difference in sensitivity to inflation, the two concepts will reflect a change in real revenue or real expenditure differently under different assumptions about inflation, as summarized in Table 2 of the text, which combines the impact of inflation on the ratios of the operational and the conventional deficits to GDP (as specified in Equations (5) and (6)) with the effect of a real improvement (i.e., rise) or a real deterioration (i.e., decline) in the balance of revenue and expenditure other than interest payments or monetary correction. Table 2 also incorporates the results of Equations (5) and (6) in the absence of a change in

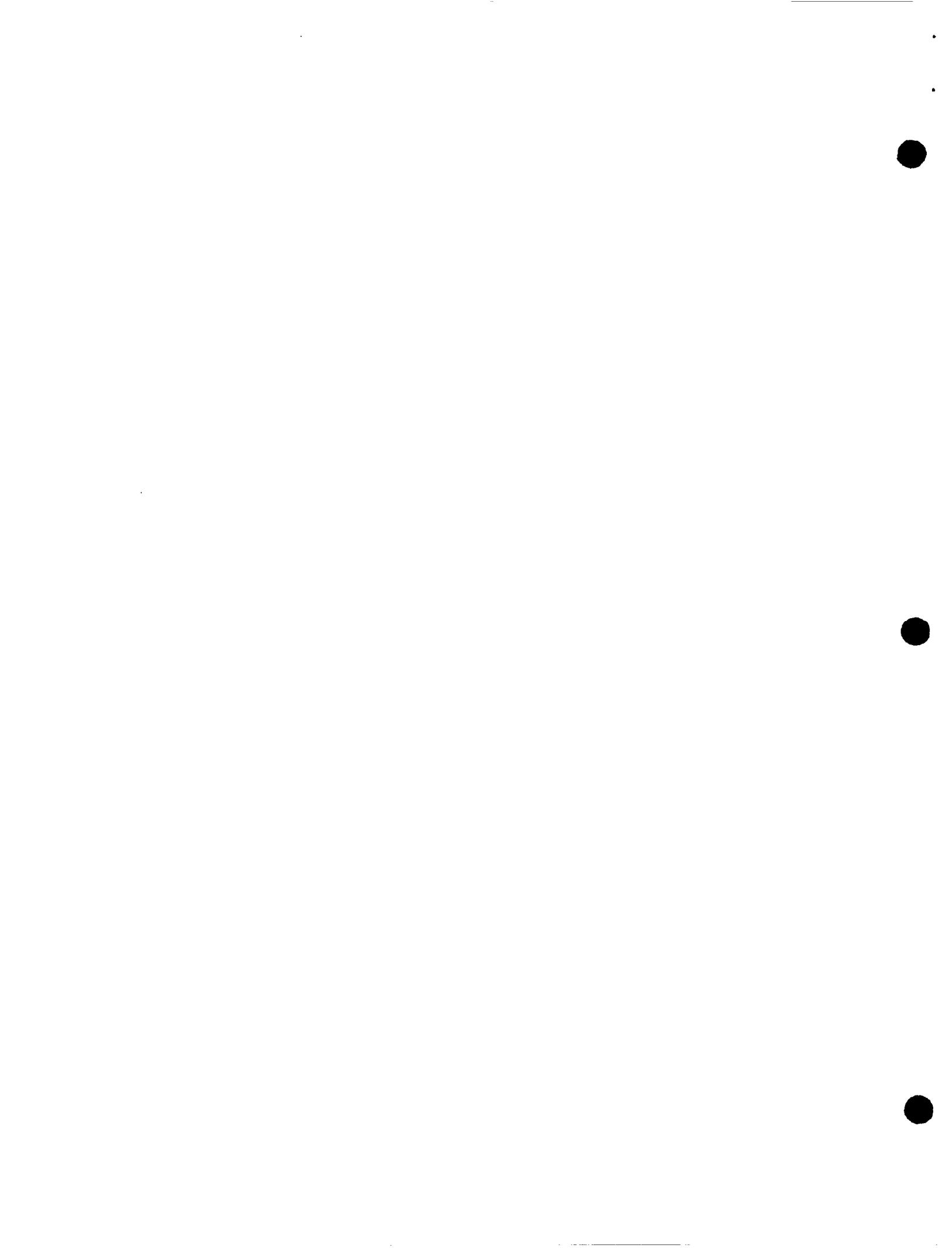
$$R_{t-1}(1+r) - E_{t-1}(1+e) - iD_{t-1}.$$

CHART 2

Sensitivity of the Conventional Balance and
the Operational Balance to Inflation



Note: Terms are as defined in the text of the Appendix.



The ratio of the operational balance to GDP in Table 2 is seen to be affected only by real changes. A real rise in revenue or a real decline in noninterest expenditure in excess of the interest payments on the previous period's operational deficit is reflected in an improvement (i.e., rise) in the ratio of the operational balance to GDP while a real rise in expenditure or a real reduction in revenue, thus defined, is reflected in a deteriorating (i.e., declining) ratio.

The impact of real changes on the conventional balance will, however, have to be compared with the impact of inflation on the monetary correction. When inflation is declining, the conventional balance rises (Equation (6)). This is because the monetary correction factor is reduced. This improvement in the balance is reinforced by a real revenue increase (or expenditure decline), and consequently the overall balance is improving. On a parallel argument, increasing inflation

and a deterioration in the real balance of $R_{t-1}(1+r) - E_{t-1}(1+e) - iD_{t-1}$ is reflected in a reduction in the conventional government balance.

However, when the real balance of $R_{t-1}(1+r) - E_{t-1}(1+e) - iD_{t-1}$

improves, and inflation increases--or when $R_{t-1}(1+r) - E_{t-1}(1+e) - iD_{t-1}$ deteriorates and inflation declines--the effect of inflation is counteracting the effects of the real improvement, and the impact on the budget will depend on the relative magnitude of the real revenue increase, the increase in interest payments on debt originating in the previous period's operational deficit, and the stock of debt subject to monetary correction. In these cases, a real revenue increase (in excess of the interest payments as noted above) combined with an increase in inflation will be evidenced by an improvement in the operational deficit, and depending on the magnitude of inflation and the size of debt subject to monetary correction, the overall conventional deficit will improve, remain unchanged, or deteriorate. On a parallel argument it can be seen that a deterio-

ration in $R_{t-1}(1+r) - E_{t-1}(1+e) - iD_{t-1}$ with declining inflation is reflected in a deteriorating ratio of the operational balance to GDP but may lead to a deteriorating or improving conventional overall balance, depending on the magnitude of the real deteriora-

tion in $R_{t-1}(1+r) - E_{t-1}(1+e) - iD_{t-1}$, the rate of increase of inflation, and the size of outstanding debt subject to monetary correction.

The improvement in the balance of revenue and expenditure on nonmonetary correction will have to outweigh the effect of a change in inflation in order for the conventional balance to improve (deteriorate) with rising (declining) inflation, i.e., $dCBAL/dp > 0$ if

$$\frac{R_{t-1}\dot{r} - E_{t-1}\dot{e} - iOPBAL_{t-1}}{GDP_{t-1}(1+\dot{y})} > \frac{D_{t-1}}{GDP_{t-1}(1+\dot{y})(1+\dot{p})^2} \quad (8)$$

or

$$R_{t-1}\dot{r} - E_{t-1}\dot{e} - iOPBAL_{t-1} > \frac{D_{t-1}}{(1+\dot{p})^2}$$

Equation (8) relates the real improvement to the size of inflation and the outstanding stock of debt subject to real interest and monetary correction.

References

- Buiter, Willem J., "Measurement of the Public Sector Deficit and Its Implications for Policy Evaluation and Design," Staff Papers, International Monetary Fund (Washington, D.C.), Vol. 30 (June 1983), pp. 306-49.
- Chelliah, Raja J., "Significance of Alternative Concepts of Budget Deficit," Staff Papers, International Monetary Fund (Washington, D.C.), Vol. 20, (November 1973), pp. 741-84.
- Eisner, Robert, and Paul J. Pieper, "A New View of the Federal Debt and Budget Deficits," American Economic Review (Nashville, Tennessee), Vol. 74 (March 1984), pp. 11-29.
- Heller, Peter S., "Impact of Inflation on Fiscal Policy in Developing Countries," Staff Papers, International Monetary Fund (Washington, D.C.), Vol. 27 (December 1980), pp. 712-48.
- International Monetary Fund, "A Manual on Government Finance Statistics" (unpublished; Washington, D.C., June 1974).
- Kelly, Margaret R., "Fiscal Adjustment and Fund-Supported Programs," Staff Papers, International Monetary Fund (Washington, D.C.), Vol. 29 (December 1982), pp. 561-602.
- Miller, Marcus, "Inflation Adjusting the Public Sector Financial Deficit," in The 1982 Budget, ed. by John Kay (London: Blackwell, 1982), pp. 48-74.
- Milne, Elisabeth, "The Fiscal Approach to the Balance of Payments," Economic Notes, Monte dei Paschi de Siena (Siena, Italy), Vol. 6 (No. 1, 1977), pp. 89-105.
- Tanzi, Vito (1977a), "Inflation, Lags in Collection, and the Real Value of Tax Revenue," Staff Papers, International Monetary Fund (Washington, D.C.), Vol. 24 (March), pp. 154-67.
- _____ (1977b), "Inflation and the Incidence of Income Taxes on Interest Income: Some Results for the United States, 1972-74," Staff Papers, International Monetary Fund (Washington, D.C.), Vol. 24 (July 1977), pp. 500-13.