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March 11, 1985

To: Members of the Executive Board

From: The Secretary

Subject: World Economic Outlook: Supplementary Note 7 - Domestic and International Effects of the U.S. Fiscal Position

The attached note on the domestic and international effects of the U.S. fiscal position provides background material for the Executive Board discussion on Monday and Wednesday, April 1 and 3, 1985 of the World Economic Outlook.

If Executive Directors have technical or factual questions relating to this paper prior to the Board discussion, they should contact Mr. Artus (ext. 7676) or Mr. Knight (ext. 7474).

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World Economic Outlook: Supplementary Note 7

Domestic and International Effects of the U.S. Fiscal Position

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Approved by Wm. C. Hood

March 11, 1985

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I. Introduction

This paper examines the question of how a change in the stance of fiscal policy in the United States might affect major economic variables. The analysis is forward-looking in the sense that it is concerned with the consequences of possible future developments in the U.S. fiscal stance, and in particular with the implications of policies designed to reduce the size of the fiscal deficits projected for the remainder of the 1980s; it does not directly address the issue of how present conditions have been influenced by past fiscal changes. 1/ In order to make an assessment of the impact of possible future fiscal developments, the paper draws on a large body of theoretical and empirical studies to arrive at conclusions about the nature and magnitudes of fiscal effects on economic activity, interest rates, exchange rates, and other variables both within the United States and abroad. As is always the case where major issues of policy are involved, the economic literature examined here does not reflect a clear consensus on the direction or quantitative importance of these effects. Nevertheless, this paper takes the view that it is possible, on the basis of the available theoretical and empirical evidence, to reach an informed judgment on the direction and rough order of magnitude of the impact that a change in fiscal policy would exert on major macroeconomic variables.

Although most of the empirical studies surveyed in the paper are broadly applicable to a fiscal deficit reduction package of moderate size, they do not directly analyze the effects that such a program might exert on expectations. For example, to the extent that market participants have come to place increased emphasis on prospective U.S. fiscal deficits, a firm and credible commitment to a substantial deficit reduction package might be regarded by the private sector as a major reorientation in the stance of fiscal policy, giving rise to shifts in expectations that would exert much stronger short-run effects on interest rates and exchange rates and smaller negative output and employment effects than standard empirical studies suggest. The paper attempts to reach some preliminary conclusions on the effects of expectations under current economic conditions.

Section II below describes recent developments in the fiscal position of the U.S. federal government, outlines two alternative projections of how the fiscal position might evolve over the next several years under present policies, and provides a brief summary of the types of fiscal measures whose effects are analyzed throughout the paper. Broadly speaking, the paper is concerned with analyzing the effects of a program that

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1/ For discussions of this latter question, see Blinder (1983), Cohen and Clark (1984), and Hooper (1984).

would reduce the primary fiscal deficit, that is the deficit net of interest payments on the public debt, by about 2 percent of GNP (approximately $65 billion, using 1983 as the base year).

The next three sections consider how a fiscal deficit reduction package would be likely to affect interest rates, exchange rates, and the rates of economic growth and inflation in the United States and the rest of the world. To the extent that market participants are forward-looking, their reaction to a significant change in the stance of U.S. fiscal policy would be conditioned by their assessment of its likely longer-run effects. Thus the analysis begins in Section III with a discussion of these longer-run effects. The analysis in this section indicates that in the longer run a deficit reduction program in the United States would reduce the level of real interest rates and raise the stock of capital, and thus would result in a higher level of potential output. The discussion then turns in Section IV to an examination of the short-run (i.e., two- to three-year) paths of U.S. interest rates and economic activity, and the likely impact on the exchange rate of the U.S. dollar over this shorter time horizon. The historical evidence surveyed in this section suggests, on balance, that a program of fiscal restraint would reduce interest rates and output growth in the short run and could lead to a significant depreciation of the real effective exchange rate of the U.S. dollar. Under present circumstances, taking account of favorable expectations effects, the negative short-run effect on output might be somewhat mitigated.

Section V of the paper still focuses on the short run, but it concentrates on international effects. Specifically, this section analyzes the likely quantitative impact of a change in U.S. fiscal policy on other countries. First the effects on industrial countries outside the United States are considered; the evidence presented here suggests that there would be a small and probably temporary reduction in the rate of output growth in other industrial countries, reflecting the lower short-run growth in U.S. imports. The section then analyzes the possible short-run impact of a change in the U.S. fiscal position on the debt service and import capacity of various groups of non-oil developing countries; this analysis indicates that the external position of these countries would not only improve in the longer run but quite possibly in the short run as well. The short-run improvement requires that the salutary effects of reduced interest rates and a depreciation of the U.S. dollar outweigh the adverse, but temporary, effects of diminished economic activity in the industrial countries.

A detailed summary of the principal conclusions of the paper is contained in Section VI. In order to keep the main argument of the paper as concise as possible, a number of important analytical issues have had to be dealt with rather cursorily in the text. The most important of these topics are examined at greater length in a set of appendices to the main paper.

II. Developments in the U.S. Fiscal Position

1. Recent and projected fiscal developments

Table 1 presents summary data on developments in the U.S. federal government's fiscal position (on a fiscal year basis) from 1973 to 1984, together with recent projections by the Administration and by the Congressional Budget Office (CBO) for fiscal 1985-90. These data show that the deficit, which had averaged just under 2 percent of GNP during the nine-year period 1973-81, rose sharply during fiscal year (FY) 1982 and FY 1983 to the historically high level of nearly 6 percent of GNP, before declining moderately in FY 1984. The increase that occurred in FY 1982 was partly a result of the tax measures that had been introduced in 1981, 1/ but it also reflected the severe recession and the associated sharp increase in unemployment in the United States. By FY 1983, however, the effects of the earlier tax reductions as well as increases in certain categories of spending (particularly military expenditure and interest payments) had become the dominant factor generating the continued rise in the fiscal deficit as a percentage of GNP. U.S. output growth was quite strong in 1983 and unemployment was declining, so that cyclical factors actually served to reduce the growth in the deficit. From FY 1981 to FY 1983, the cyclically-adjusted federal deficit is estimated to have risen by more than 2 percent of GNP (upper panel of Chart 1). 2/ Although the cyclically-adjusted deficit widened further in FY 1984, the continuation of strong economic growth served to reduce the actual deficit by about 1/2 percent of GNP.

The shift to a strongly expansionary fiscal position in the United States, in combination with a somewhat more accommodative monetary policy during the period from mid-1982 to mid-1983, contributed to the strength of U.S. economic recovery during 1983 and 1984. However, it has also been widely argued that fiscal expansion, in combination with a monetary policy that has been restrictive over much of the period since late

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1/ The Economic Recovery Tax Act (ERTA), passed in 1981, reduced personal income tax rates in three steps beginning in October 1981 and concluding in July 1983. It also introduced accelerated depreciation rules for purposes of computing corporate income taxes. The Tax Equity and Fiscal Responsibility Act (TEFRA) of 1982 offset part of these reductions by modifying the corporate tax incentives and by raising certain excise taxes. For further details on these measures, see "United States--Recent Economic Developments" (SM/84/178, 7/20/84), pp. 40-41.

2/ The cyclically-adjusted deficit shown here is that developed at the U.S. Department of Commerce. See DeLeeuw and Holloway (1983). It is derived by adjusting both receipts and expenditures to levels that would have prevailed had the economy always been on a trend defined by the middle of the expansion phase of the NBER reference cycle.

Table 1. Fiscal Position of the U.S. Federal Government

(Fiscal year basis, in percent of GNP) 1/

	Actual					Administration Projection (February 1985)						CBO Projection (February 1985)					
	1973-80	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1985	1986	1987	1988	1989	1990
Outlays	21.3	22.8	23.9	24.7	23.8	24.8	24.4	24.4	24.0	23.8	23.4	24.7	24.2	24.3	24.4	24.5	24.7
Receipts	19.1	20.8	20.2	18.6	18.6	19.1	18.9	19.0	19.1	19.4	19.5	19.1	19.0	19.1	19.3	19.3	19.4
Overall balance	-2.2	-2.0	-3.7	-6.1	-5.2	-5.8	-5.5	-5.4	-5.0	-4.4	-3.9	-5.6	-5.2	-5.2	-5.1	-5.2	-5.3
Of which:																	
Net interest payments	1.7	2.4	2.8	2.8	3.1	3.4	3.5	3.6	3.5	3.2	2.9	3.4	3.5	3.6	3.9	3.9	4.1
Primary balance	-0.5	0.4	-0.9	-3.3	-2.1	-2.4	-2.0	-1.8	-1.5	-1.2	-1.1	-2.2	-1.7	-1.6	-1.2	-1.3	-1.2
Stock of publicly held federal debt (end-year)	27.5	27.7	30.5	35.4	36.7	39.1	40.2	40.7	40.0	39.6	38.4	39.6	41.8	44.0	46.0	47.9	49.7
Overall balance (In billions of dollars)	(-39)	(-58)	(-111)	(-195)	(-185)	(-223)	(-230)	(-246)	(-248)	(-233)	(-224)	(-214)	(-215)	(-233)	(-249)	(-272)	(-296)

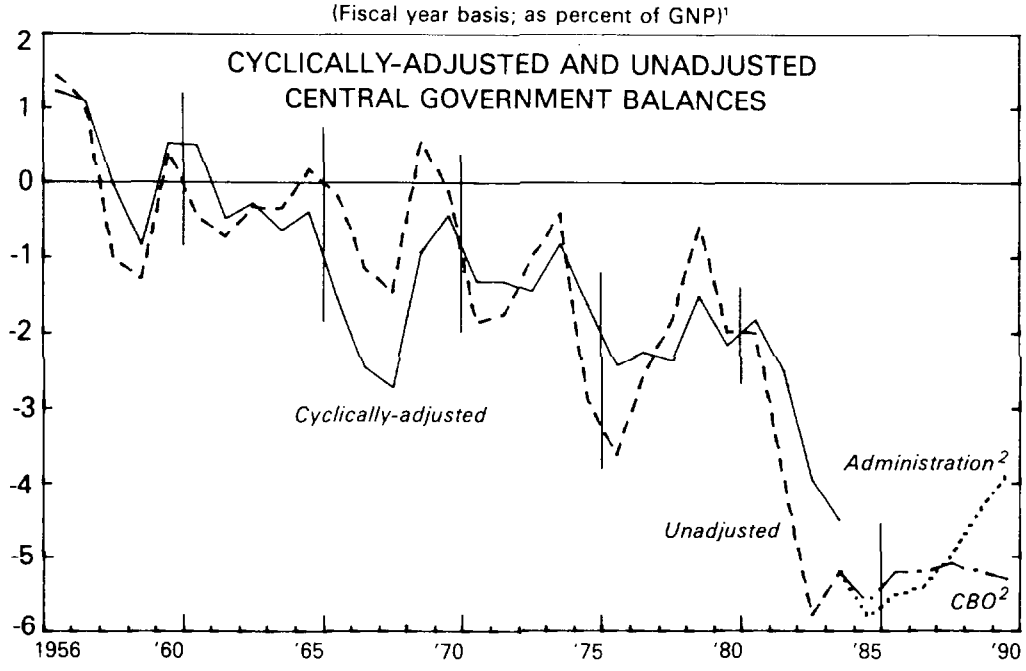
Sources: Office of Management and Budget (1985) and Congressional Budget Office (1985).

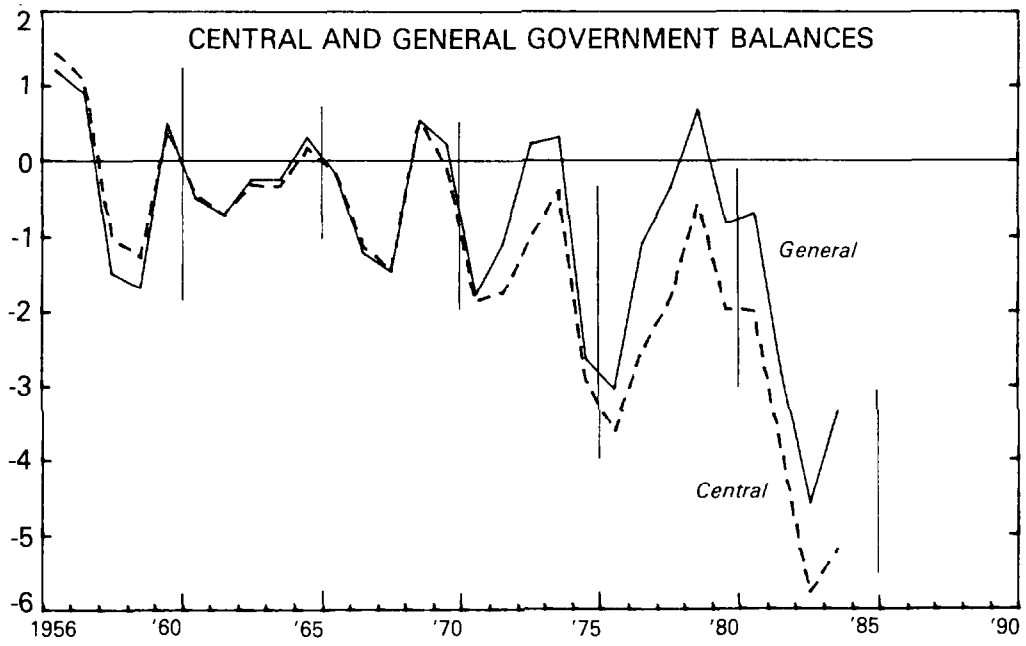
1/ Fiscal years through 1976 ended in June; since 1977, they have ended in September. The 1973-80 average therefore covers the period July 1972 to September 1980.

CHART 1

UNITED STATES FISCAL BALANCES

(Fiscal year basis; as percent of GNP)[1]





[1]Fiscal years ended on June 30 through 1976 and have ended on September 30 since 1977. The transitional quarter in 1976 is ignored in this chart.

[2]Projections as of February 1985; for sources, see Table 1.

1979, has contributed importantly to the persistence of high real interest rates in the United States--which in turn have been associated with the continued appreciation of the U.S. dollar in both nominal and real terms--and to the severe deterioration in the current account balance. 1/ These effects may also have been aggravated by the expectation that a continuation of current policies in the United States would inevitably lead to a steep rise in federal debt relative to GNP (and to private sector disposable income), so that government debt would absorb an increasing portion of available domestic savings; thus it would either constrain the financing of private investment expenditures, increase the U.S. economy's reliance on inflows of savings from abroad, or both. Concerns about these effects have led to proposals to reduce the U.S. federal fiscal deficit through various combinations of tax increases and reductions in government spending, as described further in Section II.2.

Table 1 and the upper panel of Chart 1 (dotted lines) present the fiscal projections of the U.S. Administration and the CBO for FY 1985-90, based on current laws and policies and information available as of early February 1985. Both sets of projections suggest that the ratio of the federal deficit to GNP will rise during FY 1985 to levels approaching the historical peak of FY 1983 and then will again decline. Both sets of projections also indicate that the deficit ratio will remain well above its average level for the 1973-81 period, even under optimistic assumptions about future economic growth and interest rate levels. However, the CBO projections indicate a substantially higher path for the deficits in the later years of the forecast period. Therefore, whereas the Administration projections imply that the ratio of outstanding debt to GNP will peak in FY 1987 at just over 40 percent, the CBO projections imply a continuing rapid increase in debt, with the stock reaching 50 percent of GNP by 1990.

The major reason for the difference in the two sets of fiscal projections is that the interest rates used for the Administration projections decline sharply over the period 1985-90, while those of the CBO decline much more slowly. For example, the Administration assumes that the three-month treasury bill rate will decline from a 1984 average level of 9.5 percent to 5.0 percent in 1990. The CBO projections assume that this interest rate will decline only to 8.2 percent. 2/ In addition, the Administration projections assume that U.S. real GNP would grow at an average annual rate of nearly 4 percent from 1985 onward, with the

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1/ See "Staff Report on the Article IV Consultation with the United States" (SM/84/162, 7/6/84) and International Monetary Fund, World Economic Outlook, Occasional Paper No. 32 (September 1984).

2/ A 1 percent decrease in interest rates beginning on October 1, 1984 is estimated by the CBO to reduce net interest payments by $4 billion in FY 1985 and by $10 billion in FY 1986. For further details on these assumptions, see CBO (1984) and the source documents listed in Table 1.

unemployment rate declining from 7.4 percent in 1984 to 5.8 percent in 1990; those of the CBO are based on a growth rate of about 3.4 percent, with unemployment declining to 6.2 percent.

On a broad scale, the general government balance in the United States, which includes state and local governments as well as the federal (i.e., central) government, has shown movements that are similar to those of the federal government alone (bottom panel of Chart 1), rising from 0.7 percent of GNP in FY 1981 to 4.6 percent of GNP in FY 1983. State and local governments have, in aggregate, continued to run budget surpluses during the past several years, but these surpluses have remained a fairly constant share of GNP (around 1 1/4 percent from 1977 through 1984). For simplicity, the discussion in this paper concentrates on the central government fiscal balance. This approach has the advantage of focusing more clearly on the effects of discretionary fiscal policies, which are undertaken almost exclusively at the federal level in the United States. The budgetary balances of state and local governments, in contrast, largely respond to economic developments.

The main feature that distinguishes the current fiscal situation from the experience of the last 25 years is the rather large size of current and prospective budget deficits in relation to GNP, not only for the United States but for a number of other industrial countries as well. To illustrate the importance of this distinction, Table 2 presents annual data on gross private saving, private investment (including depreciation), central government fiscal deficits, and current account positions for the United States, 14 other industrial countries, and for the whole group from 1970 to 1984. 1/

From 1970 to 1974, central government budgets were roughly balanced for these 15 industrial countries taken as a group; during the recession year 1975, fiscal positions deteriorated to an aggregate deficit equivalent to about 2 3/4 percent of the combined GDP of the 15 countries. Fiscal deficits were then reduced to a level of 1 1/2 to 2 percent of combined GDP for the period 1976 to 1981 before rising rapidly in 1982. In particular, after 1980, the U.S. fiscal deficit as a proportion of GNP rose substantially to 4.8 percent in 1982, 5.4 percent in 1983, and an estimated 4.6 percent in 1984; furthermore, as noted above, it is expected to remain high during the next few years assuming current

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1/ In order to ensure comparability of the fiscal accounts with data on saving, investment, and current accounts, the fiscal data used here are on a national accounts basis. For the period 1970-81 they are obtained from the Organization for Economic Co-operation and Development, National Accounts Statistics, except for the United States, where official U.S. data are used. With the exception of the United States, data for 1982-84 are based on staff estimates.

Table 2. Fifteen Industrial Countries: Private Saving, Private Investment, and Central Government Fiscal Position

(As percent of GNP or GDP)

(A minus indicates a deficit)

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984 1/
								United States							
Gross private saving	16.0	16.7	16.0	17.2	16.4	18.2	17.1	17.0	17.3	16.8	16.5	17.2	17.1	17.3	18.4
Gross private domestic investment	14.5	15.4	16.4	17.3	15.9	13.3	15.0	16.9	17.9	17.5	15.3	16.4	13.5	14.3	17.6
Fiscal position (central govt.) 2/	-1.3	-2.0	-1.4	-0.4	-0.8	-4.5	-3.1	-2.4	-1.4	-0.7	-2.3	-2.2	-4.8	-5.4	-4.6
Fiscal position (state and local govt.)	0.2	0.2	1.1	1.0	0.5	0.4	1.0	1.5	1.4	1.3	1.2	1.3	1.1	1.3	1.4
Current account	*0.2*	*-0.1*	*-0.5*	*0.5*	*0.1*	*1.2*	*0.2*	*-0.8*	*-0.7*	—	*0.1*	*0.2*	*-0.3*	*-1.3*	*-2.8*
Statistical discrepancy 3/	0.2	-0.4	-0.3	-0.1	-0.1	-0.4	-0.2	—	0.2	—	—	-0.2	0.1	0.2	0.4
								Other Fourteen Industrial Countries 4/							
Gross private saving 5/	22.7	23.7	24.3	24.0	22.7	24.3	23.2	23.8	25.7	24.3	23.3	24.4	24.1	24.4	25.4
Gross private domestic investment	24.3	24.2	24.2	25.1	24.6	23.3	23.0	22.7	22.7	22.9	22.9	22.8	21.8	21.1	21.7
Fiscal position (central govt.)	2.1	1.5	0.8	1.3	0.7	-1.4	-0.8	-1.2	-2.1	-1.9	-1.6	-2.0	-2.6	-2.8	-2.8
Current account	0.5	1.0	0.9	0.3	-1.1	-0.5	-0.6	-0.1	0.9	-0.5	-1.2	-0.5	-0.2	0.5	1.0
								Total							
Gross private saving 5/	19.4	20.6	21.1	21.6	20.3	22.1	21.2	21.7	22.9	22.0	21.3	22.1	21.6	21.7	22.6
Gross private domestic investment	19.5	20.0	20.6	21.8	21.0	19.3	19.7	20.4	20.9	20.9	20.1	20.2	18.3	18.1	19.8
Fiscal position (central govt.)	0.4	-0.2	-0.2	0.6	0.1	-2.7	-1.7	-1.7	-1.8	-1.4	-1.8	-2.1	-3.6	-3.9	-3.7
Current account	0.3	0.4	0.3	0.4	-0.6	0.2	-0.3	-0.3	0.3	-0.3	-0.7	-0.2	-0.3	-0.3	-0.8

Source: OECD National Account Statistics, and staff estimates.

1/ 1984 data refer to the annual rates during the first three quarters.

2/ Data on the U.S. fiscal balance in this table differ from those in Table 1 because these data are on a calendar year and national accounts basis; Table 1 refers to fiscal years for the unified budget.

3/ This item consists of the statistical discrepancy between the gross saving and investment accounts as well as the difference between the current account (balance of payments basis) and net foreign investment (national accounts basis).

4/ United Kingdom, Austria, France, Germany, Ireland, Italy, Netherlands, Norway, Sweden, Canada, Japan, Finland, Spain, and Australia.

5/ Gross private saving is defined in this case to include local government saving as well as the statistical discrepancy.

policies. 1/ While these cross-country data refer to actual (rather than cyclically-adjusted) fiscal positions, the standard estimates also show (Chart 1) that the cyclically-adjusted U.S. deficit is very high by historical standards.

In contrast to these substantial changes in central government fiscal positions, gross private saving in the industrial countries considered in Table 2 has experienced only modest variations as percentages of GDP throughout this period. Between 1973 and 1984, the flow of private saving in the 15 industrial countries rose slightly, from 21 1/2 to 22 1/2 percent, and the aggregate current account balance declined by about 1 percent of GNP. Over the same period the gross private investment ratio fell by 2 percent of GNP. Thus, while the extent of the increase in the U.S. federal budget deficit has been quite large relative to the increases elsewhere as well as relative to the historical pattern, the broader picture tends to confirm the view that fiscal developments in industrial countries have possibly contributed to upward pressure on real interest rates. 2/

2. The fiscal package considered in this paper

The budget projections shown in Table 1 and discussed above are based on current laws and policies. They do not reflect the proposals for reducing the deficit that have been made by the U.S. Administration in its budget for FY 1986 or any of the alternatives that have been discussed in the U.S. Congress. The Administration budget of February 1985 is officially projected to reduce the overall fiscal deficit by $100 billion per year, on average, during the period from FY 1986 through FY 1990, which would amount to 2 percent of projected GNP. This reduction would be achieved entirely by cutbacks in domestic expenditures. Alternative proposals discussed in Congress during 1984 generally called for similar orders of magnitude of deficit reduction, through various combinations of tax increases and reductions in domestic and military expenditures. In addition, both the Administration and members of Congress have presented proposals for altering the incidence of the fiscal system through reform of the tax structure.

This paper focuses on a hypothetical package of fiscal measures designed to reduce the primary fiscal deficit by 2 percent of GNP. 3/ This hypothetical package consists of (1) an exogenous across-the-board

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1/ These figures for the U.S. fiscal deficit are on a calendar year, national accounts, basis; they are not comparable to those given above in Table 1.

2/ For a different perspective, see Blanchard and Summers (1984), where it is argued that fiscal policies for the industrial countries as a group have not contributed to high real interest rates.

3/ Where necessary, calculations for this hypothetical change are computed using 1983 as a base year, for which 2 percent of GNP amounts to approximately $65 billion.

reduction in the level of planned federal government final expenditures on current goods and services equivalent to 1 percent of GNP; and (2) an exogenous increase in tax revenue equivalent to 1 percent of GNP. This package does not specify the particular taxes that would be increased or the expenditures that would be cut. Obviously, the macroeconomic effects would depend on the composition of tax increases and expenditure cuts. Changes in the composition of a deficit reduction package of a given size would, in general, alter both the magnitude of the effect on aggregate demand and the structure of incentives facing private agents in the economy. However, a detailed analysis of alternative proposals would be well beyond the scope of the present paper.

It is assumed in this paper that in the short run a fiscal restraint program equal to 2 percent of GNP would alter the overall fiscal deficit (inclusive of government interest payments) by approximately the same amount. In the short run, the actual decline in the primary deficit could be smaller than 2 percent of GNP if the restraint program temporarily reduced output growth and thereby reduced tax revenues and raised expenditures on income-maintenance programs. On the other hand, if interest rates were to decline, government interest payments would also decline. Over time, as the economy returned to normal growth, a sustained decrease in the cyclically-adjusted primary deficit would be expected to result in ever-increasing reductions in the overall deficit, reflecting the slower growth in the stock of debt and the associated reduction in interest rates.

It is generally assumed in this paper that the induced effects of a deficit reduction package would be proportional to the size of the package; that is, an exogenous reduction in the primary deficit equivalent to 3 percent of GNP would have an effect 1 1/2 times as large as the package considered here. However, the question also arises whether a large deficit reduction package might be considered more "credible," thereby altering private sector behavior in a way that would cause its effects to be incommensurate with those of small (or "less credible") fiscal packages. This issue, on which there is very little empirical evidence, is also discussed at various points in the paper.

III. Longer-Run Effects of U.S. Fiscal Restraint

Much of the current debate on the need for a fiscal deficit reduction program in the United States rightly focuses on the longer run. It is the longer-run effects of a persistent deficit which are the main source of concern. Moreover, it is only by considering a period extending at least through the mid-1990s that one can assess the full implications of a change in policy for the evolution of the private capital stock, exchange rates, interest rates, and ultimately, the rates

of economic growth and inflation in both the United States and the rest of the world. To the extent that market participants take into account the effect of a policy change on the course of the economy over the longer run in their present decisions, even the short-run effects of a deficit reduction program may be strongly influenced by its longer-run implications. This is especially true for the effects on exchange rates and long-term interest rates. From this perspective, it is also useful to focus on the longer run before dealing with short-run developments.

The debate about the longer-run implications of fiscal restraint largely centers on four separate questions regarding: the supply of savings by U.S. domestic residents, the U.S. labor supply, the global effects of an increase in U.S. saving, and the possible impact of growing federal debt on U.S. inflation. This section reviews the evidence on each question and derives some overall conclusions. The analysis abstracts from the economic cycle and considers economic activity at the "natural" (or cyclically-neutral) rate of unemployment; thus, the discussion focuses on the effects of changes in the U.S. fiscal stance on longer-run trends in both the U.S. economy and the rest of the world. In particular, it seeks to make quantitative comparisons between the longer-run path of the economy that would be consistent with a deficit reduction program and that which would occur in its absence. To place this comparison in its proper context, an attempt is made to specify the order of magnitude of some of the main variables in the two scenarios by the mid-1990s. However, it is obvious that this exercise is subject to many uncertainties and the results must be viewed with considerable caution.

1. The supply of savings by U.S. domestic residents

Any reduction in the U.S. fiscal deficit amounts to an equivalent reduction in the absorption of private domestic and of foreign saving by the government. However, from the standpoint of longer-run growth, it is important to analyze the extent to which efforts to reduce the fiscal deficit might induce offsetting declines in private domestic saving, with little net gain in terms of the overall rate of national saving. The further question of what happens to the use of foreign saving by the U.S. economy is considered later on.

The view that a policy-induced rise in public sector saving would, of itself, lead to a sharp decline in private saving is mainly based on the "debt neutrality" hypothesis, resurrected by Barro (1974) and others during the past decade. 1/ According to this hypothesis, private agents

1/ Considerable emphasis is placed on this hypothesis in U.S. Treasury (1984). The hypothesis is frequently referred to in the economics literature as the "Ricardian equivalence" hypothesis.

do not consider government securities as net wealth because they realize that they (or their descendants) will have to pay additional taxes in the future to allow the government to repay or service its debt. In the aggregate, government securities are associated with an equivalent future tax liability, so that changes in the supply of public sector debt do not alter the private sector's perception of its real wealth. If the private sector behaves in this way, any reduction in the fiscal deficit will lead to an equivalent cut in the flow of private saving because the private sector can now make smaller provision in its saving behavior for future tax liability.

If the reduction in the fiscal deficit were obtained by increasing tax rates, the income that the private sector no longer needed to save as a provision for its future tax liability would be used to pay the additional current taxes. On these assumptions, private consumption would remain unchanged and private saving would decline by an amount equivalent to the reduction in the fiscal deficit; total national saving would be unaffected by the cut in the deficit. Alternatively, if the reduction were obtained by decreasing government spending, the released income would be divided between private consumption and saving in line with the propensities to consume and save. For example, if the propensity to consume is 0.8, private consumption would rise by 80 percent of the reduction in the deficit, and private saving would decline by the same amount. In this case, national saving would increase by an amount equivalent to 20 percent of the reduction in the deficit.

The debt neutrality hypothesis does not stand up very well to detailed investigation. First, it relies on restrictive assumptions. In particular, there must be perfect capital markets so that private agents do not face binding liquidity constraints, and the tax system must be nondistortionary. Even more importantly, private agents must regard their descendants as perfect equivalents to themselves and must have very long time horizons covering several future generations. It is only if these assumptions are verified that private agents can be expected to increase the bequests they plan to leave to their descendants by an amount corresponding to the increase in the public debt. 1/ Second, no firm empirical evidence has been found to back up the strict neutrality hypothesis described above. Rather, the econometric evidence that is reviewed in Appendix I suggests that economic agents only take account of the tax liability implicit in the public debt to a small extent, so that perhaps about 2/3 of any change in the public debt is perceived as a change in the private sector's net wealth.

Another hypothesis, which originated in the work of Bailey (1962, 1971), is that the preponderant share of government final expenditures is on goods and services that are close substitutes for those purchased

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1/ For a further discussion of the various assumptions behind the debt neutrality hypothesis, see Tobin (1980).

directly by consumers. To the extent that the deficit is reduced by cutting government spending on these goods and services, private agents will find it necessary to spend a larger share of their own incomes to acquire them. At the extreme, the reduction in public sector dissaving resulting from expenditure restraint could be exactly offset by the induced decline in private saving, so that national saving would be unaffected by fiscal restraint. The relevance of this argument is hard to assess in the abstract. There are certainly important instances, such as expenditures on education or medical care, where declines in government spending are likely to be largely offset by increases in private consumption. But it is not clear whether extra private expenditures on items previously provided by the government would be at the expense of saving or other forms of consumption. Given that the cut in government expenditures would not, in itself, significantly reduce the incentives to make provision for the future, the presumption could be that the saving rate would remain roughly unchanged. Moreover, there are many areas where the direct substitution between public and private spending is bound to be quite limited; military expenditure is a noteworthy case in point. While the a priori reasoning is inconclusive, the econometric evidence is for once quite clear. All the studies reviewed in Appendix I indicate that the direct substitution effect between government spending and private consumption is very limited, so that it can safely be neglected in assessing the impact of fiscal restraint on private saving.

In addition to the factors considered above, changes in the composition of tax receipts and government expenditures can affect the private sector's average propensity to save by altering the distribution of income. For example, if the increase in taxes were imposed on corporate income, the negative effect on private saving would be larger than if it were in the form of excise taxes. The macroeconomic framework of this paper does not allow a discussion of these issues. However, this may not be an important drawback because in order to be politically feasible, a major deficit-reducing program would have to include a broad range of measures affecting the various social groups. On balance, the program might not change the composition of tax receipts or government expenditures in a way that would have a pronounced effect on the distribution of income among social groups with different saving propensities.

These considerations lead to the conclusion that the reduction in the "dissaving" of the government that would ensue from a cut in the primary deficit would be unlikely to lead directly to a large offsetting decline in private saving. 1/ Therefore, for a given level of the real

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1/ This conclusion is consistent with the historical evidence which shows that in the United States the gross private saving rate, that is the ratio of gross private saving to gross national product, has been remarkably stable at a value of about 0.17 since 1951.

interest rate, the ex ante level of gross national saving (which is the sum of public and private saving) would rise significantly. The evidence reviewed above and in Appendix I suggests that if a deficit reduction program placed roughly equal emphasis on spending cuts and tax increases, perhaps about two thirds of the reduction in the primary deficit would be reflected in an increase in ex ante aggregate saving. 1/ The increase in saving would be significantly larger if a greater weight were placed on spending cuts. 2/ The reduction in the growth of federal debt would lead to a cut in the growth of real interest payments and a further decline in government dissaving; though, insofar as interest payments are influenced by the stock of federal debt rather than by the level of the current deficit, this effect would build up rather slowly. Furthermore, given that a disproportionate share of financial assets is held by wealthier groups that tend to have a relatively high marginal propensity to save, a large part of the secondary reduction in public sector dissaving might tend to be offset by the decline in private saving resulting from a slower rate of accumulation of interest receipts. This secondary decline in dissaving is neglected in the rest of the analysis.

In the short run, the increase in ex ante national saving could lead to a decrease in economic activity and in the level of incomes through normal Keynesian effects; this effect is discussed below, in Section IV.3. In the longer run, however, this effect can be neglected and the proportion of increase in the intended level of gross national saving that is reflected in actual saving will depend on the relative

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1/ The evidence can be summarized by the following consumption function:

$$C = \alpha (Y-G) + \alpha\phi (G+rB-T)$$

where the notation is: C, private consumption; Y, gross national product; G, government spending on goods and services; r, interest rate on the public debt; B, public debt; T, tax revenues; α, gross private propensity to consume; and ϕ, wealth component of public debt; and where ϕ is equal to two thirds and α is equal to its 1951-84 historical average of 0.80.

With this function, a reduction in G of 1 percentage point of GNP would lead to an increase in C and therefore a decrease in private saving of 0.27 percentage point of GNP. A rise in T of 1 percentage point of GNP would lead to a decrease in C of 0.53 percentage point of GNP and therefore a decrease in private saving of 0.47 percentage point of GNP. The two measures combined would result in a cut in private saving of 0.74 percentage point of GNP. Thus, in this case the reduction in the deficit of 2 percentage points of GNP would lead to a rise in national saving of 1.26 percentage points of GNP, that is a rise amounting to almost two thirds of the reduction in the deficit.

2/ If the reduction in the deficit were obtained exclusively through spending cuts, national saving would rise by 1.46 percentage points of GNP (1 - 2 * 0.27).

size of the interest rate elasticities of private saving and investment in both the United States and the rest of the world. While there is evidence, as argued later on, that private investment is highly sensitive to interest rates in the longer run, the bulk of the evidence indicates that the interest rate elasticity of saving is very small (see, for example, Friend and Hasbrouck (1983)). This implies that practically all of the increase in ex ante U.S. saving would be reflected in an increase in actual saving.

In sum, it is likely that, from a long-run perspective, a reduction in the primary deficit equivalent to 2 percent of GNP (that is, $65 billion per year on a 1983 base) would be consistent with an eventual offsetting decline in gross private saving of only about 2/3 of 1 percent of GNP. Thus the long-run level of gross national saving might be expected to rise by 1 1/3 percent of GNP, or about $45 billion at 1983 rates (i.e., about two thirds of the reduction in the deficit.) In 1983, U.S. gross national saving was $437 billion or 13.2 percent of GNP, so that the percentage increase in gross national saving suggested by this calculation would be on the order of 10 percent, to 14.5 percent of GNP.

2. Labor supply

An argument often raised against proposed increases in taxes on incomes is that they would adversely affect labor supply, and thus the productive potential and the tax base. Even other types of taxes, such as taxes on consumption, could be viewed as having similar effects on the incentive to work, since the real value of labor incomes depends on present and future purchasing power.

The empirical evidence, however, does not suggest that a tax increase of the size being considered here would have a significant negative effect on labor supply. Taxation exerts both an income and a substitution effect on labor supply. The income effect of an increase in tax rates is positive since more hours must be devoted to earning the same income, while the substitution (or income-compensated) effect is negative since tax increases reduce the opportunity cost of taking leisure. Moreover, the income effect is influenced by the average tax rate, while the substitution effect is influenced by the marginal tax rate. Throughout the 1960s and 1970s, most empirical studies neglected this distinction and focused on the sensitivity of the labor supply to market wages; when the tax system was considered, it was treated as a proportional tax. Practically all these studies concluded that the labor supply was fairly inelastic and thus not much influenced by taxation. 1/ In recent years,

1/ A comprehensive survey of the evidence on income taxation and the labor supply as of the late 1970s can be found in Atkinson and Stiglitz (1980).

there has been a much greater awareness of the need to take account of the progressivity of the income tax and the crucial distinction between the effects of changes in marginal and average tax rates.

One of the most thorough of these new empirical studies is the econometric model of Hausman (1981a and 1981b), which is estimated for a sample of prime age husbands and wives. The compensated elasticities of labor supply with respect to after-tax wages for the mean-income group are found to be small for the husbands, about 0.2, but rather large for the wives, in the order of 1.4. Account being taken of the income effect, the total elasticity is nil for the husbands and 0.9 for the wives. These estimates highlight the negative effects that would result from a marked rise in the progressivity of the income tax, i.e., a change that would mainly affect the labor supply through the compensated elasticity. However, they also indicate that any tax increase program that does not entail a rise in progressivity would have no marked effect on the prime age husband's labor supply. 1/ It would have an effect on the wives' labor supply but even there the effect would be moderate. Assuming as is likely that the behavior of prime age single workers is similar to the one of husbands, the effect on total labor supply of a uniform 5 to 7 percent increase in income and payroll tax rates (amounting to a rise in tax receipts of about 1 percent of GNP) would be small. 2/ Moreover, this negative effect could be offset by a small reduction in progressivity. 3/ To the extent that the increase in tax revenues was obtained through a rise in indirect taxes, the effect on labor supply would probably be even smaller because of the absence of progressivity. For all these reasons, the central estimate of the effect of the deficit reduction program on the U.S. labor supply is too small to be measurable.

1/ The welfare cost of taxes measured by the deadweight loss (excess burden) is solely determined by the compensated elasticity so that the tax increase will still imply an increase in cost, even though the labor supply is unaffected (see Hausman (1981a)). Whether this cost is justified depends on the perceived marginal utility of government expenditures.

2/ In the United States, wives account for about 22 percent of full-time workers and 24 percent of full-time and part-time workers. Their average salary, however, tends to be significantly below the average for the whole labor force so that these percentages exaggerate the relative importance of their labor supply.

3/ The reduction in progressivity, while cutting the deadweight loss of the tax system, would obviously raise issues of equity that are outside the scope of this paper.

3. Global effects of an increase in the U.S. saving rate

The longer-run implications of a sustained higher rate of U.S. gross national saving depend on how this increased flow of savings is allocated between domestic fixed capital formation and the acquisition of real and financial assets outside the United States. This decision depends in turn on such factors as the form of the aggregate production function and the degree of international integration of markets for capital.

Assuming for the moment a closed economy, the production system will absorb the additional saving with only a modest reduction in the marginal product of capital if the possibilities of substitution between capital and labor are large. All the evidence indicates that this is the case in the longer run. The various empirical studies using the Cobb-Douglas production function to describe the whole U.S. economy find that the relative contributions of factors to total value added are about one third for capital and two thirds for labor. 1/ This implies that the marginal product of capital would have to decline by only 2/3 of 1 percent of its initial level to yield a 1 percent increase in the demand for capital services. 2/ Empirical studies using production functions more general than the Cobb-Douglas form usually suggest a smaller elasticity, but the difference is economically insignificant. Thus, if none of the increased savings leaked abroad, the 10 percent increase in the U.S. long-run national saving rate, which would ultimately lead to a 10 percent rise in the net capital stock, would lead to a decline in the marginal product of capital of only 6 1/2 percent of its initial level.

The implications of these calculations for U.S. economic growth over the longer term can be readily assessed. Given the weight of approximately one third on the net capital stock in standard production functions, a 10 percent rise in the net capital stock would ultimately lead to a

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1/ See, for example, the Data Resources Inc. (DRI) model of the U.S. economy (Eckstein, Green, and Sinai (1974)). Fraumeni and Jorgenson (1980) place a somewhat higher weight on capital (about 40 percent) while at the other extreme Denison (1979) places a lower weight (about 25 percent when the services of dwellings are included).

2/ With the Cobb-Douglas production function, $Y = K^{1/3} (AL)^{2/3}$, the first-order equilibrium conditions are:

$$\tau = \partial Y/\partial K = 1/3 \ (Y/K) = 1/3 \ (AL/K)^{2/3}$$

and $$w = \partial Y/\partial L = 2/3 \ (Y/AL) = 2/3 \ (K/AL)^{1/3}$$

The notation is: Y, output; K, net capital stock; A, constant; L, labor; τ, marginal product of capital; and w, wage rate.

once-for-all upward shift in the level of potential output on the order of 3 1/3 percent. This higher potential output would also allow the sustainable flow of total (private plus public) consumption to increase by 3 1/3 percent.

The upward shift in potential output would take place gradually, affecting the growth rate for a number of years. In 1983, the net stock of capital in the United States (excluding military and consumer durables) was estimated at roughly $8,000 billion. 1/ In the initial phase, when discards of newly installed equipment would be negligible, the net capital stock would increase relatively rapidly at a rate of about 1/2 percent per year (i.e., the $45 billion of increase in gross national saving divided by $8000 billion). After a few years, however, a rising proportion of the additional gross saving would have to be used to offset the additional discards, and the rate of increase in the net capital stock would slow down. Long-run equilibrium would be reached once the net capital stock had risen by about 10 percent, or $800 billion. During the first ten years, the average compounded rate of increase of the gross capital stock would rise by about 0.45 percentage point, and the rate of growth of real potential GNP would rise by about 0.15 percentage point.

Of course, these estimates indicate only the order of magnitude of the effect of the deficit reduction program on economic growth. The effect could be somewhat lower if the decline in government spending came from expenditure for capital projects or other expenditure contributing to economic growth. It could be somewhat larger if this were not the case, and the program led to a strengthening of the confidence in the policies of the authorities and an improvement of the overall investment climate.

It is difficult to assess the effects of the gradual process of capital accumulation on interest rates. The decline in the marginal product of capital that is the natural consequence of this process of capital deepening would not, of itself, induce anything more than a modest decline in real interest rates. To illustrate, if the initial value of the marginal product is about 13 3/4 percent, 2/ a 6 1/2 percent decline would bring it to 13 percent. Assuming that the capital stock depreciates at an annual average rate of, say, 6 percent, 3/ the

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1/ See Musgrave (1984).

2/ Referring back to footnote 2, page 16, the marginal product of capital is equal to one third of the ratio of output over capital. In 1983, this ratio was 0.41; U.S. GDP was about $3,300 billion, while as already indicated the net capital stock was estimated at $8,000 billion.

3/ It is extremely difficult to measure the "true" depreciation rate. In the past, 5 percent was the most commonly used estimate, but there are signs that the depreciation rate has been accelerating in recent years.

net marginal product would ultimately be cut from 7 3/4 to 7 percent. This would lead to a long-run reduction in the average level of interest rates of only about 3/4 percentage point. However, other factors might amplify the decline in interest rates. In particular, there would now be a relatively smaller stock of public sector securities. To the extent that there is limited substitutability among the various types of financial assets, and also between real and financial assets even in the longer run, this could help to reduce interest rates, especially on public sector securities. Unfortunately, there is no reliable evidence on the magnitude of this effect. 1/

Moreover, a sizable cut in the fiscal deficit could contribute to decreased economic uncertainties, at least with respect to inflation as discussed later on. This could lead financial investors to reduce the risk premium that they demand to induce them to hold bonds. Of course, this could also lead borrowers to reduce the discount that they demand to assume the risk of floating the bonds, but the two effects would be unlikely to cancel each other out because of various asymmetries. In particular, lenders are not protected against the cost of underestimating the future rate of inflation, while many borrowers are partly protected against overestimation through redemption clauses. Furthermore, in the United States, the federal and state governments account for a large share of bond flotations. These borrowers are less subject to risk considerations. Here again, it is impossible to quantify the size of this effect on interest rates. Nevertheless, there is at least a presumption that, by reducing uncertainties, a cut in the fiscal deficit could contribute to a significant lowering of real interest rates.

If it could be assumed that the integration of international capital markets were perfect and that economic agents were indifferent to the currency of denomination of financial assets, it would be relatively easy to modify the preceding analysis to take account of international capital flows. The $45 billion of extra U.S. saving could be assumed to be distributed between the United States and the rest of the world roughly in proportion to the relative sizes of the existing capital stocks of the two areas. There are no good data on the capital stock of the rest of the world; however, as a rough order of magnitude, the United States probably accounts for about one third of the world capital stock (after exclusion

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1/ As discussed in Section IV and Appendix II, which deal with short-run issues, the empirical evidence indicates that fiscal policy has an effect on real interest rates that exceeds the effect attributable to the change in the marginal product of capital. However, the empirical studies are not well designed to evaluate the longer-run effect, or to identify how much of the longer-run effect is due to limited substitutability among the various types of assets.

of the U.S.S.R., Eastern Europe, and the People's Republic of China). Therefore, about $15 billion of the extra saving might be expected to remain in the United States, while the remaining $30 billion would flow abroad. The world gross marginal product of capital would decline by somewhat more than 2 percent of its initial level from 13 3/4 to 13 1/2 percent, and the GDP of the United States and the rest of the world would be shifted upward by somewhat more than 1 percent (i.e., the previous estimates are divided by 3).

The longer-run net effect on the structure of the U.S. balance of payments and the exchange rate of the U.S. dollar would be sizable. Initially, the outflow of gross saving would lead to a rapid rise in the net external asset position (by comparison with the no-change-in-fiscal-deficit case). Later on, however, a higher and higher proportion of gross saving would be offset by depreciation of the outstanding stock of U.S. foreign investments. Ultimately, equilibrium would be reached with an increase in the net external position of perhaps $500 billion (i.e., 2/3 of the $800 billion increase in the national U.S. capital). At this stage the $30 billion outflow of gross saving would be offset by an identical amount of depreciation (given the assumed depreciation rate of 6 percent per annum). However, there would be an increase in real net investment incomes of about $40 billion ($500 billion multiplied by a net marginal product of 0.075), which would have to be offset through an appreciation-induced change in the other items of the current account. 1/ Once account is taken of the change in net incomes on foreign investments, the GNP of the United States would still rise by about 3 percent, while the GNP of the rest of the world would be roughly unchanged.

The conclusion that the real exchange rate would have to appreciate in the long run may seem surprising because of the widespread view that, in present circumstances, a reduction in the U.S. fiscal deficit would lead to a real depreciation of the U.S. dollar. As explained in Sections IV and V, overshooting effects are likely to cause a depreciation of the U.S. dollar in the first few years following the introduction of a deficit reduction program. The point of the analysis in the preceding paragraph, however, is to compare two full long-run equilibrium positions; namely, the real exchange rate consistent with a reduced fiscal deficit as compared with that which would be sustainable under present policies. The real exchange rates that would be sustainable for the dollar under both these scenarios are doubtless well below the dollar's current level.

1/ The calculation assumes that the flow of additional U.S. savings invested abroad is invested in the form of direct investments, and thus yield a return corresponding to the net marginal product of capital. In fact, a large part would probably be invested in financial assets yielding a lower rate of return so that the estimate of $40 billion must be viewed as being on the high side.

Nevertheless, because of the increased service receipts that would eventually ensue from higher U.S. holdings of foreign capital if a U.S. deficit reduction program were implemented, the long run exchange rate consistent with fiscal restraint would be significantly higher than that without it. Indeed, calculations based on the Multilateral Exchange Rate Model suggest that in the former case the long-run equilibrium exchange rate might be on the order of 10 percent higher than in the latter. 1/

A rough idea of the anticipated path of the real exchange rate under present policies can be obtained by looking at the real interest rate differential. Taking the 1985-90 projections of inflation rates in the forthcoming WEO as a proxy for market participants' expected inflation rates, the real interest rate differential on a five-year bond between the United States and the other two main industrial countries, Germany and Japan, is about 3 percentage points per year. This would suggest that the real exchange rate of the U.S. dollar is anticipated to depreciate at a 3 percent annual rate over the next six years, with a cumulated depreciation of about 17 percent by 1990. Beyond 1990, the outlook for inflation rates is far too ill-defined to be quantified, but the current long-term nominal interest rate differential could still be viewed as suggesting some further depreciation. Thus, the main effect of a deficit reduction program could be to accelerate the return of the exchange rate to a longer-run equilibrium level, rather than to change this level.

There is evidence that there are still limits to the effective degree of international integration of markets for capital, even among the industrial countries. In their studies, Feldstein and Horioka (1980) and Feldstein (1983) concluded that exogenous changes in saving in industrial countries tended to remain "bottled up" in the country of origin during the 1960s and 1970s, a result quite incompatible with the assumption of complete arbitrage in a perfect world market. In a more recent study, Penati and Dooley (1984) re-examined and extended the analysis on this topic. Their conclusion based on data for the same period was that "there is little support for the assumption that changes in the net foreign assets of industrial countries are sensitive to cross-country differences in rates of return, at least for periods longer than five years" (p. 317). Simple observation of the data also suggests that, when averaged over a number of years, net private capital flows have been relatively small in most industrial countries during the 1960s and 1970s, both as a proportion of GNP and in absolute terms. 2/

1/ See Artus and McGuirk (1981). The model was used with high trade price elasticities to take into account the long-run nature of the analysis.

2/ See International Monetary Fund, Issues in the Assessment of the Exchange Rates of Industrial Countries, Occasional Paper No. 29, (July 1984).

Nonetheless, few if any observers would doubt that the international integration of markets for capital is increasing. Furthermore, the size and depth of U.S. financial markets are such that the potential for large and sustained capital flows is probably much larger than for other countries (see Tanzi (1985)). The final outcome is thus likely to lie in-between the results of the closed-economy case and those corresponding to the case of perfect international integration of markets for capital, perhaps close to the middle.

4. The effect of growing federal debt on U.S. inflation

An important aspect of the current U.S. fiscal position is the sharp rise in federal debt that has taken place over the past several years and that is likely to continue in the foreseeable future if the fiscal deficit is not reduced significantly. Many economists, and probably the public at large, are concerned that this situation could rekindle inflation sooner or later.

One reason that is sometimes mentioned for this concern is that the rise in the public debt could have direct inflationary consequences if public securities started to be used as a substitute for money in the financing of day-to-day transactions. In practice, there are two kinds of considerations that limit the use of public or other financial securities as a medium of exchange (see Miller (1983)). First, they tend to be issued in large denominations. Second, various government restrictions reduce their liquidity; for example, banks are prohibited from buying government bonds and issuing bearer notes backed by the bonds. However, as Miller points out, whenever a policy of large fiscal deficits raises interest rates, the private sector is pushed to economize on the use of money and to seek ways of circumventing the restrictions on bonds. The introduction by money market mutual funds of demand deposit accounts backed by Treasury securities is an example of this tendency. At the present stage, however, the tendency remains quite limited.

In their influential 1981 article, Sargent and Wallace develop the more widespread monetarist view of the inflationary effects of a fiscal deficit. For them, the deficit is bound to be inflationary because it is bound to be monetized. Their point is not that monetary accommodation will take place as a result of a lack of resolve on the part of the monetary authorities, but that these authorities may have no choice. As the demand for public debt gets satiated, the real interest rate on the debt will tend to rise, making the servicing of the debt even more difficult. At some stage, the cost of raising additional resources by using public debt will become prohibitive and the monetary authorities will have to finance the deficit. Anticipations can speed up the process considerably. As the public anticipates future monetization of the deficit, inflationary expectations and nominal interest rates go up even more, considerably adding to the overall fiscal deficit.

More recently, the Sargent-Wallace analysis has been criticized for being too pessimistic. Buiter (1982) has pointed out that the fiscal deficit that is relevant in the Sargent-Wallace model is the deficit adjusted for the effect of inflation on the real value of the stock of nominal government debt, the cycle, and the net public sector capital formation. This adjusted deficit is clearly smaller than the actual deficit. Darby (1984) has stressed that the fundamental assumption of the Sargent-Wallace model is that the real interest rate on the debt is either higher than the growth rate of real net national product to begin with, or is gradually pushed above it as a result of the rise in the ratio of debt to net national product. Without this assumption, even a large primary fiscal deficit financed by issuing debt will not lead to an explosive growth in the debt ratio. Looking at the empirical evidence, Darby argues that in this regard the situation in the United States is far from worrisome. The arithmetic means of the real yields for long-term government bonds and Treasury bills during 1926-81 were only -0.1 and 0.0 percent per annum, respectively; far below the 3 percent per annum average growth rate of real income over the same years. 1/

While aknowledging the points made by Buiter and Darby, it nevertheless remains true that currently: (1) the U.S. fiscal deficit is sizable and is expected to remain so under present policies even once all the necessary adjustments are made; and (2) the (ex post) real interest rate on the public debt is above the growth rate of real net national product. Thus, even though the ultimate monetization of fiscal deficits is not a foregone conclusion, it is reasonable to suppose that the rapid rise in the public debt is contributing to marked uncertainty among market participants as to the longer-run sustainability of the current situation. In particular, economic agents may fear that political pressures for monetary expansion could develop at an early stage of the processes described by Sargent and Wallace. For example, this could happen if the economy entered a period of growth recession while interest rates remained relatively high. Such concerns may be contributing to the present high levels of nominal interest rates relative to current inflation. Looking beyond the possible re-emergence of inflation, economic agents are probably even more concerned about the extremely painful and costly process of disinflation, a process that would certainly have serious international economic repercussions.

To find out whether the deficit reduction program considered here would alleviate this situation significantly, it is first necessary to have a quantitative view of what may happen without such a program.

1/ Darby also argues that the relevant real yields are the after-tax real yields, which must have been significantly negative. However, Darby's argument is based on his view that the debt neutrality hypothesis is verified.

The left side of Table 3 shows a projection of the ratio of gross federal debt to GNP that is consistent with the "worse policies" scenario presented in the accompanying paper on the World Economic Outlook: Medium-Term Scenarios (EBS/85/49, 3/11/85). For 1985-86, we have used the WEO projections. However, for 1987-90, we have ignored the projected cyclical movements. Instead, we have assumed that U.S. real GNP would grow in line with the estimated growth rate of real potential GNP of 2.6 percent per year, while the real LIBOR would decline slowly from 5 percent in 1986 to 4 percent by 1990. 1/ The rate of inflation was kept at 4.5 percent throughout 1987-90, under the "working assumption" that during the next few years monetization of the deficit could be avoided. The WEO does not project the effective interest rate on the U.S. public debt for 1987-90; however, on the basis of the modified projections for the real LIBOR and the rate of inflation, we assumed an effective rate of 8 percent. For 1990-95, we simply extrapolated the 1987-90 estimates. On the basis of these projections, the primary federal deficit is estimated to rise from 2.6 percent of GNP in 1985 to 3.3 percent of GNP in 1990, then to decline slowly thereafter. The results indicate that gross federal debt could rise from its level of 37 percent of GNP at the end of 1984 to about 70 percent by the mid-1990s. 2/

The results presented on the right side of Table 3 indicate that the deficit reduction program would alleviate this situation considerably. For example, if it were assumed (consistently with the discussion above) that implementation of the deficit reduction program would raise the underlying rate of growth of GNP from 2.6 to 2.8 percent and cut the real interest rate on the public debt by, say, 1 percentage point, public debt would rise slowly to about 50 percent by the mid-1990s. It seems likely that such a reduction in the prospective growth of the debt would be sufficient to lead economic agents to a markedly different appraisal of the longer-run risk of monetization.

The broad picture that emerges from the above analysis is that a deficit reduction program would significantly improve the longer-run prospects for the U.S. economy and, to a smaller extent, for the rest of the world. Many aspects of the improvements can be quantified, at least as far as their order of magnitude is concerned. Others, and probably the most important ones, are quite impossible to quantify, but the direction of the effects is hardly in doubt. In many respects, the analysis is far from new or original. Nevertheless, there has recently been so

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1/ This estimate would be in line with the estimate of a 5 percent real yield on long-term corporate bonds of medium quality.

2/ The estimates in Table 3 differ from those of the Congressional Budget Office (see Table 1, page 4) primarily because we envisage a lower growth rate of real GNP, with 1990 and 1995 being considered as cyclically neutral rather than years corresponding to a cyclical peak.

Table 3. Projections of U.S. Federal Debt 1/

(Calendar year basis)

	Actual 1984	Without Deficit Reduction Program 1990	Without Deficit Reduction Program 1995	With Deficit Reduction Program 1990	With Deficit Reduction Program 1995
		In billions of U.S. dollars			
Primary fiscal balance	-67.6	-182.1	-246.9	-71.6	-90.8
Overall fiscal balance	-184.4	-384.0	-651.8	-215.1	-328.1
Outstanding debt	1,345.1	3,051.5	5,723.1	2,541.8	3,937.9
Net interest payments	116.8	201.9	404.9	143.5	237.3
Inflation-adjusted interest payments	70.2	73.2	162.0	34.0	67.5
Inflation-adjusted overall balance	-137.8	-255.3	-408.9	-105.6	-158.3
		In percent of GNP			
Primary fiscal balance	-1.8	-3.3	-3.1	-1.3	-1.1
Overall fiscal balance	-5.0	-6.9	-8.3	-3.8	-4.1
Outstanding debt	36.7	55.0	72.8	45.5	49.2
Interest payments	3.2	3.6	5.2	2.6	3.0
Inflation-adjusted interest payments	1.9	1.3	2.1	1.6	1.5
Inflation-adjusted overall balance	-3.8	-4.6	-5.2	-1.9	-2.0

1/ See text for a list of the assumptions.

much debate, not to say confusion, on the longer-run effects of a cut in the fiscal deficit that it was felt necessary to restate at some length the relevant theoretical and empirical body of evidence on this question before considering the short-run issues.

IV. Short-Run Domestic Effects of U.S. Fiscal Restraint

The preceding section has analyzed the effects that a change in U.S. fiscal policy would be likely to exert over the longer run, abstracting from cyclical and other transitory effects. This section turns to the short-run effects on interest rates and domestic economic activity and then briefly examines some evidence relating to effects on the exchange rate of the U.S. dollar; this last topic is taken up in more detail in Section V. By the "short run" is meant a period long enough for fiscal policy to influence output and incomes, but not so long that the effect of changes in fiscal policy on the rate of growth of potential output via changes in the stock of capital needs to be explicitly taken into account. For convenience, it may be useful to think of the short run as lasting for three years or so following a change in policy. However, as is discussed below, to the extent that market participants correctly anticipate the longer-run effects described in Section III, the adjustment period could be somewhat shorter.

1. General considerations

There is a spectrum of views regarding the nature of the short-run effects of fiscal policy on interest rates, output, and exchange rates. The differences in view depend essentially on how market participants are assumed to form their expectations, on the extent to which fiscal policies influence market behavior through microeconomic effects on incentives as well as by altering aggregate demand, and on how rapidly prices in goods and asset markets are assumed to respond to shifts in demand and supply.

At one extreme, it may be assumed that fiscal policies have no significant effects on supply-side incentives and that goods and labor markets adjust slowly (whether because of long-term contracts or the limited availability of information about policies and the structure of the economy) or that market expectations are formed mainly on the basis of past experience. This set of assumptions about the structure of the economy leads to the conclusion that, despite the beneficial longer-run effects described in the preceding section, a reduction in government expenditure or an increase in taxes will lead in the short run to a decline in real output and employment as well as to a reduction in real domestic interest rates and a depreciation of the real exchange rate.

At the other extreme, if it is assumed that all markets adjust very quickly and that expectations are based on a forward-looking assessment about the likely longer-run effects of the present and future course of economic policy, then a decline in government expenditure (or a rise in taxes) might be largely offset by increases in private spending. This latter view is often taken to suggest that positive supply-side responses--which in present circumstances could arise from a reduction in uncertainties associated with the prospective growth in federal debt--may be strong enough that a reduction in government spending could actually induce a higher level of total economic activity in the short run as well as in the longer run. Most empirical results, not surprisingly, are more consistent with the view that both demand and supply effects may be important. The following discussion is intended to summarize in a necessarily brief way the main lines of argument on these effects and the empirical results.

Assuming that fiscal policy works primarily by affecting aggregate demand, the short-run effects that most economists would expect are well-known and may be described quite simply. 1/ When the fiscal action takes the form of a reduction in government spending on final goods and services there is a direct decline in aggregate demand; in addition, there may be an induced multiplier effect that reduces demand by a larger amount in the short run. In the case of a tax increase or a reduction in transfer payments, there is an indirect decrease in demand that results from the initial contraction in disposable income.

This reduction in the growth of aggregate demand will normally reduce real output growth in the short run, unless the economy initially faces excess demand pressure. In addition, it will tend to reduce domestic real interest rates, as incremental money demand declines relative to the rate of monetary growth (which is assumed to be unchanged). Consequently, interest-sensitive expenditures such as housing construction and possibly business fixed investment will be stimulated. 2/ Assuming that financial

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1/ The discussion throughout this section ignores demand effects that are generally thought to be quite small. In particular, it is assumed throughout that a shift in fiscal policy--with an unchanged rate of monetary growth--would have only a small temporary effect on the rate of inflation, and that the private saving rate would not be significantly affected by a decline in interest rates. For further discussion of the nature of fiscal effects on the composition of aggregate demand, see Cohen and Clark (1984).

2/ The possibility that business investment may not rise in the short-run results from its dependence on other factors--notably growth in aggregate demand--that are working in the opposite direction. Housing investment is also affected by growth in aggregate demand but is relatively more sensitive to changes in interest rates. This point is examined in more detail in subsection 3, below.

assets denominated in U.S. dollars are close substitutes for those in other major currencies and that interest rates in other countries do not decline pari passu with those in the United States, the value of the U.S. dollar will then normally depreciate in real terms; otherwise asset holders would be likely to reduce their holdings of U.S. dollar securities. This depreciation, as well as the stimulus to total domestic saving from the reduced budget deficit, will then normally lead to an improvement in the external current account balance.

Under a number of assumptions, these demand effects could be minimized or nullified, even in the short run. Two such scenarios have received a great deal of attention in the recent literature on this subject: the debt neutrality hypothesis, which has already been described in Section III, and an approach that assumes both perfect foresight and rapid clearing of all markets (including goods and factor markets). 1/ This latter approach implies that any initial downward pressure on real output would be completely reversed even in the short run, as private spending would be stimulated so as to leave the initial employment level and flow of output essentially unchanged.

It is apparent that the assumptions that are necessary for nullifying the effects of fiscal policies on aggregate demand in the short run are very restrictive. If, as was argued in Section III, the conditions for the strict debt neutrality hypothesis to hold in the longer run are not realistic, then this conclusion holds a fortiori for the short run. Nonetheless, the influence of future tax liabilities, forward-looking market expectations, and adjustment of relative prices is of undeniable importance. These various factors clearly serve to weaken the magnitude and shorten the duration of the demand effects described above.

If one believes that the short-run effects of changes in the fiscal stance on aggregate demand are likely to be weak, the possibility then arises that the primary effect on the economy will come through changes in aggregate supply. In this case, it is at least conceivable that

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1/ Other (highly restrictive) assumptions could be made that would imply that expenditure policy would have only limited real effects. If the spending were on goods or services that were perfect substitutes for private expenditures even in the short run, then private market participants would be expected to take up the slack in aggregate demand very rapidly. In that case, there would be no effect on either real output or real interest rates. Other assumptions that would imply a lack of relation between fiscal policy and real interest rates, even in the context of a conventional demand-management model, are that money and government bonds are perfect substitutes or that real private expenditure is perfectly elastic in response to changes in interest rates.

policies designed to reduce the fiscal deficit might actually stimulate output, even in the short run. If, for example, the marginal productivity of the government sector were less than that of the private sector, then the shift in resources resulting from a decline in government spending would eventually stimulate private output by more than the decline in government output. 1/ There could also be structural (i.e., supply-side) effects from changes in tax rates, as noted in Section III.2. However, a shift in the structure of taxes could have either positive or negative structural effects. The ambiguity concerning the sign of the net effect on aggregate supply implies, of course, that if supply effects dominate, then the sign of the effects of fiscal actions on interest rates, prices, and exchange rates would depend on the specific fiscal measures that were implemented.

The determination of the likely short-run effects of any particular fiscal policy package is essentially an empirical issue. Unfortunately, there is also a divergence of views as to the appropriateness of various methods for testing fiscal effects empirically. Broadly speaking, two empirical approaches have been applied in analyzing the effects of fiscal policy on output and interest rates: single-equation (reduced form) studies and studies based directly on structural models. 2/ Although, in principle, the two approaches should give similar results, there are practical differences in the way they may be applied that result in quite different implications. In particular, if there are significant interactions in the structural model that are omitted from the reduced form, or if variables are allowed to respond endogenously in the full model that are assumed to be given exogenously in the reduced form, then the two approaches may well yield conflicting results. These conflicts appear to be especially serious when analyzing fiscal effects on output; this point is elaborated in Section IV.3.

1/ Measurement of this effect is made difficult, if not impossible, by the absence of a measure of the market value of government output.

2/ Some economists argue that neither type of econometric analysis is capable of revealing useful information about the effects of any government policy, because econometric models are specified at least partly in terms of decision rules rather than fundamental behavioral relationships. According to this view, the implementation of policy will alter the parameter values of these relationships, rendering the analysis of the model invalid. The argument against the use of econometric models for policy analysis is commonly known as the "Lucas critique" (see Lucas, 1976). However, at least for a fiscal policy such as the one being considered in this paper, there is no evidence that the change in the parameter values would be large. In fact, Blinder (1984) concludes on the basis of an examination of fiscal effects in three large econometric models that his investigation "did not turn up much evidence to suggest that the Lucas critique is of great empirical importance."

The results of both types of empirical studies might be called into question if present circumstances differ in a fundamental way from historical patterns. There are three considerations that are relevant to this issue, each of which is related to the large size of the current and prospective fiscal deficits in the United States. First, in forming expectations about the future course of the U.S. economy, market participants are likely now to be focusing on the deficit much more closely than formerly. The short-run effects of fiscal actions on economic activity, interest rates, and exchange rates might therefore be unusually sensitive to shifts in expectations about the likely long-run effects of a major reorientation in the stance of fiscal policy, as discussed in Section III of this paper. Consequently, if a program were implemented now to reduce deficits over a period of several years, the economy might possibly adjust much more quickly than prior evidence would suggest.

Second, the effects of fiscal restraint might depend on the extent to which the policy is perceived as credible; that is, the extent to which market participants believe that it will result in a more sustainable long-run fiscal position. Most empirical evidence is based on an assumption that expectations do not take full account of the likely consequences of current policies and that they are not subject to sudden shifts; such evidence is therefore more applicable to small adjustments in the fiscal stance than it would be to a credible program to correct a fundamental imbalance in the economy. This consideration also would imply that the long-run benefits of a credible program of fiscal restraint might appear more quickly than most evidence would suggest; in that case, the unfavorable short-run effects would, on balance, be offset sooner.

The third possible source of uncertainty concerning the effects that a fiscal deficit reduction program might have on economic activity arises from a quite different view of how market expectations are formed. In particular, the large increase in the structural fiscal deficit that has occurred in the United States during the past few years has been associated with movements in nominal interest rates relative to inflation that have been quite different from past behavior. In these circumstances, it could be argued that market participants may have come to place excessive (i.e., irrational) emphasis on the effects of the combination of loose fiscal policy and tight monetary policy, so that the level of interest rates (adjusted for current inflation) is significantly higher than would be warranted by the degree to which the deficit absorbs saving flows.

If this contention were accepted, then the implication would be that the announcement of a credible fiscal deficit reduction program in the United States would result in a reversal of these expectations and a fall in interest rates to levels that would be consistent with the future stance of fiscal policy. The elimination of the irrational component of

real interest rates, combined with a more optimistic assessment of the long-term prospects for economic growth in the U.S. economy that might result from the announcement and implementation of a credible fiscal program, could stimulate fixed capital formation and might also exert a positive effect on domestic private saving.

The quantitative significance of these effects would, of course, depend on the degree to which past levels of real interest rates had exceeded what was warranted by existing economic conditions, but it is at least conceivable that the positive confidence effects associated with the fiscal program would be enough to offset, or more than offset, its negative direct effects on aggregate domestic demand, particularly if it were introduced at a time when the economy was approaching full employment of resources. Such conclusions are highly speculative, and it is difficult to test them on the basis of existing experience. Nevertheless, the possibility is worth bearing in mind in considering the potential short-run costs and benefits of a significant redirection in the stance of fiscal policy.

2. Effects on domestic interest rates

The relationship between fiscal variables and domestic interest rates in the United States has been subjected to extensive econometric analysis, dating back to the seminal study by Feldstein and Eckstein (1970). The results of more than 30 of the most recent of these studies have been examined for the present paper, and these results are discussed in some detail in Appendix II. Two general conclusions may be drawn from this discussion. First, the apparently conflicting conclusions of the various studies can be largely accounted for by a few differences in approach. Second, practically all the studies that carefully specify the functional relationships find significant effects on interest rates. This subsection begins by identifying the major differences in approach; it then examines the magnitudes of the effects that have been measured.

Perhaps the most important point to be kept in mind in reviewing empirical evidence about the effects of fiscal policy on interest rates is that the available studies do not constitute a set of tests of a single hypothesis. As this section and Appendix II indicate, these studies differ in methodology (they include single equations estimated by varying techniques as well as simulations of large models), in the choice of the variable used to represent the stance of fiscal policy (for example, the stock of debt, actual or cyclically-adjusted deficits, levels of spending, or tax rates), in the type of interest rate examined (short or long term), in the way other variables that affect interest rates and that might interact with fiscal policy (such as monetary growth or inflation) are controlled for, and in the choice of sample period. It is therefore essential to determine the extent to which differences in

empirical findings are related to these choices and to reach a judgment as to whether a failure to account for certain factors casts doubt on the validity of the conclusions reached by some of these studies.

The first problem in empirical estimation of the effect of fiscal policy on interest rates arises from the fact that government deficits and interest rates both respond cyclically to changes in economic activity. A slowdown in economic growth raises the flow of government spending and reduces tax revenues; at the same time, by correspondingly reducing the growth in the demand for money, it is very likely to bring a decline in interest rates relative to current inflation. Consequently, it is difficult to trace empirically the causal linkages that lead, in the short run, from changes in the fiscal position to movements in the level of interest rates: the observed correlation between them could well be negative, even if policy-induced changes in the deficit have a strong positive influence on rates. Those studies that do adjust for cyclical influences on fiscal variables (usually by using a "structural" or cyclically-adjusted fiscal deficit or by simulating the effects of a specific change in government expenditures or in tax rates) tend to find significant or quantitatively important effects more consistently than do those studies that estimate relationships between interest rates and either unadjusted deficits or the stock of government debt. 1/ Most of the recent studies that fail to find significant effects on interest rates are suspect on the basis of this criterion.

Another important empirical difficulty is that of accounting for the interaction between fiscal and monetary policies. Since both types of policy are likely to have major effects on interest rates, it is essential that any empirical study control for monetary policy in order to isolate fiscal effects. Specifically, to the extent that there has been a positive correlation between monetary growth and fiscal deficits and that episodes of accelerating monetary growth have been associated, at least initially, with falling real interest rates, the omission of monetary growth from an equation explaining interest rates will bias downward the

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1/ Of the 12 studies described in Appendix II as finding insignificant or perverse effects (see the listing in Part 3 of Table 14), only Tatom (1984) directly adjusts the fiscal variable for cyclical influences; Evans (1985) indirectly takes account of feedback effects by using two-stage least squares estimation. Of the 21 studies that do find significant or sizable positive effects, the majority account for cyclical factors in some way. In addition to the simulation studies, these papers include DeLeeuw and Holloway (1985) and Barth et al. (1984), both of which use cyclically adjusted deficits; Miller (1983), which uses long-run data; Makin (1984), which uses real expenditures; and Sinai and Rathjens (1983), which uses expected deficits.

estimated effects of fiscal variables. Several of the studies that do not find significant fiscal effects either omit monetary variables altogether or introduce them only indirectly, 1/ whereas almost all of the studies that do find significant or quantitatively important effects control directly for monetary growth. Although other differences among the studies could account for the difference in results, the prima facie evidence certainly indicates that a proper accounting for monetary policies is crucial in this context.

There are several other difficulties in measuring fiscal effects on interest rates and other variables. First, there is the perhaps impossible task of accounting properly for the role of expectations in transmitting fiscal policies to the private sector of the economy. 2/ For example, as discussed above in Section IV.1, a fiscal program that is expected to persist over a period of several years would be expected to have larger short-run effects on interest rates than one that is more temporary. In general, empirical studies that assume perfect foresight, or that use data on expected rather than current deficits, find relatively larger effects on interest rates for a given change in the deficit. 3/

Second, it is not always clear how much information resides in historical data. A major shift in the orientation of fiscal policy, such as the implementation of the large tax cuts of 1981-83, could be termed a change in "regime" that would affect private economic behavior fundamentally and that would therefore have effects quite different from those of

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1/ Canto and Rapp (1982), Fackler and McMillin (1983), Frankel (1983), and Tatom (1984) omit monetary variables; Hoelscher (1983) includes Federal Reserve purchases of Treasury securities; Motley (1983) includes a measure of the excess supply of money; and Plosser (1982) and Makin (1983) include only unanticipated changes in monetary growth.

2/ In addition to the issues discussed below, some economists have hypothesized a key role for expectations by arguing that only unanticipated changes in fiscal policy should have real effects. However, tests of this hypothesis have not yielded clear results. As shown in Table 14 in Appendix II, Makin and Tanzi (1983) found significant effects from unanticipated changes in the stock of government debt. Laumas and McMillin (1984), on the other hand, argue that anticipated fiscal policy, as well as unanticipated, may matter in a world of multiperiod labor contracts, a point that had been developed earlier by Fischer (1977) in the context of monetary policy. Laumas and McMillin did not test for effects on interest rates, but they did find that anticipated policy, by their measure, actually had larger effects on output than did unanticipated policy.

3/ For an analysis of the effects of assuming perfect foresight compared to static expectations, see Masson and Blundell-Wignall (1984). Sinai and Rathjens (1983) incorporate data on expected deficits.

a smaller or more routine tax cut. 1/ In that case, even a long run of data covering many years might contain only a very small number of true observations (i.e., changes in regime) that would be useful for testing the effects of such a policy shift. Miller (1983) uses long-run data in order to account for this phenomenon, and his study finds significant effects on interest rates. 2/ Unfortunately, there are not nearly enough data to permit a determination from this type of study of whether the effects from a change in regime are significantly different from those of a marginal change in the deficit.

A third way in which shifts in expectations might be important is that a deficit-reducing program that is perceived as leading to a more sustainable fiscal position could have stimulative effects through expectations that might not be captured by econometric analysis of historical data. This possibility is especially relevant, of course, for the problem at hand, in view of the favorable long-run effects of fiscal restraint discussed in Section III, above. Conjectures on this point, however, are essentially speculative. None of the studies under review deals directly with the question of whether current conditions warrant a different analysis from that based on postwar data. 3/

Table 4 gives a representative sample of results from those studies that attempt to deal with the empirical difficulties described above. Part A of the table includes four single-equation studies that both control for monetary growth and adjust the fiscal variable in some way to remove systematic endogenous variations; Part B summarizes the results of four structural simulation studies. All eight of these studies record statistically significant estimates or quantitatively important simulation effects on real interest rates. For the single-equation studies, the magnitude of the interest rate change that is estimated to be associated with a fiscal policy change of the size under consideration in this paper (2 percent of GNP) ranges from about 1/2 to 3 1/2 percentage

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1/ This point was originally developed by Lucas (1976).

2/ Dewald (1983) also uses long-term data in order to eliminate cyclical influences; he finds positive effects on interest rates, but they are only marginally significant. See Appendix II for further discussion of these studies.

3/ However, Blinder (1984) argues that several large-scale econometric models incorporate many of the expectational and supply-side factors that have been noted as important elements of the transmission process for the 1981-82 tax changes. He concludes that an analysis of the pattern of the prediction errors in these models does not support the notion that the models are invalid for analyzing recent policies.

Table 4. Selected Estimates of Fiscal Effects on Interest Rates 1/

	Fiscal Variable	Interest Rate	Magnitude of Effect 2/ (percentage points) after 1 year	after 3 years
A. Single-equation studies				
DeLeeuw and Holloway (1985)	Cyclically adjusted stock of debt	3-year Treasury securities	0.9	2.6
Mehra (1984)	Real expenditure	Treasury bills	0.6	0.6
Miller (1983)	Growth rate of debt (long-term data)	Treasury bills		3.5
Muller and Price (1984)	Deficit and stock of debt (moving averages)	Aaa corporate bonds	3.4	
B. Simulation studies				
Brinner (1984)	Military spending	Aaa corporate bonds	1.5	2.7
	Transfer payments	" "	1.2	1.1
	Income tax rates	" "	0.7	0.7
Brayton and Clark (1984)	ERTA tax changes	Treasury bills	2.6	3.1
		Corporate bonds	1.3	1.4
Fair (1984)	Real expenditure	Treasury bills	0.4	0.4
Friedman (1982)	Real expenditure	Treasury bills	1.6	
	" "	Treasury bonds	2.0	
	" "	Aa utility bonds	1.3	
	" "	Aaa corporate bonds	1.6	

1/ For a more complete presentation of recent evidence, see Appendix II.
2/ Change in the interest rate for a $65 billion change in the fiscal variable (2 percent of 1983 GNP). The absence of a figure indicates that the magnitude could not be determined for the given period. The estimate listed for Miller as a third-year effect is actually a long-run effect.

points in both the short and the long run. 1/ For the structural models summarized in the second part of the table, the simulated effects are mostly between 1 and 2 percentage points in the short run, and they average about the same amount after three years.

In order to assess the domestic and international effects of fiscal policy--especially its effects on exchange rates, it is important to ascertain its impact on the term structure of interest rates. In theory, a change in the stance of fiscal policy could cause either short- or long-term interest rates to change by a relatively larger amount. A contraction of the growth of government debt, coupled with an unchanged rate of monetary growth, would reduce somewhat the average maturity of net outstanding financial assets and could therefore reduce long-term interest rates by relatively more than short-term rates. The strength of this effect would depend on the maturity structure of the debt that would otherwise have been issued and on the strength of liquidity preference as a determinant of the term structure of interest rates. 2/ On the other hand, if the policy change is initially perceived to be temporary, then the short-run effect on long-term rates might be relatively small.

The empirical evidence reviewed here suggests broadly that the net effect of fiscal policies on the term structure of interest rates is likely to be small. A perusal of Table 4 reveals that the estimated first-year effects on treasury bill rates range from about 1/2 to 2 1/2 percentage points; the effects on long-term bond yields range from about 3/4 to 3 1/2 percentage points. Friedman's and Brayton and Clark's simulations should be the most useful for this purpose, since they incorporate effects on a variety of interest rates within the same simulation exercise. However, Friedman's results suggest that the magnitudes are comparable for both short- and long-term rates, while those of Brayton and Clark indicate relatively larger effects on short rates. 3/

1/ The long-run results, however, are not necessarily valid tests of the type of long-run effects discussed in Section III, since the models underlying the results in Table 4 were not formulated for that purpose.

2/ For an exposition of these relationships, see Friedman (1978). At the end of FY 1983, the average maturity of the stock of U.S. Treasury securities outstanding was just over four years.

3/ Brinner (1984) also reports results for a short-term rate, the rate on Federal funds. In that exercise, the Federal funds rate changes by quite a bit more than the yield on corporate bonds. On the other hand, Dewald (1983) finds (based on his results using quarterly data) that fiscal actions in the form of changes in the real value of the deficit have a significantly positive effect only on long-term rates. These and other results relating to the term structure of interest rates are discussed further in Appendix II.

Overall, examination of the characteristics of recent studies of the relationship between fiscal variables and interest rates indicates that there is a substantial body of evidence supporting the view that fiscal policy has affected interest rates in the United States in a predictable manner that is consistent with standard models of aggregate demand. The two factors that appear to characterize most clearly those studies that do not find significant effects are that they do not fully account for cyclical influences on the fiscal variable or that they fail to control adequately for the influence of monetary policy on interest rates. A central estimate based on recent studies would suggest that a fiscal contraction like that considered in this paper would be likely to reduce interest rates by about 2 percentage points over a two- to three-year period.

3. Effects on domestic economic activity

As indicated at the beginning of this section, most theoretical models suggest that with an unchanged rate of monetary growth a deficit-reducing change in government spending will directly cause at least a short-run decline in domestic output relative to its potential level, and it may induce a decline in private expenditure as well. Less agreement exists regarding tax policy, although the conditions for expecting no effect at all on output are rather stringent. In any event, most models agree that output will eventually tend back toward its initial path over the longer term, as the fiscal contraction provides the scope for additional private activity. The empirical issue here is the extent and duration of the decline.

The effect of a shift in fiscal policy on business investment is especially difficult to predict. Fiscal contraction exerts two opposing effects on investment spending. Other things equal, the decline in real interest rates would have a stimulative effect on investment spending; but fiscal contraction also cuts aggregate demand and final sales, which may tend to depress investment through an accelerator process. Most standard policy simulation models yield the result that the latter effect outweighs the former, so that fiscal contraction tends to reduce business investment in the short run. However, it is universally accepted that firms' investment expenditures are highly sensitive to expectations about profitability and sales. To the extent that a credible deficit reduction program led to more positive expectations, the negative effects on investment would be mitigated. On the other hand, an increase in corporate tax rates or a reduction in depreciation allowances would tend to depress fixed investment by lowering the real after-tax return on capital.

More generally, there are several other channels by which a change in the fiscal stance may lead to an offsetting effect on private output even during the first few years following a policy change. 1/ First, there is a financial mechanism working through the demand for money. For a contractionary fiscal policy with an unchanged monetary policy, the reduced pressure on the stock of money available to the economy will drive interest rates down, stimulating interest-sensitive expenditure such as housing construction and--as noted in the preceding paragraph--possibly business investment. Second, there is a more general portfolio process whereby a decrease in the growth of the stock of government debt may result in a decline in the required rate of return on fixed capital, stimulating private investment expenditure. 2/ Third, any decrease in aggregate domestic demand will in part take the form of reduced imports, so that the current account will improve. Therefore, the short-run decline in output generated by fiscal contraction will be smaller than the decline in demand. This improvement would be stronger in response to a tax increase than to a cut in government spending, since the direct effect of the latter would be weakened to the extent that government outlays have a small import content. Fourth, if the fiscal contraction were to induce a depreciation of the real exchange rate (see the next subsection and Section V), it would then be expected to lead eventually to a further improvement in the current account balance and thereby to a further offsetting increase in output.

The empirical evidence on the magnitude and speed of these offsetting processes is somewhat mixed, although the available results clearly indicate that the negative effects of fiscal policy on output are greater in the first one or two years than they are thereafter. This evidence is discussed in detail in Appendix III; a few selected results are summarized in Table 5. Of the single-equation studies listed in the table, only one (Batten and Thornton) is directly concerned with measuring the time pattern of the effects of fiscal policy. 3/ That study finds a significant short-run effect that very quickly tapers off to zero. The simulation studies, on the other hand, generally indicate that the reversal

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1/ For a more detailed description of these channels, see Spencer and Yohe (1970) and Price and Chouraqui (1983).

2/ This process requires the rather sensible assumption that government bonds be closer substitutes for money and other financial assets than for physical capital. Otherwise, portfolio shifts could reinforce rather than offset the effects of fiscal policy on output. This point is developed in Tobin and Buiter (1980).

3/ Barro, and Canarella and Garston, estimate static effects; Evans includes the lagged value of income as an explanatory variable, which gives a Koyck lag structure. Evans's formulation thus imposes the condition that the long-run effect be larger than the short-run effect. For a more complete discussion of recent evidence, see Appendix III.

Table 5. Selected Estimates of Fiscal Effects on Real Output 1/

	Fiscal Variable	Multiplier 2/ After 1 year	Multiplier 2/ After 3 years
A. Single-equation studies			
Batten and Thornton (1983)	High-employment expenditure	0.4	0.0
Barro (1981)	Real expenditure	0.3	0.3
Canarella and Garston (1983)	Real expenditure	0.3	0.3
Evans (1984)	Real expenditure	0.2	0.2
B. Simulation studies			
Caprio et al. (1984)	Deficit	1.1	0.3
Cohen and Clark (1984)	Income tax rates	1.0	0.0
Masson and Blundell-Wignall (1984)	Real expenditure		
	a. with perfect foresight	1.0	0.6
	b. with static expectations	1.5	1.5
Sinai and Rathjens (1983)	Real expenditure and taxes, in equal amounts	0.6	0.4

1/ For a more complete presentation of recent evidence, see Appendix III.

2/ Ratio of the change in real GNP to the initial change in the deficit generated by the given fiscal variable. For the single-equation estimates, which are log-linear, the multiplier has been derived using the 1982 value of the ratio of cyclically-adjusted government expenditure to trend GNP.

of the initial effect of a sustained shift in the fiscal stance is only partial after three years. The exceptions are Cohen and Clark, who find that the initial effect is totally reversed after three years, and Masson and Blundell-Wignall, whose results suggest--for the case in which they assume that private market participants have static expectations about the future course of the economy--that there is virtually no tapering off at all during the period of the simulation.

Part of the difference in these various results is associated with differences in methodology between single-equation (reduced form) studies and simulations of large-scale (structural) models. As noted in the first part of this section, these two types of studies often give conflicting results, especially in the context of testing for fiscal effects on output. The simulation studies listed in Table 5 generally show higher multipliers than do the single-equation estimates.

A possible problem with the single-equation studies reviewed here is that fiscal policy may have been ill-timed during all or part of the sample period--expanding, for example, at times when the economy is already near its capacity. In that case, these equations will underestimate the potential effect that well-timed policies would have had on real output. Alternatively, if fiscal policy has been very well-timed--expanding quickly in response to declining output, and conversely--then a simple reduced-form approach will again fail to isolate the fiscal effect on output. It is therefore not surprising that single-equation studies have generally indicated somewhat smaller effects than have simulations with structural models.

The principal difficulty with simulation studies is that large-scale models are not analytically transparent; one cannot clearly judge what aspects of the model's structure are responsible for a given macroeconomic result. This problem is acute in circumstances such as the present when theoretical disputes are at the forefront of policy discussions. Nonetheless, it is useful to examine recent simulations, not least because all of the major models produce qualitatively similar results regarding the general thrust of fiscal effects. To some extent, this consensus emerges because the models themselves were constructed on the basis of standard (neo-Keynesian) theories, but this point must not be pushed too far. Most models today are highly eclectic in their use of theoretical structures (perhaps to a fault); they incorporate many neoclassical and supply-side elements, although their treatment of expectations may still be inadequate. 1/

1/ As noted earlier, Blinder (1984) discusses the treatment of expectations and supply-side effects in the three models that he surveys. Green (1980) examines in detail the determination of investment spending in four large econometric models, focusing primarily on the different ways that the models apply neoclassical theory.

By and large, the simulation studies with structural macroeconometric models suggest that a decrease in real federal government expenditures or an increase in tax rates will reduce total real GNP by an amount more or less equal to the initial change in the deficit within one to two years. As long as the rate of monetary growth is held fixed, few simulations show an initial multiplier much greater than unity. The implication is that a reduction in government spending tends to exert a direct deflationary effect on GNP but does not generate any indirect overall contraction in private spending unless it is accompanied by a monetary contraction as well. An increase in tax rates directly reduces private disposable income and thereby leads to a contraction in private spending; but the evidence from model simulations suggests that any further multiplier effect is likely to be quite small. Furthermore, these conclusions are based on simulations that generally begin at times when substantial slack exists in the economy. If the implementation of fiscal restraint during 1985-87 were to come at a time when output is straining at its capacity level, then the adverse effects of the policy shift on real output would be somewhat reduced.

Simulation studies also produce broad agreement that in the short run fiscal contraction will lead to an increase in residential construction but a decrease in business investment. In principle, these effects could go either way, as the contraction of aggregate demand and the decline in interest rates work in opposite directions. But the picture that emerges from the recent model simulations examined in Appendix III is that the effects of the slowdown in aggregate demand and the increased tax burden outweigh the effects of declining interest rates and declining resource absorption on business investment. The housing market, however, is highly interest-sensitive, and it constitutes a major channel by which fiscal actions lead to an offsetting change in private sector activity. 1/

An overall examination of both simulation and single-equation studies leads to three principal conclusions about the effects of fiscal policy on output. First, virtually all available evidence supports the view that either a reduction in government spending or an increase in taxes will lead to at least a temporary contraction in output. Second, most evidence indicates that the short-run deflationary effect on output will be mitigated after the first year or so, but whether the offsetting effects are total or only partial after a three-year sustained policy change remains an open question. Third, the major negative short-run effects would normally fall on business investment, while the major positive effects

1/ The importance of this channel in the future may be diminished somewhat by the emergence of variable-rate mortgages.

on the domestic economy in the short run would take the form of a stimulus to housing expenditure. An additional stimulus would be expected to work through a reduction in the external current account deficit; that linkage is explored in Section V.

As noted above, these conclusions are based on historical evidence that--because of the unusually large size of present and prospective deficits--may not be entirely relevant to present circumstances. In particular, to the extent that fiscal action now were to alleviate concerns about the cumulative effect of prospective deficits, and to the extent that the economy would adjust more quickly to a credible program that was announced and understood in advance, the negative impact on output would be smaller than that summarized here. Unfortunately, there is not much empirical work on how these factors might influence the effects of a fiscal restraint program. However, a recent study by Masson and Blundell-Wignall (1984) serves to illustrate the sensitivity of simulation results to program credibility. That study includes simulation experiments designed to determine whether a U.S. fiscal contraction that had a strong impact on expectations would have substantially different effects on output, interest rates, and exchange rates from those of a program that left expectations essentially unaltered. Such a study is especially relevant for a program like the one under consideration in this paper, which would be implemented over a period of some years but which would be announced and passed into law at the beginning of that time.

The results of the Masson and Blundell-Wignall study are discussed at length in Section V, below. At this stage, however, it is relevant to note their finding that if market participants viewed a program of U.S. fiscal restraint as reflecting a fundamental reorientation of economic policy, both U.S. long-term interest rates and the exchange value of the U.S. dollar would immediately tend to decline sharply. Since the direct effects of the policy on aggregate demand would come into play more gradually, the contractionary effects on output would be partially offset by these interest rate and exchange rate movements. For example, their simulations indicate that after one year, the decline in U.S. output would be about two thirds as large as the decline estimated with static expectations.

4. Direct effects on exchange rates

Just as there is controversy over the extent to which the substantial rise in the cyclically-adjusted U.S. fiscal deficit since 1981 has contributed to the large and sustained increase in the real value of the U.S. dollar, 1/ there is also wide disagreement about the degree to which a fiscal deficit reduction program might lead to a dollar depreciation in

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1/ For evidence on that issue, see Hooper (1984).

the short run. Standard economic analysis suggests that for a country such as the United States, where domestic financial assets are likely to be close substitutes for those denominated in foreign currencies, a fiscal contraction would be likely to induce a depreciation of the home country's real exchange rate. 1/ The reason for this pattern is that a fiscal contraction tends to decrease the demand for money and for domestic credit; with unchanged monetary growth, real interest rates on domestic assets will fall relative to those abroad. For a given level of the expected longer-run equilibrium exchange rate, this means that the actual exchange rate must initially depreciate in order to lower the expected return on foreign currency assets. If fiscal restraint were to reduce the expected inflation rate in the United States by alleviating concern about the ability of the monetary authorities to maintain effective control over monetary growth in the longer run, the magnitude of this depreciation would be correspondingly reduced. Furthermore, as discussed in Section III, the longer-run equilibrium path of the exchange rate may actually be above the path that would have occurred without a fiscal restraint program, but this effect is likely to be secondary in the short run. The simulation results for the large macroeconometric models that permit these various factors to be taken into account are described in Section V below. The present very brief discussion focuses on one aspect of this process; namely, the direct relationship between movements in real exchange rates and in real interest rate differentials.

Empirical evaluation of the relation between interest rates and exchange rates has proved difficult because the results are sensitive to small changes in specification or in data coverage, and most models have failed to perform better than a random walk in out-of-sample tests, even when actual values for interest rates and other exogenous variables have been used. Nonetheless, a number of estimates based on reduced-form models of portfolio adjustment--including those of Knight and Mathieson (1979), Artus (1981), Hooper and Morton (1982), Frankel (1983), Shafer and Loopesko (1983), and Boughton (1984)--have found significant positive effects of real interest differentials on real exchange rates. A consensus view of this work would suggest that a 1 percentage point decline in the real short-term interest differential is consistent with a decline in the country's real effective exchange rate of approximately 1 percent.

This evidence appears to imply that fiscal restraint would have only a very modest effect on exchange rates. 2/ Such empirical analyses, however, are based for the most part on the assumption that the change in

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1/ This conclusion is based on the assumptions that, while financial asset prices adjust rapidly, the adjustment of goods prices occurs slowly, and that monetary growth is unchanged. For further exposition of this process, see Cohen and Clark (1984).

2/ This issue is also discussed further in Section V.

the short-term interest differential leaves real long-term differentials unchanged. For the type of fiscal restraint program considered in this paper, yield-curve considerations are extremely important, particularly given present conditions. To take a simple example, suppose that financial market participants form exchange rate expectations rationally and that foreign financial assets are perfect substitutes for those denominated in dollars. Then, if the longer-run equilibrium exchange rate is roughly unchanged, a percentage point increase in the real interest differential in favor of U.S. dollar ten-year bonds vis-à-vis bonds of similar maturity denominated in other currencies implies that transactors will quickly bid down the real value of the dollar by about 10 percent. Then, the real value of the dollar will appreciate (in relation to what it would otherwise have done) at a rate of 1 percent a year for the next ten years, in line with the change in the real interest rate differential. 1/ Thus, in contrast to movements in real short-term interest rate differentials, which are empirically estimated to exert roughly a one-to-one effect on real exchange rates, shifts in long-term real interest differentials are likely to be associated with much larger exchange rate overshooting effects. Unfortunately, there is as yet little empirical evidence on these effects, if only because of the difficulty of measuring long-term inflationary expectations and thus long-term real interest rates. 2/ Consequently, they are typically excluded from the exchange rate equations of large econometric models like those described in the next section. To the extent that they fail to account for overshooting effects, simulations with large-scale models may tend to understate the exchange rate movements associated with important changes in the stance of U.S. fiscal policy.

V. Short-Run International Effects of U.S. Fiscal Restraint

This section examines the available empirical evidence concerning the channels by which a change in U.S. fiscal policy is transmitted to other countries through both trade and financial linkages. Subsection 1 deals with interactions between the United States and other industrial countries under alternative assumptions about how their policies react to the shift in the U.S. fiscal stance. Subsection 2 traces the impact that changes in interest rates and industrial country exchange rates exert on non-oil developing countries and the feedback effects on the industrial countries themselves.

1/ For an exposition of this point, see U.S. Council of Economic Advisors (1984), pp. 53; and Shafer and Loopesko (1983), pp. 54-55.

2/ Shafer and Loopesko (1983) estimate an exchange rate equation using interest rates on ten-year bonds and based on the uncovered interest-parity condition. They find effects that are somewhat larger than those of most studies using short-term rates, but the differences are much smaller than the simple uncovered-parity model would imply.

As the discussion below indicates, trade and financial linkages interact in complex ways in transmitting the effects of changes in fiscal policy from one industrial country to another. First consider trade linkages in isolation. The discussion of Section IV has indicated that, at a given level of the real exchange rate, a program of fiscal restraint in the United States would tend to reduce aggregate domestic demand in the short run. To the extent that output growth initially declined, reduced leakages of U.S. expenditure into imports would also result in slower growth of foreign exports and to some moderation in the levels of economic activity in countries that trade with the United States. 1/ Of course, given the high degree of exchange rate flexibility among major countries, these multiplier effects of trade linkages on domestic and foreign income are likely to be modified significantly by exchange rate changes.

Financial linkages operate through changes in U.S. interest rates, changes in interest rates in other industrial countries, movements in exchange rates, wealth effects on developing countries that are major borrowers, and feedback effects that moderate financial conditions in the United States itself. For example, when real interest rates fall in the United States as a consequence of greater fiscal restraint, other countries may experience some combination of a decline in their real interest rates and an appreciation of their nominal exchange rates relative to the U.S. dollar. Owing to the overwhelming importance of the dollar in international trade and finance, these linkages are both strong and fast acting. However, the transmission of U.S. financial developments to other major industrial countries depends crucially on the types of monetary policies that they pursue. Furthermore, given the degree of flexibility in the present exchange rate system, these interrelations also depend critically on how market participants' expectations respond to changes in the stance of policy. Indeed, to the extent that contract prices in goods and factor markets adjust relatively slowly in response to exogenous shocks, much of the short-run adjustment to a shift in fiscal or monetary policy will be thrown onto interest rates and exchange rates, which may initially "overshoot" their longer-term equilibrium values by substantial amounts.

1. Effects of a change in the U.S. fiscal position on other industrial countries

Most of the recent empirical work on the international transmission of economic developments among industrial countries has made use of large internationally-linked econometric simulation models that emphasize

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1/ Owing to import leakages, the domestic income multiplier of fiscal policy is smaller in an open economy than in a closed one.

interactions arising through trade flows, financial flows, and, in certain cases, the direct effect of international developments on domestic variables, such as the impact of exchange rate changes on domestic wage and price formation. Part (a) of this subsection briefly compares the trade linkages among industrial countries that are incorporated in three of the best-known international simulation models. To isolate the role of international trade in goods and services, the analysis initially makes the simplifying assumption that exchange rates remain unchanged after the U.S. fiscal shock. Part (b) then analyzes the implications of exchange rate flexibility for the transmission process, both generally and on the basis of simulations of the effects of a change in fiscal policy using two well-known internationally-linked macromodels. Finally, Part (c) considers the complex issue of how the credibility of a fiscal deficit reduction program might be likely to influence expectations and, through them, short-run output and price effects.

(a) Comparison of the trade linkage effects specified in three international models

To the extent that fiscal restraint in the United States leads to a short-run reduction in the growth of aggregate domestic demand, 1/ it also leads, via the marginal propensity to import, to slower growth in U.S. imports of goods and services. These changes in trade flows then induce variations in output and employment in other countries through multiplier effects. If nominal exchange rates remain unchanged, these international spillover effects tend to be positive; that is, a fiscal contraction in the United States would tend to reduce income and employment in other industrial countries, as well as in the United States.

Before surveying the empirical literature, it is important to note two general points that are relevant in assessing the quantitative results that have been obtained concerning the effects of trade linkages. First, although the total value of U.S. trade is very large (U.S. goods and services exports for 1984 are estimated at $364 billion), this trade is rather widely distributed geographically. 2/ A U.S. fiscal contraction would therefore tend to have negative but widely dispersed impacts on levels of economic activity in a relatively large number of trading partner countries. Only in the case of Canada would a weakening of output growth in the United States be expected to exert a substantial direct deflationary short-run effect, because of the large scale of Canada's bilateral trade with the United States. Second, the proportion of U.S. GNP that arises from exports of current goods and services remains relatively small, on the order of 10 percent. Thus, although trade linkages

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1/ This issue is dealt with in detail in Section IV.3.

2/ For a discussion of relevant aspects of the geographic pattern of U.S. merchandise trade, see Appendix IV.

transmit a U.S. fiscal contraction to economic activity in U.S. trading partners, the feedback effect of weaker output growth abroad onto the U.S. economy is likely to be relatively small. In other words, the multiplier effect of a U.S. fiscal contraction excluding international feedback effects does not seem to be much smaller than it would be if these international effects were included.

The simulations in Table 6 provide a convenient comparison of the simulated "Keynesian" open-economy income multipliers that are embedded in three of the best-known internationally-linked macroeconometric models. While these simulations are based on the artificial assumption of unchanged exchange rates, they serve to isolate the strength of the trade linkages in each model. Thus, the simulation results provide a useful benchmark on whether the international transmission mechanism resulting from trade linkages taken in isolation operates in much the same way in each of the different models. As already noted above, in practice the overall international effects depend heavily on other factors, such as how induced interest rate and exchange rate changes modify the simple linkages considered here. Discussion of these latter effects is deferred to the next subsection.

Table 6 compares the simulated domestic and international multiplier effects of a change in fiscal policy in the United States for the models of Project LINK, the OECD (INTERLINK), and the Japan Economic Planning Agency (EPA). 1/ The structures of these models are outlined in somewhat greater detail in Appendix IV. Table 6 gives the own-country and cross-country dynamic (one- to three-year) multiplier effects on real income in each model for a permanent exogenous change in the level of U.S. government expenditure on final goods and services equal to 1 percent of GNP. The effect on real income is measured as the percentage deviation between the level of real income in each year after the fiscal shock and its level for that year in the control solution. Positive entries in the table mean that the reported effect on real income operates in the same direction as the fiscal shock.

The estimates in Table 6 make it clear that the multiplier effects resulting from trade linkages alone are broadly consistent in both direction and magnitude across these three models. 2/ For the United States

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1/ These simulations were performed under conditions that were as nearly comparable as the different model structures allow. As noted in the text, these simulations are based on the artificial simplifying assumption that interest rates and exchange rates remain unchanged after the fiscal shock.

2/ The simulation results of each linked model are compared for the United States itself (column 1), six other major industrial economies (columns 2-7), and (for one model) the EEC as a regional group.

Table 6. Comparison of Three Forecasting Models: Simulated Income Multiplier Effects of a Sustained Change in U.S. Fiscal Expenditure Equal to 1 Percent of GNP Assuming Unchanged Exchange Rates 1/

(Deviation as percent of control solution)

Model 2/	Simulation Year	U.S. Domestic Effect	Effect on Real GNP in Partner Counries						
			Japan	Germany	France	United Kingdom	Italy	Canada	EEC
LINK	1	1.6	0.1	0.1	0.1	0.1	0.1	0.5	n.a.
	2	2.4	0.2	0.2	0.1	0.1	0.2	0.6	n.a.
	3	2.7	0.2	0.3	0.1	0.1	0.3	0.6	n.a
INTERLINK	1	1.6	0.4	0.3	0.2	0.2	0.2	0.5	0.2
	2	2.0	0.6	0.5	0.4	0.4	0.4	0.8	0.4
	3	1.9	0.8	0.7	0.5	0.4	0.5	0.8	0.5
EPA	1	2.0	0.1	0.0	0.1	0.2	0.1	0.4	n.a.
	2	2.0	0.5	0.4	0.3	0.5	0.3	1.2	n.a.
	3	1.8	0.8	0.5	0.4	0.8	0.3	1.0	n.a.

1/ In each column a positive entry means that the output effect operates in the same direction as the fiscal spending shock. The fiscal shock is a change in central government nonwage expenditure equivalent to one percent of U.S. GNP. Results in the table are one-year to three-year dynamic multipliers; that is, the percentage deviation of the level of output after the shock to each model's control solution. Simulations are based on the assumption of unchanged exchange rates and accommodating monetary policy.

2/ Sources are: LINK: Filatov, Hickman and Klein (1982); INTERLINK: Larsen, Llewellyn and Potter (1983); and EPA: Yoshitome (1984). Except for INTERLINK, the results in this table are from Helliwell and Padmore (1982).

itself, a sustained fiscal expenditure reduction of 1 percent of GNP generates--under the above assumptions--a third-year multiplier effect on real income that varies from under 2 percent of GNP for EPA and INTERLINK to 2.7 percent for the LINK model. These multipliers are much larger than those described above in Section IV, owing primarily to the assumption of an accommodating monetary policy in these simulations but not in the earlier section. The simulated effects of the U.S. fiscal change on output in other countries via trade linkages are fairly strong for Canada and, to a lesser extent, for Japan and the Federal Republic of Germany; for the other countries, however, the foreign trade multipliers are rather weak. The models predict that after two years the multiplier effects for Canada range from about 2/3 of 1 percent to as high as 1.2 percent (EPA model); for Japan, Germany, France, the United Kingdom, and Italy, the international multiplier effects for the three models range from about 0.3 percent to about 1/2 of 1 percent. Broadly speaking, these results imply that, as regards international trade linkages, the structural characteristics of three of the best-known internationally-linked simulation models are quite similar.

(b) International transmission effects based on linked macroeconometric models with flexible exchange rates

Analysis of trade multipliers at unchanged exchange rates is obviously not sufficient to give a clear impression of how the effects of a U.S. fiscal restraint program might affect other countries under current conditions. Since the major currencies float individually or in the context of the cooperative arrangements of the European Monetary System, it is important to get an idea of the extent to which the exchange rate movements induced by a shift in U.S. fiscal policy would affect the international transmission of real income changes. The nature of these exchange rate effects depends on a number of factors, including the responsiveness of the U.S. current account balance to real exchange rate developments, the degree of substitutability between assets denominated in U.S. dollars and those in other currencies, confidence factors, and the monetary policies pursued by countries that have extensive trade and financial ties with the United States.

The importance of this latter factor can be seen in the following examples. Suppose that the U.S. fiscal deficit was reduced via a contraction of government spending, and that this policy was accompanied by a deceleration in the rate of monetary expansion in the United States, so that key domestic interest rates remained constant in real terms. Under these assumptions, the deflationary impact of fiscal restraint would initially tend to improve the U.S. current account position, putting upward pressure on the real value of the U.S. dollar. In this case, the effects of fiscal restraint on U.S. economic activity would tend to be larger than those reported in the preceding subsection, while the effects

on economic activity in other countries would be reduced. Alternatively, suppose that when the fiscal contraction occurred in the United States, rates of monetary expansion were held unchanged both in the United States and abroad. In these circumstances, U.S. fiscal restraint would initially put downward pressure on domestic output, but it would also tend to reduce U.S. interest rates relative to those prevailing abroad and to cause the real value of the U.S. dollar to depreciate. These two latter effects would mitigate the deflationary impact of the contractionary fiscal policy on U.S. domestic output, and would increase the extent to which the deflationary effect would be transmitted to other countries. Thus, both the real exchange rate effect of U.S. fiscal restraint and the extent to which any deflationary impact is transmitted abroad depend crucially on whether money growth rates in the United States and elsewhere are altered following the change in the U.S. fiscal stance.

There are several models that give a quantitative impression of the extent to which, other things equal, a given depreciation of the U.S. dollar might affect output, prices, and the current account of the United States and other major countries. For example, Table 7 presents simulation results for (A) a sustained 1 percentage point cut in U.S. short-term interest rates and (B) a 10 percent depreciation of the U.S. dollar using the INTERLINK model. 1/ As the table indicates, the results of the simulations with this model suggest that a sustained 1 percentage-point reduction in U.S. short-term interest rates translates into a 3.2 percent effective depreciation of the dollar and effective appreciations ranging from 1.2 to 1.5 percent for most other included currencies. While these simulated effects are somewhat larger than the consensus view of the estimated portfolio balance models referred to in Section IV.4 above, they may still fail to catch exchange rate overshooting effects. In particular, to the extent that a fiscal restraint program reduced the level of U.S. long-term interest rates, the discussion of Section IV suggests that its impact on the real exchange rate of the U.S. dollar might be much greater than one-for-one. Since most econometric models do not explicitly take account of these term structure effects, they may tend to underpredict the effects of major fiscal measures on the exchange rate, particularly in current circumstances. The simulated output effects of a 10 percent dollar depreciation reported in Table 7 are fairly small for the United States (of the order of 1/2 of 1 percent for GNP and only slightly over 1 1/2 percent on the level of prices after three years, even with wage/price feedbacks included), but they are substantially larger for other countries.

The interest rate and exchange rate effects reported in Table 7 suggest that interest rate movements and associated exchange rate flexibility would significantly alter the simple fiscal multipliers reported in Table 6. The key to this issue, of course, lies in estimating the exchange

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1/ Larsen, Llewellyn, and Potter (1983), Table A7.

Table 7. O.E.C.D. Interlink Model with Flexible Exchange Rates: Effects of Exogenous Changes in Interest Rates and Exchange Rates

(Percent Change from Baseline Levels)

Effects on:	Year	United States	United Kingdom	France	Germany	Italy	Canada	Japan	Total OECD
A. Sustained one percentage point cut in U.S. short-term interest rates:									
Real GDP	third	0.4	-0.1	0.0	-0.2	-0.2	-0.1	-0.1	0.1
Prices 1/	third	0.5	-0.6	-	-0.6	-0.5	-0.3	-0.2	-
Long-term interest rate 2/	third	-0.7	-0.3	-0.2	-0.2	-0.2	-0.5	-0.3	-0.4
Effective exchange rate 3/	third	-3.2	1.5	-0.8	1.4	1.2	1.4	1.5	n.a.
B. Sustained 10 percent depreciation of the U.S. dollar: 4/									
Real GDP	1	0.1						-0.3	-0.1
	2	0.5						-0.9	-0.3
	3	0.5						-1.2	-0.4
Prices 1/	1	1.0						-0.5	-0.1
	2	1.4						-0.7	-0.3
	3	1.6						-1.1	-0.5
Current Account 5/	1	-6.8						2.4	0.6
	2	3.7						-0.7	-
	3	7.7						-1.3	1.0

Source: Larsen, Llewellyn, and Potter (1983). Tables A6 and A7.

1/ Total domestic demand deflator.
2/ Deviation in percentage points.
3/ Price of domestic currency in terms of weighted basket of foreign currencies.
4/ Including wage/price feedbacks.
5/ In billions of U.S. dollars.

rate effect of a given change in U.S. fiscal policy. Unfortunately, there is hardly any area of applied economic research where the extent of agreement about quantitative effects is as limited as it is in the case of exchange rate analysis. Part of the problem seems to be that while such models can take account of interest rate linkages, they are unable to take adequate account of confidence factors that may significantly alter assetholders' preferences for securities denominated in different currencies. Indeed, as already noted in Section IV, the major conclusion of the empirical work of the past five years is that econometric models of exchange rate determination rarely outperform random walk models. In these circumstances, the crucial task of policy analysis is to try to assess the degree to which predicted effects are likely to be sensitive to different exchange rate outcomes. Such effects obviously depend, in the first instance, on the types of monetary policies pursued both within the United States and abroad.

Two internationally-linked models--the EPA model and the Federal Reserve's Multi-Country Model (MCM)--have been used to simulate the effects of a change in U.S. fiscal expenditure with exchange rate flexibility. For purposes of illustration, the simulations described here assume that after the change in U.S. fiscal policy all countries hold their rates of monetary growth unchanged, allowing domestic interest rates to vary. Under these assumptions, simulation experiments with both models suggest that a fiscal contraction in the United States tends to depreciate the value of the U.S. dollar in effective terms. Similarly, both models suggest that even with exchange rate flexibility, income reductions in the United States induce declines in income abroad. In other words, the dollar depreciation tends to reinforce the cross-country income multiplier effects described in Table 6.

The results in Table 8 are those reported in Yoshitomi (1984), based on the EPA model. Again, the experiment considered is a sustained change in the level of government nonwage expenditure in the United States, but now exchange rates are endogenous; after the fiscal shock, monetary growth rates are assumed to remain unchanged both in the United States and abroad. The table permits comparison of the effects on output, interest rates, and exchange rates that occur under a regime of flexible exchange rates with what would have occurred in the fixed exchange rate case.

As the table shows, the simulations with the EPA model suggest that a sustained reduction of U.S. fiscal expenditure equivalent to 1 percent of GNP would reduce U.S. short-term interest rates by more than 1 percent in the first year, and by about 1 1/2 percentage points in the second and third years. By contrast, declines in short-term interest rates range from 0.2 to 0.5 percentage points for other industrial countries. Thus, the fall in U.S. interest rates resulting from the fiscal contraction moves interest rate differentials against the United States, stimulating capital flows to other countries that more than offset the incipient improvement in the current account of the U.S. balance of payments.

Table 8. EPA Model: Simulated Effects of a Sustained Change in Real U.S. Government Expenditure Equal to 1 Percent of GNP

(Fixed = fixed exchange rate regime)
(Flex. = flexible exchange rate regime)
(Percent deviation from the control solution)

Effects on:	Year	United States		United Kingdom		France		Germany		Italy		Canada		Japan	
		Fixed	Flex.	Fixed	Flex.	Fixed	Flex.	Fixed	Flex.	Fixed	Flex.	Fixed	Flex.	Fixed	Flex.
Real GNP	1	2.0	2.0	0.1	0.1	0.1	0.1	0.0	0.2	0.1	0.1	0.4	0.5	0.1	0.2
	2	2.0	2.0	0.5	0.6	0.3	0.2	0.4	0.6	0.3	0.3	1.2	1.6	0.5	0.6
	3	1.8	1.8	0.8	1.0	0.4	0.0	0.5	1.0	0.3	0.5	1.0	1.0	0.8	0.9
Short-Term Interest Rates	1	1.1	1.0	0.4	0.4	0.1	0.0	0.1	0.0	0.2	0.2	0.5	0.5	0.1	0.1
	2	1.4	1.4	0.7	0.6	0.2	-0.1	0.2	0.1	0.3	0.3	0.8	1.0	0.1	0.1
	3	1.7	1.7	0.8	0.8	0.3	-0.5	0.3	0.1	0.4	0.4	1.1	1.1	0.1	0.1
Effective Exchange Rates 1/	1	*	0.6	*	-0.3	*	-0.0	*	-0.9	*	-0.1	*	-1.4	*	-0.7
	2	*	0.7	*	-0.1	*	-1.4	*	-2.3	*	-0.1	*	-1.4	*	-1.0
	3	*	0.3	*	-0.3	*	-3.9	*	-2.7	*	-0.8	*	-0.5	*	-0.8

Source: Yoshitomi (1984).

1/ Price of the domestic currency in terms of a weighted basket of foreign currencies.

As a result of these interest rate movements, the U.S. dollar generally declines against other currencies, and U.S. net imports fall. For example, Japanese exports to the United States decline by between 5 1/2 and 6 1/2 percent relative to the baseline simulation, those from Germany by over 5 percent, and those from the United Kingdom by about 4 percent in the second and third years after the U.S. fiscal contraction begins. Yoshitomi also finds that although U.S. fiscal disturbances are transmitted abroad with greater force when there are flexible exchange rates and fixed money supplies than would have been the case if exchange rates had been fixed, the effect on U.S. real GNP is little changed from the case of fixed exchange rates. Although the depreciation of the U.S. dollar reduces U.S. net imports--thereby exerting an expansionary impact on the economy--it also tends to raise the U.S. inflation rate (measured by the consumption deflator). Thus the dollar's depreciation is less in real than in nominal terms.

To summarize, Yoshitomi finds that the transmission of a U.S. fiscal disturbance to the other countries included in the EPA model is generally greater under a regime of floating exchange rates than under fixed exchange rates, in the sense that real GNP in all other countries is affected more strongly for all years after the initial fiscal shock. This linkage occurs because a U.S. fiscal contraction tends to lower interest rates in the United States more than those abroad and thus tends to depreciate the U.S. dollar.

A simulation experiment based on a very similar fiscal shock has been performed using the Federal Reserve's Multi-Country Model (Table 9). Because interest rates and exchange rates are also endogenous to this model, its simulation results are directly comparable to those reported by Yoshitomi in Table 8 above. As in the earlier case, the fiscal shock is a sustained change in government spending equal to 1 percent of initial GNP. 1/ Again the table defines a positive change in the endogenous variable as one that operates in the same direction as the fiscal shock, while one that operates in the opposite direction is negative. The simulation assumes that after the fiscal shock government spending is held exogenous in real terms. As regards the specification of monetary policy in the model, the monetary base is held exogenous in each country except the United States (where M1 is the policy instrument) and the United Kingdom (where the policy instrument is the official discount, rate and market interest rates are tied fairly closely to it). Output and prices in countries not individually included in the model are exogenous. For Table 9 it is assumed that the exogenous shock occurs in the first quarter of the initial year for which results are reported.

1/ The entries in the table are shock minus control deviations and are generally in terms of percent.

Table 9. Federal Reserve Multi-country Model:
Simulated Effects of a Sustained Change in
Real U.S. Government Expenditure Equal to 1 Percent of GNP

(Percent deviation from the control solution) 1/

Effects on:	Year	United States	United Kingdom	Germany	Canada	Japan
Real GNP	1	1.5	0.1	0.2	0.4	0.2
	2	0.9	0.2	0.5	0.8	0.2
	3	0.1	0.1	0.5	0.8	0.2
	4	-0.1	-0.1	0.3	0.4	0.1
Prices (CPI)	1	0.0	0.0	0.0	0.1	0.2
	2	0.3	0.1	0.2	0.7	0.2
	3	0.6	0.1	0.2	1.3	0.2
	4	0.7	0.1	0.2	1.3	0.1
Interest rate	1	0.7	0.1	0.0	-0.2	0.0
	2	1.9	0.1	0.0	-0.3	0.0
	3	2.0	0.1	0.0	0.1	0.0
	4	1.7	0.1	0.0	0.5	0.0
Exchange rate 2/	1	0.3	-0.3	-0.4	-0.6	-0.2
	2	0.9	-0.5	-0.8	-2.4	-0.2
	3	0.4	0.0	-0.3	-2.5	0.4
	4	-0.1	0.6	0.2	-1.4	0.7

Source: U.S. Board of Governors of the Federal Reserve System (1983).

1/ In the table each positive entry means that the effect operates in the same direction as the shock (e.g., in year 1, a reduction in U.S. fiscal spending would depreciate the U.S. dollar by 0.3 percent).

2/ Price of domestic currency in terms of a weighted basket of foreign currencies.

A comparison of the MCM results in Table 9 with those reported for the EPA model in Table 8 reveals a number of qualitative similarities in their results for the five countries that are included in both. In particular, the simulation experiments with both models suggest that, given unchanged rates of monetary growth, a fiscal contraction in the United States will depreciate the U.S. dollar in effective terms and appreciate other currencies. Similarly, both models suggest that under flexible exchange rates there is a positive transmission mechanism from a fiscal change in the United States to GNP in the other (included) countries.

The exchange rate results are also quite similar in quantitative terms. In particular, both models suggest that the impact of fiscal restraint on exchange rates would be rather small. For example, the EPA model suggests that in the second year after a 1 percent fiscal contraction the U.S. dollar would reach its maximum depreciation, equivalent to about 0.7 of 1 percent in effective terms; the MCM model indicates that the maximum depreciation would occur in the same year and estimates it to be of the order of 0.9 percent.

However, the simulations produced by the two models do contain some differences in the short-run interest rate and output effects of the fiscal shock. For interest rates, the EPA model predicts a gradual fall in the level of U.S. interest rates by a total of some 1.7 percentage points in the third year after the fiscal contraction, whereas the MCM model predicts a somewhat more rapid and larger effect on real interest rate of about 2 percentage points. 1/ As a result of this difference, the depreciation of the U.S. dollar resulting from a fiscal contraction is slightly larger in the case of the MCM model than in that of the EPA model, and the income multiplier is noticeably smaller (1.5 in the first year and declining thereafter, as compared to a multiplier of nearly 2 for the EPA model).

As regards output, on the basis of the hypothetical fiscal restraint package considered in this paper (which is equivalent to 2 percent of GNP) the MCM and the EPA model suggest negative first-year effects on U.S. GNP of about the same magnitude. But whereas the MCM indicates that any deflationary impacts would be rapidly reversed, the simulations from the EPA model suggest that they would persist. While U.S. real GNP is simulated to be back at its baseline level by the third year after implementation of the fiscal restraint program in the MCM, the EPA model suggests that it would remain 2-3 percent lower over this time period. Thus the MCM suggests a much weaker international transmission of output changes than the EPA model, even though exchange rate changes are simulated to be about the same in both cases.

1/ A more detailed discussion of interest rate effects may be found in Section IV.2 and in Appendix II.

To summarize, both the MCM and the EPA model suggest that a contraction in fiscal expenditure equivalent to 1 percent of GNP would depreciate the U.S. dollar by between 3/4 and 1 percent in effective terms, would reduce the interest rate by perhaps 1 1/2 percent, and would cause real income to decline relative to its baseline level in the United States. These negative multiplier effects would be transmitted directly and would result in lower levels of real GNP (compared to the control simulation) in partner countries. Qualitatively similar simulated domestic and international effects of a fiscal contraction implemented via an increase in tax rates are described in Appendix IV. However, it is very important to reiterate that these models, like those described in Section IV.4, yield simulated effects on real exchange rates that are surprisingly small, considering the likely effects of deficit reduction on long-run interest rates discussed in Section III.

The survey of empirical work in this subsection yields the following tentative conclusions about the international transmission process:

(1) In general, the internationally-linked econometric models suggest that the multiplier effect of a change in U.S. fiscal policy on GNP within the United States would be much the same irrespective of the exchange rate regime. This conclusion depends critically on two factors: first, the U.S. economy is still relatively closed (so that the feedback effects from induced income changes abroad onto the U.S. economy are rather weak). Second, the models generally predict that the exchange rate effects of fiscal shifts are relatively modest, leading to only relatively small changes in competitiveness.

(2) While theoretical models suggest that under a regime of flexible exchange rates a fiscal contraction in the United States could have either a stimulative or a contractionary effect abroad (depending partly on the types of policies undertaken elsewhere), the results of simulations with the EPA and MCM models indicate that U.S. fiscal shocks are largely transmitted directly (that is, a contraction in the United States would induce a contraction abroad, and vice versa), particularly if rates of money growth remain unchanged abroad. This result again relates to the small exchange rate changes induced by fiscal shifts. The results also imply that, for the reasons already noted above, these effects are modest in size.

(3) Finally, in the face of a fiscal contraction in the United States, foreign monetary authorities would be likely to raise their rates of money growth in order to offset, at least partially, the induced effect of the U.S. fiscal change on their exchange rates. To the extent that they did so, the short-run deflationary effects of the reduction in the U.S. fiscal deficit on other countries would be mitigated.

(c) The importance of credibility and expectations effects in assessing the international consequences of a fiscal restraint program

The conclusions reached above concerning the likely international effects of a U.S. fiscal restraint package are based on the results of major empirical studies completed during the past several years using internationally-linked models. However, the basic conclusion that a fiscal contraction of the size considered in this paper would have only a modest effect on the exchange market value of the U.S. dollar must be interpreted with considerable caution. Most econometric models have seriously underpredicted the appreciation of the U.S. dollar in real terms that occurred from the third quarter of 1980 to the present. To the extent that the dollar is currently above the level that would be sustainable in the longer term, the overvaluation is a reflection of factors that standard structural models fail to catch.

In these circumstances, a fundamental redirection of the stance of fiscal policy might lead to a sufficiently strong expectation effect that there would be a substantial depreciation of the U.S. dollar. For example, the analysis of Section III suggested that a U.S. fiscal restraint program of the size considered in this paper (2 percent of GNP) might be expected to permanently reduce the level of long-term real interest rates by a significant amount. Section IV.4 emphasized that, other things equal, such a decline in U.S. long-term yields might be expected to induce a larger depreciation in the real value of the U.S. dollar than is indicated by the simulation results for the internationally-linked models discussed in the preceding subsection, owing to the fact that these models do not adequately take account of term structure considerations and related exchange rate overshooting effects. 1/

On the other hand, a credible program of fiscal restraint in the United States would not leave other factors unchanged. To the extent that it reinforced confidence in the long-run sustainability of U.S. policies, particularly the present noninflationary stance of monetary policy, it would tend to strengthen the portfolio preference for assets denominated in U.S. dollars. Such an effect would be likely to attenuate the tendency for the dollar to depreciate. From this perspective, as already noted in Section IV, the relevance of standard empirical studies to policy analysis may be limited at the present time, both because current conditions differ in important ways from the environment in which most empirical studies were undertaken, and because standard studies rarely focus specifically on the degree to which the credibility of a policy may, of itself, exert a significant impact on expectations and economic behavior.

1/ For a recent attempt to incorporate overshooting effects in an internationally-linked macroeconomic model, see Hooper (1984).

Turning again to the simulation study of Masson and Blundell-Wignall (1984), results for both the United States and the rest of the world are summarized in Table 10 based on a reduction in fiscal spending equal to 1 percent of GNP, beginning in the first half of 1984. Briefly, Masson and Blundell-Wignall found that if market participants viewed a U.S. fiscal contraction as reflecting a fundamental change in the stance of policy (Case "R" in Table 10), both the exchange rate of the U.S. dollar and U.S. long-term interest rates would immediately fall by a fairly substantial amount. These variables would only decline marginally, however, if expectations remained unaltered after the policy change (Case "S"). Similarly, the deflationary effects of the reduction in fiscal expenditure were found to be substantially larger over several years in the case where the reduction in fiscal spending was not initially considered credible by market participants than in the case where "rational expectations" held, even when the long-run effects of the two policies were the same. These alternative assumptions may also lead to a substantial difference in the degree to which the U.S. fiscal shock is transmitted to the rest of the world. Although rest-of-the-world output declined on impact in both of the simulations undertaken by Masson and Blundell-Wignall, the fall was much smaller in the rational expectations case.

While conclusions from this sort of simulation work must be viewed as highly tentative, they would, if confirmed, have important implications for the conduct of fiscal policy in present circumstances. They suggest that a large, vigorous, and consistent program of reductions in the fiscal deficit might exert important effects on interest rates and the value of the U.S. dollar that would be much larger than those indicated by standard empirical work. Nevertheless, such a view remains highly conjectural at this stage. The basic conclusion of the work of Masson and Blundell-Wignall is that while a deficit reduction program would still exert some deflationary impact on output, interest rates, and the exchange rate, the adverse output effects of a credible program would be far smaller than those of a program that was not initially believed, owing to the fact that markets would immediately begin to price assets and goods on the expectation of the long-run effects, whereas the negative demand-side effects would begin to appear only as the program was implemented.

2. Effects on the non-oil developing countries

This subsection of the paper addresses the important role that changes in industrial country fiscal policies can play in influencing the economic environment in which developing country growth and adjustment take place. These issues are of particular concern at a time when the debt problems of many non-oil developing countries (NODCs) loom large in policy discussions. Specifically, this subsection first analyzes the question of how fiscal restraint in the United States would be likely to

Table 10. Simulation of a Reduction in U.S. Government Spending Equal to 2 Percent of GNP Starting in 1984, with Rational and Static Expectations and With Perfect Asset Substitutability 1/

(Percentage Deviations from Baseline)

		1984		1986	1988
		S1	S2	S2	S2
United States					
Effective exchange rate	R	-5.02	-4.81	-4.58	-4.93
	S	-0.73	-1.43	-3.69	-5.23
Interest rates					
Short-term	R	-1.24	-1.12	-0.94	-1.38
	S	-1.72	-1.82	-2.28	-3.25
Long-term	R	-2.35	-2.41	-2.72	-3.07
	S	-0.08	-0.17	-0.51	-0.92
Real output	R	-2.28	-1.81	-0.95	-0.83
	S	-2.74	-2.67	-2.33	-2.13
Inflation rate 2/	R	0.34	-0.09	-0.31	-0.48
	S	0.05	-0.21	-0.62	-1.03
Rest of World					
Interest rates					
Short-term	R	-0.81	-0.70	-1.08	-1.55
	S	-0.27	-0.42	-1.30	-2.59
Long-term	R	-2.39	-2.47	-2.82	-3.16
	S	-0.01	-0.04	-0.20	-0.53
Real output	R	-0.22	-0.18	0.07	0.27
	S	-0.40	-0.44	-0.75	-0.99
Inflation rate 2/	R	-1.08	-0.47	-0.46	-0.46
	S	-0.16	-0.29	-0.68	-1.05

Note: S1 and S2 denote the first and second semesters.

Source: Masson and Blundell-Wignall (1984).

1/ For exchange rates and long-term bond rates: denoted R and S, respectively.

2/ Annual interest rate or inflation rate, in percent, minus the rate in the baseline simulation.

affect the short-run (i.e., one to three years) debt-servicing capacities of the NODCs, and the volume and value of their total imports. For simplicity, quantitative estimates are made for an impact effect extending over one year, though the accompanying discussion is more general. This subsection also estimates the feedback effects of a change in the level of NODC imports on the merchandise trade balances of the United States and other industrial countries.

Three types of developments in industrial countries that affect the environmental conditions faced by developing countries are described and analyzed quantitatively: a change in the level of interest rates prevailing in industrial country financial markets, a movement in the value of the U.S. dollar relative to the currencies of other industrial countries, and shifts in the levels of activity in the industrial countries.

Analytically, the problem of estimating the effect of tighter U.S. fiscal policy on the external position of the NODCs is addressed here in two parts. First, for each of the three changes in the external economic environment--interest rates, exchange rates, and industrial country activity--an estimate is derived of the likely impact on the current account balances and debt service ratios of non-oil developing countries taken as a group, under the working assumption that import volumes are held constant at their initial levels following the change. A detailed breakdown of these effects for different categories of NODCs and for various geographic regions is presented in Appendix V. Next, again for each of the three exogenous shifts, a calculation is made of the change in import volumes that could occur if the volume of lending to NODCs remained unchanged in real terms. Thus, two polar cases are calculated: one in which import volumes do not change but the external debt position, as summarized in the debt service ratio, is altered; and another in which the debt position is held constant and the entire effect of the changed external environment is allowed to feed through onto NODC import volumes.

The results of this analysis can be briefly summarized as follows. To the extent that U.S. fiscal restraint induced a decline in both U.S. interest rates and the value of the U.S. dollar relative to other major currencies, these two effects would tend to reinforce one another in reducing the level of NODC debt in real terms (i.e., deflated by NODC export prices). However, a policy of U.S. fiscal restraint might also lead, at least initially, to diminished activity in the United States and, to a lesser extent, in the other industrial countries. The effect of diminished activity is twofold: it leads to an adverse NODC terms of trade effect, and it results in diminished industrial country demand for the exports of NODCs. This activity effect tends at least partially to offset the positive interest and exchange rate effects of U.S. fiscal restraint.

Over the longer run, non-oil developing countries could be expected to reap clear benefits from the higher level of U.S. net saving, lower real interest rates, and slightly faster potential output growth in the United States that would be associated with fiscal restraint (see Section III). In the short run, however, the net outcome of each of the factors described above on the external position of the NODCs depends critically on the size of the interest rate and exchange rate effects relative to the short-run activity effects. Other things equal, the larger are the effects in financial markets relative to real output effects, the more likely it is that the short-run changes will also work in favor of the NODCs. Over several years, as the short-run effects of fiscal restraint on industrial country activity diminished, any negative activity effects would cease to be a factor in determining the NODC's external position. However, the lower real interest rate would have a continuing beneficial effect on the NODCs.

The overall impact effects of a U.S. fiscal deficit reduction program are also likely to differ greatly across different analytical and geographic subgroups of non-oil developing countries. In particular, the larger are (1) the initial stock of a country's external debt, (2) the proportion of debt denominated in U.S. dollars, and (3) the component of total debt contracted at floating interest rates, the larger is the beneficial effect of a fall in real interest rates or a depreciation of the dollar. Thus, among the geographic subgroups, Western Hemisphere NODCs are particularly sensitive to changes in the financial environment brought about by altered U.S. fiscal policy. Among the analytical subgroups, the net oil exporting NODCs and those that export manufactures (which, to be sure, include several Western Hemisphere NODCs) are relatively more sensitive than the other analytical subgroups, partly because they tend to have relatively large amounts of floating rate U.S. dollar debt.

Table 11 provides a summary of the effects estimated to occur within one year for each of the environmental changes described above on the external position of NODCs taken as a group. Appendix V provides a detailed description of the procedure employed in making these calculations and also gives the relevant data on initial conditions that are used to make these calculations for each major group of NODCs. In Table 11, the first column summarizes the interest rate effects. If the interest rate on U.S. dollar-denominated instruments were to fall as a result of a U.S. fiscal contraction there would be a positive wealth effect on NODCs, owing to the reduced dollar value of present and future interest payments. In the short run, the maximum amount of resources that would be freed in the NODCs by such a development depends on both the initial stock of developing-country floating-rate debt and the size of the decline in interest rates. With approximately two thirds of the estimated $595 billion of developing-country debt 1/ in 1984 at floating

1/ The data used in this subsection are described in Table 18 in Appendix V.

Table 11. The Effect of Environmental Changes on the Non-Oil Developing Countries 1/

	A 100 Basis Point Decrease in the Interest Rate	A 10 Percent Depreciation of the Dollar Against Other Industrial Country Currencies 2/	A Decrease in the Growth Rates of Industrial Country Real GDP (minus 1 percent for the U.S., minus 0.1 percent elsewhere)
Change in:			
Export value (In billions of dollars)	0	29.9	-6.74
Export volume (In percent)	0	0	-.97
Export price (In percent)	0	8	-.82
Import value (In billions of dollars)	0	30.8	0
Import volume (In percent)	0	0	0
Import price (In percent)	0	8	0
Interest payments (In billions of dollars)	-3.96	1.5	0
Current Account balance (In billions of dollars)	3.96	-2.4	-6.74
Debt service/export ratio, as a percentage change from the baseline value 3/	-4.2	-6.5	1.8
Change in import volume implied by no additional real borrowing: 4/			
In percent	1.0	1.4	-2.3
In billions of constant dollars	3.96	5.4	-8.7
In billions of current dollars	3.96	38.9	-8.9

1/ This table is constructed under the initial assumption that the initial import volume of NODCs remains unchanged.

2/ It is assumed that the real effective exchange rates of NODC remain constant.

3/ The initial debt service/export ratio is .2519. A decrease of 4.2 percent is equivalent to a change of 1.06 percentage points.

4/ This is calculated by solving for the import volume that will keep the ratio of the current account (less amortization) to total exports constant.

rates, each percentage point drop in U.S. interest rates would free resources sufficient to allow a rise in NODC import volume of approximately 1 percent, or nearly $4 billion at 1983 prices. Of course, in present circumstances the actual increase in NODC imports would probably be significantly smaller than 1 percent, owing to the need to clear arrears and improve debt-servicing performance. If import volumes were to remain constant, the debt service ratio would fall by 1 percentage point, to just over 24 percent. These calculations assume that interest rates in the other industrial countries would decline by an amount that matches that on dollar-denominated assets; if interest rates on non-dollar debt did not decline, the reduction in debt service resulting from this source alone would be somewhat smaller. 1/ However, if a decline in U.S. interest rates were not matched abroad, the exchange rate of the U.S. dollar would tend to depreciate.

The second effect, also presented in Table 11, involves the possible response of NODC imports to any depreciation of the dollar against other industrial country currencies that might be associated with U.S. fiscal restraint. There are three ways in which a depreciation of the dollar against other industrial country currencies would be expected to affect NODCs. First, the dollar depreciation would cause the dollar price of both imported and exported goods to rise. NODCs may gain or lose from this effect, depending on their initial trade balance and on whether their terms of trade improve or deteriorate. Second, a dollar depreciation could alter the relative price of traded and nontraded goods, thus affecting NODC export volumes. Finally, a dollar depreciation would raise the dollar value of that portion of the NODC's external debt that is denominated in currencies of other industrial countries that have appreciated relative to the dollar.

Of all these changes, the terms of trade effect is the most difficult to analyze. Conceptually, a devaluation of the dollar against the currencies of other industrial countries can shift the terms of trade either in favor of or against any individual developing country. If, as an analytical simplification, it is initially assumed that the NODC's export supply is completely price inelastic, then the magnitude of the increase in the dollar price of NODC exports will depend on demand elasticities and the share of U.S. demand in the global markets for goods exported by the NODCs. The larger is the U.S. market relative to those in other

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1/ Using the data on the share of foreign currency debt provided in Appendix V, alternative calculations could be made to estimate a change in interest rates on dollar-denominated assets alone. However, owing to the preponderance of dollar-denominated debt in short-term floating rate debt, the results are not substantially different from those reported here.

industrial countries for NODC's exports, all other things equal, the smaller will be the rise in the dollar price of the NODCs' exportables in the face of a dollar depreciation vis-à-vis the other industrial country currencies. 1/ Relaxation of the assumption of zero price elasticity implies that an induced positive supply response by the NODCs will moderate the dollar price rise. Conversely, the larger the share of the NODC's exports to other industrial countries, the smaller will be the change in the price expressed in the currencies that have appreciated, and the larger the rise in the dollar price. Similarly, the NODCs' dollar import prices will depend on the geographic pattern of its imports and its own capacity to substitute cheaper imports.

In the absence of known import and export demand price elasticities between the developing countries on one hand and the United States and other industrial countries on the other, it is difficult to say anything about the effects of a change in the exchange rate on the terms of trade even given the relative sizes of various markets. If NODCs can shift easily between alternative markets in satisfying their import demands (i.e., if there is a high elasticity of substitution between goods produced in different countries from the NODC's viewpoint) then a depreciation of the dollar against other industrial country currencies might have some positive effect on the NODC terms of trade. On the other hand, if there is low substitutability, then the fact that the United States is more important in NODC export markets than in their import markets suggests that a dollar depreciation would have a negative effect on the terms of trade. 2/ There is, unfortunately, little empirical evidence to help in gauging the magnitude of this effect, though it seems reasonable to suppose that it is modest for the NODCs taken as a group. Consequently, in all of the calculations undertaken it is assumed that the developing country terms of trade remain constant in response to a decline in the value of the dollar relative to the other major currencies. This assumption greatly simplifies the calculations that have been undertaken here.

1/ This can be seen if we assume that there is no induced change in the supply of developing country exports as the dollar depreciates against other industrial country currencies. Market equilibrium will occur only if the net change in total demand (United States and other industrial countries) is zero after relative prices have changed as a result of the depreciation. In a limiting case where there is no demand outside the U.S., so non-U.S. demand is unchanged, it must be true that U.S. demand is also unchanged. Consequently, the dollar price of the developing countries exports cannot have changed.

2/ In 1983 the U.S. accounted for 38 percent of NODC's exports to the industrial countries but only 27 percent of NODC industrial country imports came from the United States. See pages 20 and 21 of the International Monetary Fund, Direction of Trade Yearbook.

Specifically, the calculations assume that a 1 percent depreciation of the dollar leads to an increase of 0.8 percent in both import and export unit values expressed in dollars. 1/ We have also assumed that the price of traded goods relative to nontraded goods is constant, so that there is no induced export supply response in the face of a dollar depreciation.

The final aspect of depreciation of the dollar relative to the other major currencies that needs to be examined is its effect on the debt-servicing position of developing countries. If a particular developing country is a net debtor, and if some portion of its debt is denominated in non-dollar currencies, then the nominal debt service (and the nominal debt), expressed in dollars, will increase as the dollar depreciates. However, for plausible amounts of non-dollar debt, the increase in the dollar price of exports will almost certainly have such a strong effect on the value of exports that the debt service ratio will fall (as will, of course, the real level of the debt). Thus, from this effect, we would expect the external position of NODCs to improve either through an improved real debt position, or through the ability to import a larger volume of goods. 2/

As can be seen in Table 11, the estimated impact effect of a dollar depreciation on the NODCs as a group is an overall decrease in the ratio of external debt service to exports. 3/ This improvement occurs because the dollar value of exports increases relatively more than that of debt

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1/ This value, while admittedly arbitrary, falls midway between a recent staff estimate and an estimate of the effect of exchange rates on commodity prices in Chu and Morrison (1983).

2/ The numbers used here are, at best, first approximations, and it is important to point out their limitations. First, the total stock of external debt is adjusted only for official foreign exchange holdings. For many debtor countries, this is probably a reasonable assumption; for others who may hold a large external asset position, it may not be. If a country's net liabilities are overstated, the adverse effect on the country's external position will also be overstated. Second, it is assumed that assets and liabilities have the same currency composition and furthermore that this currency composition also characterizes debt repaid in the period. Third, in estimating the fraction of debt denominated in dollars we have used BIS data. These data are subject to some error especially concerning the currency of composition of loans from offshore banks. It is assumed all such loans are dollar denominated.

3/ Note that this effect occurs despite the fact that under our assumptions a dollar depreciation induces (i) an increase in the trade deficit measured in dollars (given the assumption of no change in the terms of trade or trade volumes), and (ii) an increase in service payments again measured in dollars.

service payments. In other words, the value of the nominal debt rises less than the price level, so that there is a net improvement in the external liability position of the NODCs. This result implies that if the flow of new lending were held constant in real terms the volume of NODC imports could increase. The results presented in Table 11 suggest that a 10 percent depreciation of the U.S. dollar against the other industrial country currencies would cause the NODC debt service ratios to fall by almost 6 1/2 percent, holding import volume constant. Alternatively, assuming no new lending to the NODCs, import volume could rise by 1.4 percent. Subgroups vary greatly in their initial trade positions--some being in surplus, others not--and in their overall level of indebtedness. Appendix IV provides a set of tables that give results analogous to those presented in Table 11 for each of the geographic and analytical subgroups.

In addition to the interest rate and exchange rate effects shown in the first two columns of Table 11, there is a third effect that must also be considered: that of any change in industrial country activity on the NODCs. Two channels are investigated. The first estimates the direct effect of diminished industrial country activity on the NODCs' terms of trade, and the second calculates the direct impact on the demand for NODC exports. 1/ Empirically there is a direct relationship between the level of industrial country activity and the NODCs' terms of trade. However, the relationship used here does not yield any information about how this relative price change should be apportioned between import and export prices. Consequently a large number of alternative estimates could be generated for column 3. The case presented here assumes that diminished industrial country activity lowers the dollar price of NODC exports but not their imports. Thus this assumption is consistent with the view that the dollar price of raw materials and other NODC exports is largely determined by variations in industrial demand whereas the prices of manufactures and other NODC imports are relatively 'sticky.' 2/

Both the terms of trade effect and the export volume effect are based on rough assumptions about possible decreases in the real growth rates of the United States and other industrial countries: 1 and 0.1 percentage point, respectively. A decrease of 1 percentage point in the

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1/ The elasticities underlying these calculations came from Bond (1984).

2/ The debt service ratio calculation is sensitive to the assumption made about the allocation of the terms of trade effect between import and export prices. The more import prices fall, the more export prices and values must fall for a given terms of trade effect and, consequently, the more the debt service ratio will rise. The calculated import volume changes, on the other hand, are relatively robust to the terms of trade allocation assumption. See Appendix V on this point.

growth rate of U.S. GNP, matched by a decrease of 1/10 of 1 percent that in the other industrial countries, is estimated to lead to an increase in the debt service ratio of 1.8 percent, assuming no volume response in imports, or lead to a 2.2 percent drop in imports, assuming no new lending in real terms to the NODCs.

The information in Table 11 has been arrayed so as to facilitate calculation of the net effect on the NODCs of U.S. fiscal restraint once the difficult questions concerning how much weight should be given to each of the three effects (interest rate, exchange rate, and activity) have been addressed. Perhaps the most difficult of these questions is that of how much the U.S. dollar would depreciate in the face of a 1 percentage point drop in the interest rate on dollar-denominated assets. A decrease in the U.S. interest rate will have a larger effect on the spot exchange rate if the level of interest rates in the other industrial countries remains unchanged and if the lower level of U.S. interest rates is expected to be permanent. For example, a 1 percentage point change in the U.S. interest rate that is expected to persist for ten years will be associated with nearly a 10 percent change in the exchange rate. (This case is consistent with the first two columns of Table 11.)

As an illustration, simply summing the three columns of Table 11 suggests that the NODCs would be a net beneficiary of a more restrictive U.S. fiscal policy on the basis of either the debt service ratio criterion or the import volume criterion. If the exchange rate were to change by a much smaller amount than the 10 percent shown in Table 11, say 1 percent, then the NODCs would show an improvement in their debt service ratio, assuming import volumes are constant. This follows largely from the interest rate effect on debt service. On the other hand, the NODCs would experience a decrease in import volumes for a given level of real lending, primarily because of their reduced export earnings.

The U.S. fiscal package considered in this paper consists of a reduction in the primary budget of 2 percent of GNP. This is expected to lead to approximately a 200 basis point fall in the short-term interest rate and a decrease of perhaps 1 1/3 percentage points in the growth rate of U.S. GNP. Changes of this magnitude would be expected to have a net beneficial effect on the NODCs by either of the two criteria. This calculation ignores any of the exchange rate consequences of the U.S. fiscal program. While it is impossible to predict with any confidence how much the dollar would depreciate, it is clear that any depreciation would further improve the NODCs' external position.

The basic conclusion yielded by these calculations is that changes in U.S. fiscal policy affect the NODCs through several channels that may work in opposite directions. In the short run, the lower interest and exchange rate consequences of a tighter U.S. fiscal policy serve to

improve the NODCs' external position, while the possible lower level of industrial country activity in the short run associated with U.S. fiscal restraint works to the detriment of the NODCs. While the net effect of these factors varies among the different NODC subgroups, on balance it is quite possible that they are favorable in the short run. Over the longer term, the effect must be salutary to the NODCs, as any transitory activity effects diminish while the lower interest and exchange rates continue to improve the NODCs' debt and trade position over time. Such net benefits to NODCs would tend to be even greater to the extent that the positive "credibility effects" described earlier limited the negative activity effects of fiscal restraint in the industrial countries.

Furthermore, the effect of changes in U.S. fiscal policy vary noticeably among the geographic and analytical NODC subgroups. The Western Hemisphere NODCs, owing to large amounts of floating rate dollar debt, are particularly sensitive to changes in interest rates on U.S. dollar assets. The exchange rate effects are also large for Western Hemisphere NODCs. They, as well as NODC manufactures and NODC net oil exporters, start from a position of trade surplus. Consequently the increases in the dollar prices of imports and exports that follow a dollar depreciation will, at unchanged terms of trade, cause these subgroups to experience more of an improvement in their external position than other subgroups.

The estimates summarized in Table 11 are based on the assumption that there is no significant short-run feedback effect from the developing countries onto the industrial countries. However, the altered conditions in the NODCs would be expected to exert some feedback effects onto the industrial countries as NODC demand for industrial country exports changed. In an effort to quantify some of these effects, the World Trade Model (WTM) was run with lowered levels of activity and changed NODC demand consistent with the lower interest rates and activity levels described in Table 11. The effect on the merchandise trade balances of the industrial countries is given in Table 12. The lowered levels of activity, by themselves, would lead to lower imports and consequently to lower exports in the industrial countries. However, the lower U.S. interest rate, assuming it led to increased import demand on the part of the NODCs, would cause exports for all countries except Canada to rise in the first semester of the simulation. Canadian exports would fall, reflecting the relatively high weight of U.S. imports (which would fall substantially) and the low weight of NODCs in that country's trade.

VI. Summary and Conclusions

Given the size of the U.S. economy, policy actions taken by the U.S. authorities obviously have very important effects not only on the United States itself but on the world economy. This paper has surveyed the

Table 12. Changes in Merchandise Trade Balances from Diminished Global Activity 1/

(Net Exports; in billions of U.S. dollars)

	1985 S1	1985 S2	1986 S1	1986 S2
Canada	-0.20	-.07	-.12	-.18
United States	.90	1.58	2.34	3.14
Japan	.18	.26	.09	-.11
France	.11	.15	.17	.17
Germany	.10	.04	-.03	-.12
Italy	.04	-.03	.02	.01
United Kingdom	.08	.09	.10	.10
Belgium	.01	.01	-.01	-.03
Denmark	.01	.01	.01	.01
Netherlands	.04	.04	.04	.03
Austria	.01	.01	.01	.01
Norway	.01	.01	.01	.01
Sweden	.01	.02	.01	0
Switzerland	.02	.02	.01	0

1/ The growth rate of U.S. demand is held at 1 percent less than the control value. Growth of demand in the other industrial countries is 0.1 percent less than control, and U.S. interest rates are assumed to fall by 1 percentage point.

relevant theoretical and empirical literature on the effects of fiscal policy in an attempt to give some answers on how a change in the U.S. fiscal position might be expected to influence macroeconomic variables in the United States and in other countries. Specifically, the paper has considered a hypothetical program that would reduce the primary fiscal deficit, that is the deficit net of interest payments, by about 2 percent of GNP, with equal weights on spending cuts and tax increases.

As is always the case when major issues of policy are under consideration, there are different views on the likely effects of alternative policy choices. Indeed, the spectrum of opinion on the likely magnitudes of the effects of a major change in U.S. fiscal policy is especially wide, owing to two factors that have been examined at length in this paper. First, there is not a clear consensus in the professional literature regarding the nature of the theoretical effects of changes in fiscal policy. Second, as discussed in Section II, current and prospective federal deficits are rather large in relation to GNP by comparison with the historical experience of the last 40 years; thus the role of expectations in determining the effects of a fiscal deficit reduction program on output, interest rates, and exchange rates might not be the same as in the past. Nevertheless, this paper reflects the view that a thorough survey of the available literature--taking account of current conditions--makes it possible to say a good deal about the direction of the likely effects of a change in the U.S. fiscal stance, and also to reach tentative conclusions at least about the rough orders of magnitude of the implications of such measures.

The following is a brief summary of the principal conclusions of this paper, including references to the sections where each issue is examined in detail.

1. Longer-run effects

The longer-run effects of a fiscal deficit reduction program of the type considered in this paper would be favorable.

1. The analysis of Section III indicates that over the longer run the fiscal restraint program considered in this paper would lead to a once-and-for-all upward shift in the level of U.S. potential Gross National Product (GNP) of around 3 percent. This would allow the sustainable flow of total (private plus public) consumption to increase by a similar amount. The main reason for this conclusion is that the evidence adduced in Section III.1 rejects arguments that a decline in the absorption of saving by the U.S. federal government would be totally or largely offset by a reduction in gross private domestic saving. Thus the deficit reduction program is estimated to lead to an increase in U.S. gross national saving of about 1 1/3 percent of GNP in the longer run.

this would ultimately give rise to an increase in the capital stock owned by U.S. residents of perhaps 10 percent. The rise in saving and in the capital stock would be larger if a greater weight were placed on spending cuts. In addition, Section III.2 also suggests that a tax increase would be unlikely to have a significant negative effect on the supply of labor, particularly if it did not entail a rise in the progressivity of taxes on incomes.

2. It is extremely difficult to quantify the longer-run net effect of fiscal restraint on the structure of the U.S. balance of payments and the exchange rate of the U.S. dollar, partly because the extent of international capital market integration is a matter of dispute. If capital market integration were perfect, the extra U.S. saving could be assumed to be distributed between the United States and the rest of the world roughly in proportion to the relative sizes of the existing capital stocks of the two areas. The longer-run effects on the structure of the U.S. balance of payments and the exchange rate of the U.S. dollar would be sizable. Ultimately, there would be an increase in real net income from foreign investment of perhaps $40 billion (at the scale of 1983), which would have to be offset through an appreciation-induced change in other items of the current account (Section III.3). As explained in the paper, the conclusion that the real exchange rate would have to appreciate in the longer run, perhaps on the order of 10 percent, results from the fact that two long-run equilibrium positions are being compared; namely, the real exchange rate consistent in the longer run with a reduced fiscal deficit and that which would be sustainable under present policies. The real exchange rates that would be sustainable for the dollar under both these scenarios are significantly below the dollar's current le el. Moreover, as noted below, in the short run the program would help to foster a "soft landing" for the U.S. dollar. In any event, the degree of international integration of capital markets is not perfect, so that the magnitude of the longer-run net effect of the program on the balance of payments and the exchange rate are likely to be substantially smaller than the above estimates suggest.

3. The longer-run effect of fiscal restraint on U.S. inflation would also be favorable. Projections made in this paper--as well as those of the U.S. Congressional Budget Office (CBO)--suggest that with no change in the stance of fiscal policy the level of federal debt outstanding will rise rapidly relative to GNP throughout the next decade. Many economists are concerned that this situation could eventually rekindle inflation. An extreme version of this argument is that once the deficit is so large, it is bound to be inflationary at some stage because it is bound to be monetized. This extreme version is too pessimistic; at least at this stage the ultimate monetization of fiscal deficits is not a foregone conclusion. Nonetheless, market participants may reasonably fear that political pressures for monetization could grow rapidly, especially if

the economy entered a period of growth recession while interest rates remained relatively high. A program designed to reduce the primary fiscal deficit by 2 percent of GNP would alleviate this situation considerably because it would rapidly stop the rise in the ratio of debt to GNP (Section III.4).

2. Short-run effects

The preceding conclusions make it clear that the long-run effects of a fiscal deficit reduction program on both real interest rates and the level of potential output in the United States would be beneficial. Because of the difficulties involved in assessing the effects of expectations on economic behavior, however, there is less certainty about the nature and timing of the changes that would take place in these variables in the first several years after the program was implemented.

1. Following implementation of a fiscal restraint program, U.S. real interest rates would be reduced in the short run, as well as in the long run, through the alleviation of financial pressure in the economy and the reduction of market uncertainty about the sustainable course of the economy. The analyses of Sections III.1 and IV.2, taken together, suggest that the decline might be on the order of 2 percentage points. In addition, if the change in policy were viewed as credible from the beginning, the decline in real interest rates would be likely to begin earlier than it would if market participants initially did not regard the fiscal package as a fundamental reorientation in the stance of economic policy. It is important to note, however, that the evidence from the empirical studies considered in Section IV concerning the effect of changes in fiscal policy on the level of real interest rates would not support the view that the movements in nominal interest rates relative to inflation that have actually occurred in the United States over 1980-84 can be fully explained as the effect of fiscal developments over that period.

2. While a deficit reduction program would unambiguously reduce interest rates, there is considerable uncertainty as to its likely short-run output effects. As pointed out in Section IV.3, the nature--and even the direction--of these effects depends on such factors as: (i) the specific types of tax and expenditure measures undertaken, (ii) the expectations effects of the program, (iii) the stance of monetary policy, (iv) the resulting changes in the real exchange rate of the U.S. dollar, and (v) the speed at which product markets adjust to the appearance of excess supplies and demands. On balance, the empirical studies surveyed in Section IV suggest that in the short run, assuming an unchanged rate of U.S. monetary expansion, output growth would probably be reduced somewhat in the United States, owing to the reduction in the growth of aggregate domestic demand. This effect would occur partly

because it seems likely that fixed business investment, though it would rise in the longer term, would be reduced somewhat in the first several years after the program was implemented, as a result of the reduction in aggregate demand growth associated with fiscal restraint (Section IV.3). Conversely, the analysis suggests that residential investment in the United States would probably be stimulated in the short run--as well as the long run--since the negative short-run effect from weakening aggregate demand would be more than offset by the stimulus resulting from the decline in real interest rates. Short-run effects on both residential investment and fixed investment would, of course, be strongly influenced by expectations. To the extent that market participants have focused excessively on the U.S. deficit, pushing real interest rates to historically high levels, the positive influence that a credible fiscal restraint program might exert on expectations could conceivably stimulate investment, even in the short run. But it seems unlikely that the expectations effects would be this strong (Section IV.3).

On balance, the studies cited in Section IV suggest that under present circumstances the reduction in output would probably be rather smaller than the fiscal package itself, even in the first year. This negative effect would be attenuated, perhaps substantially, during the second and third years after the package was implemented. In addition, if a change in policy were viewed as credible from the beginning, the negative short-run effects on output would be smaller and more quickly reversed, as market participants anticipated the beneficial effects that were likely to come over the longer run (Sections IV and V).

3. The real exchange rate of the U.S. dollar might tend to depreciate in the short run in response to the decline in differentials between real interest rates prevailing in the United States and those in other major industrial countries. However, a credible program of fiscal restraint could also lead to a strengthening of confidence in the sustainability of U.S. economic policy--particularly the present noninflationary stance of monetary policy--thus reinforcing the portfolio preference for assets denominated in U.S. dollars. Such an effect would be likely to attenuate the tendency for the dollar to depreciate. The empirical studies of portfolio behavior (Section IV) and the simulation experiments based on internationally-linked macroeconometric models (Section V) suggest that in the short run a fiscal deficit reduction program would tend to depreciate the exchange rate by a modest amount. In turn, the dollar depreciation would mitigate the short-run effects of any decline in aggregate domestic demand on the level of U.S. output (Section V.1). However, the present paper has argued that such empirical results should be interpreted with considerable caution both because the simulation models do not allow for overshooting effects resulting from the changes in long-term interest rates that would be consistent with the developments already discussed in Section III, and because they fail to take account of the confidence

effects that might result from a significant strengthening of the U.S. fiscal stance. Thus the net effect of fiscal restraint on the real value of the U.S. dollar might differ significantly from that suggested by the standard empirical studies.

Perhaps the most important exchange rate effect of fiscal restraint, however, would be to reduce the likelihood of a sudden crisis of confidence in the value of the U.S. dollar. On balance, because current differentials in real interest rates suggest that the U.S. dollar may well be above the level that would be sustainable in the longer run, the main effect of a fiscal deficit reduction program would likely be to accelerate the depreciation of the real exchange rate to the longer-term sustainable level (discussed in Section III), rather than to change this level. In this context, it is important to note that the empirical evidence considered in this paper does not suggest that the dollar's real effective appreciation from 1980 to 1984 is fully attributable to the fiscal stance adopted in the United States since 1980. Nor does it suggest that a fiscal deficit reduction program of the size examined in this paper could be expected to generate future changes of similar magnitude in the opposite direction (Section V.1).

4. Given the stance of monetary policy, a fiscal restraint program would also contribute to reduced inflationary pressures in the United States. This would be so because such a change would reduce the likelihood of a sharp cyclical business expansion that would lead to overheating and because it would allay concerns that future changes in federal debt would ultimately lead to a more accommodative monetary policy. However, any substantial short-run depreciation in the value of the U.S. dollar on the foreign exchange market would temporarily result in some rise in the levels of costs and prices in the United States (Section III.4).

5. In the first years following implementation of a U.S. fiscal restraint program, there would probably be a small reduction in the rate of output growth in other industrial countries, reflecting the lower short-run growth in U.S. imports brought on by diminished activity in the United States and a depreciation of the U.S. dollar. This conclusion is based on the assumption of unchanged monetary policy in both the United States and other industrial countries. To the extent that expectations of future exchange rates and interest rates are forward-looking, asset and goods prices would adjust more quickly to their long-run levels; this effect would tend to minimize the short-run negative effects of U.S. fiscal restraint on output in other countries, as well as in the United States. Because of the permanently lower level of real interest rates worldwide, activity in the other industrial countries would probably be favorably affected after the first few years. Furthermore, inflationary pressures in the other industrial countries would be reduced to the extent that their currencies were to appreciate against the U.S. dollar (Section V.1).

6. Section V.2 suggests that in response to a decline in interest rates or a depreciation of the U.S. dollar, the external position of the non-oil developing countries (NODCs) would tend to improve in the short run. These favorable effects are expected to outweigh the effects of lower industrial country activity on the demand for NODC exports and the terms of trade. The short-run effects would vary among NODC subgroups; the subgroups that have trade surpluses or large portions of debt at floating interest rates and denominated in U.S. dollars would benefit relatively more. In the longer run, there would be an even larger salutary effect on the NODCs from lower real interest rates and a slightly increased growth rate of potential output in the industrial countries.

APPENDIX I

Empirical Studies on the Effects of Government Debt and Government Spending on Private Saving

(Appendix to Section III.1)

The debt neutrality hypothesis (also known as the "Ricardian equivalence" hypothesis) states that a shift in the means of financing of government spending between current taxes and the issue of public debt leaves private consumption unchanged. This implies that any change in public sector saving is directly offset by an opposite change in private sector saving so that the flow of saving available for the financing of private capital formation is unaffected. In recent years, numerous empirical studies have attempted to test this hypothesis empirically, mainly using data for the United States. Most of these studies have been undertaken within the framework of a consumption function of the form:

$$C = \alpha (Y - G) + \alpha \phi \Delta B \qquad (1)$$

where C = private consumption
Y = gross national product
B = public debt
G = government spending on goods and services
α = gross private propensity to consume
ϕ = wealth component of public debt

Given that $\Delta B = G + rB - T$, where T refers to tax revenues (including all non debt-creating sources of public sector funds) and r refers to the interest rate on the public debt, equation (1) can be rewritten as follows:

$$C = \alpha Y - (1 - \phi)\, \alpha G - \alpha \phi T + \alpha \phi r B \qquad (2)$$

The neutrality hypothesis is that $\phi = 0$, while the Keynesian hypothesis is that $\phi = 1$ (that is, disposable income should be measured by deducting taxes rather than government expenditures).

In addition, a number of these studies tested the hypothesis of direct substitutability between government spending and private consumption by expanding the consumption function in order to allow the coefficient of government spending to reach -1, that is,

$$C = \alpha Y - (1 - \phi)(\alpha + \gamma)\, G - \alpha \phi T + \alpha \phi r B \qquad (3)$$

In equation (3), γ identifies the effect of direct substitutability. If $\gamma = 1 - \alpha$, the coefficient of G is equal to -1 whenever $\phi = 0$. This latter case is an extreme form of neutrality in which neither taxes nor government spending has any effect on private consumption and saving.

On the whole, the results of these consumption function studies have been disappointing in that they have failed to provide very powerful tests of the debt neutrality hypothesis. Most of the time, the standard errors of the estimated coefficients are so large that neither the hypothesis that $\phi = 0$ nor the hypothesis that $\phi = 1$ can be rejected. Moreover, the results vary a great deal among studies, as can be seen from the survey of recent studies presented in Table 13. The only consistent result is that there is no evidence of a relatively large positive value for γ; namely, there is no evidence of an important direct substitutability between government spending and private consumption. This finding is further confirmed by the results obtained by Kormendi (1983) on the differential effects of the various components of government spending. Even when government consumption was isolated, there was no evidence that this component had an effect on private consumption that was greater than the implied reduction in permanent total disposable income.

There are at least two main reasons for the failure of empirical studies to yield a better indication of the value of ϕ. The first is that none of them uses variables that are carefully corrected for cyclical variations. Over the cycle, consumption and tax revenues are positively correlated, and this probably biases the coefficient of T in equation (3) toward zero. 1/ The effect is to provide spurious support for the neutrality hypothesis ($\phi = 0$). Of the studies presented in Table 13, those by Kochin (1974), Buiter and Tobin (1979), and Kormendi (1983) are especially subject to this criticism because they do not correct for cyclical variations. The other studies show an awareness of the problem, but the way they deal with it is rather superficial. Tanner (1979) and Seater (1982) include in the equation the product of the unemployment rate and disposable income. Feldstein uses the lagged value of the tax variable itself as an instrumental variable. Hernandez-Cata uses a more general instrumental variable approach for the tax variable. He also deflates all the variables by income (Y) to reduce the multicollinearity among C, Y, and T. While these adjustments may help to reduce the bias, there is no reason to assume that the results are completely purged of cyclical effects.

1/ A further problem is that permanent income is proxied in all these studies either by current income or by current and lagged income. Thus, there is also a cyclical variation in Y that is correlated with the cyclical variations in C and T. This problem is in addition to the usual simultaneous equation problem arising from the fact that C is also a determinant of Y.

Table 13. Empirical Results from Consumption-Function Studies 1/

	Equation 2/	Period	ϕ	γ
Kochin (1974) 3/	(4)	1952-71	0.72	--
Tanner (1979) 3/ 4/	(4)	1947-74	0.68	--
Buiter and Tobin (1979)	(6)	1949-76	0.44	-0.05
Feldstein (1982) 4/	(1.2)	1930-77	0.44	-0.50
Hernandez-Cata (1982)	(2b)	1955-81	0.62	0.22
	(2c)	1955-81	0.35	0.13
Seater (1982) 3/ 4/	(1.2)	1947-74	0.43	--
Kormendi (1983)	(6)	1930-40/ 1947-76	-0.10	-0.16

1/ This table reproduces many of the results already discussed in Hernandez-Cata (1982).
2/ The equation numbers are those in the reviewed studies.
3/ The study assumes that $\gamma = 0$, namely, it is based on equation (2) rather than equation (3).
4/ The study includes government debt as a separate variable in the consumption function.

The second reason for the lack of clear empirical results is that none of the studies makes a distinction between temporary and permanent changes in taxes or government spending. In the present context, this is a fundamental weakness. For example, if a cut in tax rates is temporary, or simply perceived by market participants as being temporary, one may observe that consumption rises by only a small amount. However, the explanation may have nothing to do with the debt neutrality hypothesis; it may simply be that market participants are spreading the temporary increase in disposable income over a long planning horizon. Thus, the implicit assumption of all the empirical studies considered here that changes in tax rates are always permanent and perceived as being so may further bias the estimate of ϕ toward zero. As many changes in tax rates, especially the reductions, may have been viewed initially as being temporary, the magnitude of the bias may be quite large. Similarly, the failure to distinguish between temporary and permanent changes in government spending may bias the coefficient of government spending toward zero.

In practice, it is extremely difficult to alleviate these weaknesses of the method based on equations (1) and (3). In particular, there is no objective way to identify how fiscal changes are perceived by market participants. Moreover, if the variables were properly corrected for cyclical variations, it is likely that the year-to-year variations in G and T during the 1950s, 1960s, and 1970s would be found to be quite small by comparison to the variations in C and Y.

Two other methods have been used to test the debt neutrality hypothesis in the framework of a consumption function. The first is to estimate the effect of pay-as-you-go social security on consumption. In principle, this effect should largely depend on whether individuals discount the future costs of the system to their children and grandchildren. Unfortunately, the results of this method are also inconclusive because the year-to-year changes in the asset value of social security are small and, in addition, this asset value is extremely difficult to measure. Auerbach and Kotlikoff (1983) demonstrate that even if individuals ignore the cost of the social security system to future generations (i.e., $\phi = 1$), the method can easily lead to the false conclusion that they take it into account fully (i.e., $\phi = 0$).

The second method is to start from the Euler equation derived from the study of intertemporal consumption behavior (see Hall (1978)). With quadratic utility and a stochastic environment, this equation may be written as

$$E_t C_{t+1} = \alpha + \beta C_t \qquad (4)$$

where E_t is the expectations operator conditional on information available up through period t.

If the debt neutrality hypothesis does not hold, past values of the government deficit should have explanatory power for consumption expenditure. Using quarterly data for 1948-81, Aschauer (1985) does find that past values of the deficit have some explanatory power. However, he attributes this explanatory power to the fact that past values of the deficit can also be used to predict future government spending and that government spending can directly affect private consumption. Aschauer finds no evidence that apart from their role in forecasting government spending, past deficits help to forecast consumption, so that he concludes that the data do not reject the debt neutrality hypothesis. The problem is that this study suffers from the same weaknesses as those based on equations (1) or (3). In particular, the author makes no attempt to correct the fiscal deficit for cyclical effects, and does not differentiate between temporary and permanent changes in fiscal policy.

Ultimately, it seems that the consumption function approach is an inefficient tool to investigate the longer-run effect of the stock of government debt on the stock of private savings. A better approach is probably to test directly for the effect of public debt in the framework of the demand for private sector capital. This demand is of the following form:

$$K = \gamma [Y - G + \phi \Delta B] - \phi B + \tau r, \qquad (5)$$

where K is the demand for private sector capital.

In the demand for private sector capital, the focus is obviously on the effect of the cumulated deficit over a number of years, namely the effect of B rather than ΔB. Recent tests conducted in this framework by Carmichael (1983) lead to an estimate of ϕ of 0.66 (with a t-statistic of 2.5). The problem with this approach is that the estimate of ϕ is mainly determined by the angle between two trend-like variables, K and B. Thus, it could be biased if, as is likely, some omitted other trend-like variables play a role in the long-run demand for private sector capital. Nevertheless, this estimate is probably more reliable than those derived from the consumption function approach.

APPENDIX II

Recent Studies of the Short-run Effects of Fiscal Policy on Domestic Interest Rates

(Appendix to Section IV.2)

This appendix reviews in more detail the recent studies of the effects of fiscal policy on interest rates that are summarized in Section IV.2 of the main text. A comprehensive list of these studies is presented in Table 14. As noted in the text, there is no consensus as to the magnitude of these effects, because there is no agreement as to the appropriate specification of the relationships involved or the empirical methodology for estimating them. What emerges from a close examination of these empirical studies is that many of the disagreements about the magnitude of fiscal effects can be traced to specific differences in the way relationships are specified or estimated.

Perhaps the clearest delineation among the more than 30 studies under review is the choice of the variable used to represent changes in fiscal policy. A number of studies use unadjusted data on the stock of government debt outstanding, or data that are adjusted only by deflating them to real per capita terms. Although some of these studies have found significant relationships between these variables and interest rates, no clear pattern of evidence has emerged from them. Others have focused on flow variables including deficits, changes in the stock of debt (which are almost equivalent to the deficit), expenditures, and tax rates. 1/ In general, studies using cyclically-adjusted fiscal variables or relatively long time periods have proved to be more likely to find large or significant effects. 2/

1. Studies using cyclically-adjusted deficits or debt

The most common approach to reducing the distorting effects of the feedback from interest rates to budget deficits is to adjust the deficits for cyclical influences. A number of model-based measures of cyclically-adjusted deficits (also sometimes referred to as structural, full-employment, or high-employment deficits) are available. Three of the studies included in Table 14 incorporate cyclically-adjusted fiscal

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1/ The deficit is usually measured on a national income accounts basis or on the basis of the unified budget, both of which omit some borrowing that nonetheless adds to the stock of debt.

2/ A distinction between "large" and "significant" is made in this context in order to identify both cases where a relationship is statistically significant but quantitatively unimportant and those where an effect is estimated to be large but whose significance cannot be determined by standard statistical tests.

Table 14. Survey of Recent Empirical Studies of Linkages Between Fiscal Variables and Interest Rates in the United States

	Fiscal Variables 1/	Interest Rates	Model 2/	Simulation Period 3/
I. Simulation studies, all of which indicate sizable positive effects 4/				
Blinder (1984)	ERTA, TEFRA, and expenditure 5/	Certificates of deposit, treasury bills, and corporate bonds	WEFA, DRI, and MPS	1981-89
Brayton and Clark (1984)	ERTA	Treasury bills and corporate bonds	MCM	1981-87
Brinner (1984)	Military spending income tax rates and transfers	Federal funds and corporate bonds	DRI	1985-88
Caprio et al. (1983)	Expenditure	Treasury bills and bonds and corporate bonds	MCM	1980-83
Cohen and Clark (1984)	Income tax rates	Treasury bills	MPS and MCM	1982-86
Fair (1984)	Expenditure	Treasury bills and bonds	Fair	1970-72
Friedman (1982)	Expenditure	Treasury bills and bonds, utility bonds, and corporate bonds	MPS, extended	1974-77
Hooper (1984)	ERTA, TEFRA, and expenditure 5/	Treasury bills	MCM	1982-85
Masson and Blundell-Wignall (1984)	Expenditure	Commercial paper	MINILINK	1984-88 (semiannual)
Roley (1983)	Stock of securities of various maturities	Corporate bonds	MPS, extended	1966, 1971

Table 14. Survey of Recent Empirical Studies of Linkages Between Fiscal Variables and Interest Rates in the United States (Continued)

	Fiscal Variables 1/	Interest Rates	Technique 6/	Data Period 3/
II. Regression studies that indicate statistically significant positive effects 7/				
Barth et al. (1984)	cyclically-adjusted stock of debt	short- and long-term	OLS and AUTO	1955-83
Carlson (1983)	stock of debt	corporate bonds	AUTO	1953-83
DeLeeuw and Holloway (1985)	cyclically-adjusted stock of debt	three-year treasury securities	OLS	1956-83 (annual)
Dewald (1983)	real deficits	corporate bonds	OLS	1953-81
Galli and Masera (1983)	growth rate of debt	treasury bonds	OLS	1962-82
Kudlow (1981)	flow of borrowing	treasury bonds	OLS	1958-80 (annual)
Makin and Tanzi (1983)	unanticipated deficits	treasury bills	nonlinear MLE	1960-81
Mehra (1984)	real expenditure	treasury bills	OLS	1952-79 (semiannual)
Miller (1983)	growth rate of debt	treasury bills	OLS	1948-81 8/
Muller and Price (1984)	stock of debt and deficit/saving ratio	corporate bonds	OLS	1958-83
Sinai and Rathjens (1983)	stock of debt; expected deficits	corporate bonds	OLS	1960-82

Table 14. Survey of Recent Empirical Studies of Linkages Between Fiscal Variables and Interest Rates in the United States (Concluded)

	Fiscal Variables 1/	Interest Rates	Technique 6/	Data Period 3/
III. Regression studies that find insignificant or negative effects				
Canto and Rapp (1982)	nominal and real deficits	one-year treasury securities	VAR	1929-80 (annual)
Clarida and Friedman (1984)	change in nominal deficits	treasury bills	VAR	1962-79
Evans (1985)	actual expenditure and deficits	treasury bills and corporate bonds	2SLS	1979-83 (monthly)
Fackler and McMillin (1983)	stock of debt	treasury bonds	VAR	1963-79
Frankel (1983)	stock of long-term debt	term structure	nonlinear MLE	1954-80 (annual)
Hoelscher (1983)	flow of borrowing; change in real stock of debt	treasury bills	AUTO	1952-76
Makin (1983)	exports 9/; nominal deficit	treasury bills	transfer functions	1959-80
Mascaro and Meltzer (1983)	stock of debt	short- and long-term	OLS	1969-81
Motley (1983)	nominal primary deficit	treasury bills	AUTO	1970-82 (monthly)
Plosser (1982)	unanticipated changes in stock of debt	term structure	nonlinear GLS	1954-78
Tatom (1984)	high-employment and actual deficits	treasury bills and corporate bonds	OLS	1955-83
U.S. Treasury (1984)	level of and change in real stock of debt; real deficits	corporate bonds	weighted MLE	1965-83

variables, two of which find significant positive effects of interest rates. DeLeeuw and Holloway (1985) specify a portfolio balance model that incorporates the government budget constraint; they solve for the rate of interest as a function of the cyclically-adjusted stock of government debt, 1/ the monetary base, and the expected inflation rate. Their regression results suggest that a reduction in the cyclically-adjusted stock of debt equal to 2 percent of GNP--the magnitude of policy shift described in the main text of this paper--would reduce the yields on three-year treasury securities by some 85 basis points. Since a change in fiscal policy of the type being examined in this paper would reduce the stock of debt by 2 percent of GNP in the first year and by 6 percent after three years, these results imply that interest rates would be expected to be reduced by 2 1/2 percentage points after three years by this policy change.

Barth et al. (1984) replicated and updated DeLeeuw and Holloway's work, and added the flow of federal purchases of goods and services as an argument in the equation. These changes had almost no effect on DeLeeuw and Holloway's estimates; however, federal purchases proved also to be a significant variable. Their results suggest that if half of the fiscal contraction (i.e., 1 percent of GNP) were in the form of reduced expenditure, interest rates would be reduced by another 40 basis points. Since this relation is a flow effect, this change may be added to the effects estimated by DeLeeuw and Holloway; thus, these results imply that interest rates would decline by about 1 1/4 percentage point after one year and by about 2 3/4 percentage points after three years.

In contrast to the findings of DeLeeuw and Holloway, and Barth et al., Tatom (1984) estimates that the high employment deficit calculated by the Federal Reserve Bank of St. Louis is negatively correlated with both short-term and long-term interest rates. The difference in results could be due to differences in the way deficits are cyclically adjusted, or (perhaps more likely) to the way the estimating equations are specified. Tatom's equations are bivariate relationships between deficits and interest rates, whereas the other two studies control for other determinants, including monetary growth and expected inflation. If, for example, fiscal expansion were positively correlated with high monetary growth, failure to control for the latter's negative influence on real interest rates would bias downward and could even reverse the sign of the estimated fiscal influence in a regression such as Tatom's.

1/ This stock is the source series for the cyclically-adjusted deficits plotted in Chart 1 of the main text. It is calculated by adjusting both receipts and outlays to the values that would occur if output and employment were at "mid-expansion" levels; i.e., if the economy were always in the middle phase of a cyclical expansion.

2. Studies focusing on the actual deficit

One of the few studies to find a significant relationship between unadjusted borrowing and interest rates is that of Kudlow (1981). Kudlow specifies a reduced form equation in which the rate of interest depends upon the rate of monetary growth, the expected inflation rate, and the ratio of federal government borrowing (not cyclically adjusted) to GNP. 1/ This borrowing variable has a significant coefficient, although the estimated variance may be underestimated, owing to serial correlation. Kudlow's equation indicates that a fiscal contraction on the order of 2 percent of GNP would reduce long-term interest rates by about 2/3 of 1 percentage point.

A rather different study that also yields an estimated positive relationship between unadjusted deficits and interest rates is that of Miller (1983). The feature that distinguishes Miller's approach from most of the others focusing on unadjusted deficits is that he uses very long-run data (four periods, each 8 1/2 years long) in order to isolate the effects of secular changes in economic policy from short-run fluctuations. In his model, treasury bill rates are determined by the growth rates of government debt and bank reserves, both of which have normal and significant coefficients. His results imply that a fiscal contraction amounting to 2 percent of GNP would reduce short-term interest rates by about 3 1/2 percentage points. However, a major disadvantage of this type of study is that it severely restricts the degrees of freedom available for estimating coefficients, so that the results must be viewed quite cautiously.

Dewald (1983) also employs long-run data, but he uses cycle averages rather than fixed data intervals. This procedure leaves six observations (compared with Miller's four), from which he estimates positive but generally insignificant effects on both short- and long-term interest rates. These estimates indicate that the fiscal contraction being analyzed here would reduce both interest rates by about 2 percentage points.

Most other efforts to estimate effects of unadjusted deficits on interest rates through reduced-form equations have found little significance in the relationships. Hoelscher (1983), for example, specifies a fiscal relationship that is similar in some ways to Kudlow's, but he measures the expected inflation rate using the Livingston survey data, 2/

1/ An anomaly of this specification is that it implies that if fiscal contraction brought a commensurate reduction in GNP, then it would have no effect on interest rates.

2/ The Livingston survey is a semiannual survey published in the Philadelphia Bulletin, in which market participants are asked to forecast the consumer price index 6 and 12 months ahead.

he adds the unemployment rate as a proxy for economic activity, he inserts the Federal Reserve's net purchases of government securities rather than the money stock, and his equation explains the treasury bill rate rather than long-term interest rates. With this specification, Hoelscher finds that a fiscal contraction of this magnitude would reduce interest rates by less than 20 basis points, and his coefficient on federal borrowing is statistically insignificant. A rise in unemployment, however, would significantly lower interest rates.

Muller and Price (1984) estimate an equation that incorporates the current ratio of the budget deficit to private saving as a determinant of the yield on corporate bonds, but this variable is estimated to exert virtually no effect. Makin (1983) adds the unadjusted deficit to an equation explaining treasury bill yields by expected inflation (Livingston survey), unanticipated changes in the stock of money (residuals from an ARIMA model explaining M1), and the variance of inflation. The coefficient turns out to be quite small and statistically insignificant. Motley (1983) finds no significant effects on treasury bill rates from unadjusted deficits in equations that also include expected inflation (polynomial distributed lag), the excess supply of money (residuals from a money demand function) and the gap between actual and potential GNP. The lack of relationship in Motley's study holds regardless of whether the fiscal position is measured by the budget deficit on a national income basis or by the change in the stock of debt held by the public.

Galli and Masera (1983) estimate correlations between interest rates and the growth rates of the monetary base and the stock of government debt. When they use long-term interest rates and measure expected inflation by the change over the preceding year, they obtain a significantly positive effect from the growth in public debt. However, in that case, they estimate that there is no monetary influence on real interest rates. In all of their other tests (long-term interest rates with expected inflation measured as the realized future rate, and short-term rates with both expectations measures), they find either an insignificant or a perverse relationship, along with a normal monetary influence.

Canto and Rapp (1982) estimate a set of vector autoregressions relating the yield on one-year treasury securities to nominal and real deficits. They are unable to reject the hypothesis that deficits exert no causal influence on interest rates. These results thus complement those of Fackler and McMillin relating to the relationship between the stock of debt and the level of interest rates. Similar findings are reported by Clarida and Friedman (1984), with respect to yields on three-month treasury bills. All of these results are consistent with the notion that actual government deficits in the United States have sometimes reflected changes in policy and sometimes have reflected changes in economic activity, leaving little significant relationship between the two.

3. Studies focusing on the actual stock of debt

In addition to these various studies relating interest rates to the flow of borrowing or the level of the deficit, there have been a number of studies focusing on stock variables as measures of fiscal policy. The principal rationale for this difference is that flow variables, such as the budget deficit, are more directly related to aggregate demand pressures, while stock variables more directly reflect portfolio pressures in asset markets. In principle, therefore, the two approaches are complementary, although in practice it is difficult, for econometric reasons, to incorporate both types of variables in a single regression. 1/

One approach that has been very influential was developed by Feldstein and Eckstein (1970). Their estimation is based on a portfolio balance model in which government bonds are hypothesized to serve as a substitute for corporate bonds. Neither the current deficit nor the flow of government spending directly enters the equation determining the yield on corporate bonds, but the deficit has an indirect effect by raising the stock of government debt, which enters the equation in real per-capita form. Government spending has an effect only to the extent that its multiplier differs from unity, because the income variable in the Feldstein-Eckstein approach is private, rather than total, GNP. Other determinants of interest rates include the expected inflation rate (measured as a polynomial distributed lag on past inflation rates) and the real per capita value of the monetary base.

The equation estimated by Feldstein and Eckstein, using quarterly data from 1954 through 1969, implies that a 10 percent increase in the real per capita stock of government debt would lead to a 15 basis-point rise in the yield on corporate bonds, holding the other determinants fixed. 2/ That result would imply that a policy package of the magnitude

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1/ The principal problem arises from collinearity between stock and flow measures of closely linked variables such as deficits and debt. Muller and Price (1984) nonetheless found that a regression that incorporated both stock and flow effects gave significant effects from both. In their model, the stock of debt is deflated by private sector wealth, while the budget deficit is deflated by private saving; both variables are measured as nine-quarter moving averages. It is possible that the two estimated coefficients reflect the positive effect on interest rates from deficits (or debt) and the negative effect from saving (or wealth), rather than two independent types of fiscal influences.

2/ This estimate is based on their equation (10), which has the best statistical fit of the several estimates given in their paper. Other versions give effects from the stock of debt that are nearly twice as large as the one reported here.

being discussed in the body of this paper would reduce corporate bond rates by approximately 7 basis points after one year and by 20 basis points after three year years. Clearly, this effect is not very large, but it is estimated to be statistically significant. Carlson (1983) estimates essentially the same regression updated through the second quarter of 1983 and obtains very similar results.

The U.S. Treasury (1984) has conducted a study that includes re-estimating the Feldstein-Eckstein equation. Curiously, they find, for the sample period used by Feldstein and Eckstein, that the coefficient on the stock of government debt is negative and, for the sample period used by Carlson, that the coefficient is positive and about twice as large as that found by Carlson. 1/ Barth et al. (1984) replicate this equation over Carlson's sample period, and they find a significant positive coefficient about halfway between that of Carlson and that of the Treasury. They also find, however, that the parameters of the equation vary substantially in response to relatively small changes in the sample period, suggesting that the Feldstein-Eckstein model may not be very robust. This conclusion is similar to that reached in the Treasury study.

A number of the other studies listed in Table 14 estimate relationships in which the level of interest rates depends on the stock of government debt, using models that differ in a number of respects from that of Feldstein and Eckstein. In general, however, these versions do not yield any more stable estimates than those just described. For example, Sinai and Rathjens (1983) describe an equation that is embodied in the DRI model of the U.S. economy, in which the corporate bond rate depends on the real per capita values of the monetary base, government debt, and GNP; the unemployment rate; and measures of both anticipated and unanticipated inflation. This equation gives a significantly positive effect from the stock of debt when estimated through 1979. However, the effect vanishes when the equation is updated through 1982, which is rather surprising in view of the large increase in the debt during the recent period. 2/

Mascaro and Meltzer (1983) estimate a portfolio balance model in which the variability of monetary growth is included as an additional argument. Their reduced-form interest rate equations suggest that the direct influence of the stock of government debt is small and statistically insignificant.

1/ Possible explanations for the differences are that the data have been revised since 1970 and that the specific parameterization of the polynomial distributed lag may have been different.

2/ This finding led Sinai and Rathjens to replace the stock of debt with a measure of expected future deficits; see section (4), below.

Fackler and McMillin (1983) specify a reduced-form set of vector autoregressions that they estimate by a full-information maximum likelihood technique. Their tests lead them to reject the hypothesis that changes in the nominal stock of government debt are a causal agent determining the level of interest rates. As with many of the other studies examined here, the absence of cyclical or other adjustment in the stock of debt could well account for this finding.

The U.S. Treasury (1984) study adds the real stock of debt to the study's "preferred" interest rate equation and finds that it has an insignificant effect. This procedure, however, is somewhat unusual. Rather than incorporating the stock of debt into their initial specification and then examining the fit of that equation, the authors first specify an equation without the debt data, choosing an estimation technique, lag structure, and related details; they then add the debt data to that equation. This procedure may bias downward the statistical significance of the estimated influence of the stock of debt.

Two other studies--Frankel (1983) and Plosser (1982)--estimate relationships between the term structure of interest rates and the stock of government debt. Frankel's rationale for this specification is that short-term assets may be used as the numeraire for evaluating changes in other yields, since he assumes that money and other short-term assets such as treasury bills are perfect substitutes. Plosser develops a model based on efficient capital markets and rational expectations; this model has the property that an influence from the stock of debt on the level of interest rates should also be reflected in an influence from unanticipated changes in debt on the term structure of interest rates. The estimates of both Frankel and Plosser are therefore joint tests of the hypothesis that a change in the stock of debt influences the level of interest rates and of the assumption that this influence must also be reflected in a shift in the term structure of interest rates. Neither study finds a significant relationship between the stock of debt and the term structure; Plosser, however, does find a significant effect from the level of government spending.

Muller and Price (1984) have recently attempted to adjust for the feedback effect of interest rates on the stock of debt (via their effect on budget deficits) by using a moving average of the stock of debt rather than actual quarterly data. They find that a regression relating the yield on corporate bonds to, inter alia, the ratio of government debt to private-sector wealth yields a negative (i.e., perverse) coefficient; 1/

1/ The other variables entering their estimating equation are the ratio of the monetary base to wealth, the gap between potential and actual GNP, the level of capital outflows, Tobin's q (the ratio of market value to replacement cost of non-financial corporations' net assets), expected inflation (measured as a polynomial distributed lag on current and past inflation rates), and a dummy variable representing the effects of the Penn Central bankruptcy in 1970.

however, replacing actual debt with a nine-quarter moving average generates a significantly positive coefficient. Their equation implies that a reduction in the budget deficit of 2 percent of GNP (whether from a spending cut or a tax increase) would reduce the corporate bond yield by close to 3 1/2 percentage points in the first year, a far higher estimate than that of any of the versions of the Feldstein-Eckstein equation using unadjusted data.

4. Other single-equation studies

Dewald (1983) estimates a bivariate relationship between real interest rates and real deficits. That is, the deficit is adjusted for the effects of inflation, but not for cyclical factors. With this adjustment, deficits are hypothesized to affect interest rates only to the extent that they raise the real value of the government debt. 1/ Although Dewald concludes (p. 29) that these real deficits "account for very little of recent high real interest rates," his quarterly regressions show a significantly positive effect on long-term (but not short-term) interest rates. As described above in section (2), Dewald also estimates relationships using cycle-average data.

Evans (1985) notes the importance of compensating for the endogeneity of deficits, but rather than cyclically adjusting the deficit he estimates the interest rate equation using two-stage least squares. Instruments for the deficit in this equation include military spending, federal employment, the discount rate, bank borrowing from the Federal Reserve System, and two dummy variables. Other arguments in the interest rate equation are the ratios of government spending and the stock of money to the trend value of national income. No explicit control is made for the effect of inflationary expectations on interest rates, 2/ and income affects interest rates only through the trend value that serves as the denominator for each explanatory variable. Estimating this equation with monthly data from the 1979-83 period, Evans finds that deficits have had an

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1/ The variable that enters Dewald's equations is (D-I·B)/YF, where D is the actual deficit on a national income basis; I is the expected inflation rate, measured either as the actual rate or on the basis of a model described in the paper; B is the stock of debt; and YF is potential output.

2/ Evans estimates equations for the treasury bill rate, the yield on Aaa corporate bonds, and the treasury bill rate minus the actual rate of inflation during the month. This last equation could be considered to control for inflationary expectations if the one-month inflation rate is taken as a proxy for the expected rate and if expected inflation has a one-for-one effect on interest rates in the current month; neither proposition is supported by available evidence.

insignificant effect on interest rates. However, whether this use of two-stage least squares is sufficient to eliminate the cyclical influence on the deficit is open to serious question, 1/ and Evans does not offer evidence on this point.

Makin and Tanzi (1983) adjust fiscal deficits by incorporating only unanticipated changes; that is, they estimate an ARIMA equation to predict changes in the deficit, and then include the residuals from that equation as an argument in the equation determining treasury bill rates. This formulation is based on the hypothesis that in a world in which markets are fully efficient and in which expectations accurately reflect all available information, anticipated deficits would have no effect on interest rates, though unanticipated changes would. The other arguments are the same as those listed earlier for Makin (1983). In contrast to Makin's finding that the actual deficit does not significantly influence interest rates, Makin and Tanzi conclude that an unanticipated rise in the deficit does tend to increase interest rates. Their estimate implies that a fiscal restraint package of the magnitude being considered in this paper, assuming that its effects had not already been anticipated, would reduce short-term interest rates by about 1 1/4 percentage points.

Sinai and Rathjens (1983) adopt a rather different approach to expectations, arguing that deficits should affect interest rates when they become expected, not when they occur, because market participants will make current use of the information that deficits will lead to future crowding out. They demonstrate that adding a measure of expected future deficits to the equation for corporate bond rates in the DRI model produces a significant effect.

Most of the above estimates refer to the effects on interest rates from a change in government debt, or some variant thereof. Many of these studies also include a measure of aggregate demand as an additional determinant, so that fiscal policy could also have indirect effects on interest rates. Wherever aggregate demand is included, its effects are generally estimated to be statistically significant. In addition, two of these

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1/ In principle, the application of two-stage least squares is designed to compensate for feedback from the endogenous variables in a structural model to the endogenous variables included as explanatory variables in a regression, by first regressing the latter on all of the exogenous variables in the model. Evans, rather than specifying a full structural model, picks an arbitrary set of instruments for the first stage. In any event, even if each instrument is truly exogenous in the sense of being determined by the authorities, there is no guarantee that the set of instruments as a group will generate predicted values of the deficit that are free of cyclical influences.

studies incorporate the direct effect of government spending on aggregate demand as an argument in the interest rate equation. Mehra (1984) estimates a significant effect from the sum of real government spending and real exports (representing the autonomous component of aggregate demand), but Makin (1983) finds only a very weak effect from government spending alone. 1/ Both studies focus on treasury bill yields and include the Livingston estimates of expected inflation, but their equations otherwise differ in important respects. Makin includes unanticipated monetary growth and the variance of inflation as additional arguments, whereas Mehra includes the ratio of import prices to the GNP deflator (as a proxy for supply shocks), monetary growth relative to trend, and lagged real output growth.

5. Simulation studies

The discussion to this point has concentrated on regression studies that enable one to determine the significance and, in many cases, the direct quantitative impact of fiscal policy on interest rates. Also of interest are simulation studies with full structural models, which enable one to determine the quantitative importance of fiscal policies in a broader context. That is, fiscal actions in general may affect all of the other variables that affect interest rates, including income, expected inflation, and monetary growth. Single-equation studies of the determinants of interest rates do not capture these indirect channels of fiscal influence.

The disadvantages of simulation studies are that it is much more difficult to determine statistical significance or to isolate the channels that are responsible for a given effect or that account for differences among models. Even when different studies use the same basic model, isolating the source of any differences can be frustrated by their inherent complexities. All of these models are nonlinear, and their simulation properties are sensitive to initial conditions as well as to the precise specification of the fiscal policy (for example, a cut in personal income tax rates may have quite different effects from a cut in corporate tax rates) and to even minor variations in the model itself. 2/

Quantitatively important fiscal effects on interest rates are generated by all of the large-scale econometric models of the United States. Several of the studies shown in Table 14 perform simulations using these

1/ Makin also tests for exports alone, and again finds an insignificant effect.

2/ An additional possible source of differences is in the way that an unchanged monetary policy is defined. Except as noted in the following discussion, all of these simulation studies hold M1 growth on a fixed control path.

models. Blinder (1984), for example, performs simulations with three large models--the Wharton Econometric Forecasting Associates (WEFA) Model, the Data Resources (DRI) Model, and the MIT-PENN-SSRC (MPS) Model--and concludes that the three models have quite different effects on interest rates. For a fiscal contraction of the size being described here, his simulations indicate that long-term interest rates would be reduced by more than 4 percentage points after three years according to the MPS model and by more than 1 1/4 percentage points according to WEFA, but would actually be increased slightly according to DRI. 1/ The differences in these results arise primarily because the models have quite different implications for the effect of fiscal contraction on aggregate demand, as described in Appendix IV.

Friedman (1982) and Roley (1983) also simulate the MPS model, but they incorporate an additional submodel of the corporate bond market in order to reflect a broader range of asset substitution effects than is found in the basic model, and they add the government budget constraint to the model. Friedman simulates the effect of a $10 billion rise in government spending and finds that short-term and long-term rates rise by about 50 basis points. This effect translates to about a 1 1/2 or 2 percentage point decline associated with the fiscal contraction being considered here, assuming that effects from tax increases would not be too dissimilar from those of spending cuts. 2/

Roley conducts a simulation experiment similar to Friedman's, but with different initial conditions, and reaches similar conclusions. In addition, he simulates--using only the financial submodel--the short-term effects of changing the stock of debt at specific maturity intervals. This experiment suggests that the interest rate effects are sensitive to the way the deficit is financed: An increase in short-term debt affects primarily short-term interest rates, and conversely. Consequently, it appears that the decline in corporate bond yields expected from a fiscal contraction could be maximized by concentrating on reducing the supply of long-term treasury securities relative to short-term issues. The longer-run differential impacts, however, are likely to be rather smaller.

Recent simulations reported by Brinner (1984) using the DRI model suggest that the interest rate effects of a spending decrease are larger than those of a tax increase. For the most part, these differences are

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1/ Blinder holds M2 growth fixed in each simulation.

2/ Friedman also compares his results with those from the unaltered MPS model, but the results are ambiguous. The addition of the extended corporate bond model magnifies the effect of fiscal policy on treasury bill rates but attenuates them on corporate bond yields. The addition of the government budget constraint has the opposite effect.

associated with a relatively large effect on income and are what one would expect on the basis of conventional IS/LM theoretical models. Brinner's simulations imply that a deficit reduction equal to 2 percent of GNP would reduce the yield on Aaa corporate bonds by about 1 1/2 percentage points after four quarters if the reduction came from a cut in military spending, by 1 1/4 points if from a cut in transfer payments, and by about 3/4 of 1 point if from an increase in income tax rates. 1/

Sinai and Rathjens (1983) also simulate the DRI model to study fiscal policy effects, but they incorporate an interest rate equation in which yields depend on expected deficits, as described earlier in this appendix. These simulations show somewhat larger interest rate effects than those of Brinner. A deficit reduction of 2 percent of GNP, resulting from a balanced combination of spending reductions and tax increases, would reduce treasury bill rates by some 3 1/2 percentage points after one year, with corporate bond yields declining by about half that amount. These effects would then diminish over time, relative to the reduction in the deficit.

Fair (1984) runs simulations with his own model that indicate that a fiscal contraction of 2 percent of GNP would reduce interest rates by an amount ranging from about 30 basis points to nearly 70 basis points, depending upon the specification of the Federal Reserve's reaction function. Fair's simulations, however, allow the growth rate of the stock of money to rise endogenously to offset part of the fiscal contraction, so the pure fiscal effect would be somewhat larger.

The simulations described up to this point relate to models of the U.S. domestic economy. In addition to these studies, several authors have examined internationally linked systems in order to incorporate feedbacks on the U.S. economy from the effects that a fiscal policy change might have on other countries. For example, Masson and Blundell-Wignall report simulations with the MINILINK model developed at the OECD. 1/ A simulation in which it is assumed that exchange-rate and interest-rate expectations are characterized by perfect foresight has the result that short-term interest rates would decline by about 1 1/4 percentage point after one year, while long-term rates would fall by about 2 1/2 points. However, when the authors assume static expectations, short-term rates decline by about 2 percentage points, and long-term rates show only a very small

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1/ The effects from the cut in military spending build up over time, while those of the other two policies do not.

2/ The MINILINK model is a reduced-scale version of the OECD's INTERLINK system. Whereas the latter contains models of each individual OECD country and major non-OECD regions, MINILINK is a two-country model representing the United States and the rest of the world.

decline during the first few years of the simulation. Essentially, the assumption of rational expectations accelerates the effect on long-term rates, which otherwise builds up very slowly in the model.

A number of studies make use of the multi-country model (MCM) developed by the staff of the Board of Governors of the Federal Reserve System. Cohen and Clark (1984) perform simulations with two models--the MPS and the MCM--to calculate the effect of a 10 percent reduction in personal tax rates. With the MPS model--which is not internationally linked--treasury bill rates rise by 1 percentage point after two years and remain at that level during the last three years of the five-year simulation exercise. With the MCM, rates rise by about 2 1/2 percentage points after two years but then drop back to a level about 1 1/2 percentage points above the control path. Cohen and Clark note, however, that a later re-estimation of the MCM resulted in a higher interest elasticity of the demand for money, lowering the interest rate effect from fiscal policy. The two models thus would display fairly similar interest rate effects with this modification in spite of their different implications for exchange rates (see Section V of the main text).

Nonetheless, a more recent paper by Brayton and Clark (1984) finds still larger interest rate effects using the MCM. This paper simulates the effects of the ERTA tax cuts, under which the federal deficit is estimated to be increased by about $14 billion after one year (i.e., by mid-1982) and by $85 billion after three years. Standardizing the associated interest rate changes to a $65 billion deficit reduction (approximately 2 percent of 1983 GNP) implies that such a reduction would reduce treasury bill rates about 3 percentage points during the first three years before tapering off. Corporate bond rates would fall by about half as much.

Caprio et al. (1983) run simulations with the MCM, according to which a fiscal contraction of 2 percent of GNP would reduce treasury bill rates by about 6 percentage points after three years, and would reduce government bond rates by 2 percentage points and corporate bond rates by 4 percentage points over the same period. The effects are rather larger than those estimated either by Cohen and Clark or by Brayton and Clark, perhaps because the fiscal shock examined in their paper involves a change in the level of government spending, whereas the other studies involved changing income tax rates. As noted earlier, other models also have the property that interest rates change relatively more under a spending shock than under a tax shock.

Finally, Hooper (1984) describes the sensitivity of changes in U.S. interest rates to whether monetary authorities in other countries allow their own interest rates to respond. The normal working assumption built into the MCM is that Canadian interest rates respond pari passu but that rates in other countries are fixed. That assumption generates

the result that a fiscal package of the size considered here would reduce short-term interest rates by about 2 percentage points after two years, a result that is roughly in line with Cohen and Clark's estimates. However, if one assumes that all foreign interest rates move in step with U.S. rates, then U.S. rates fall by about 2 1/2 percentage points. The rationale for this result is that the foreign response prevents the dollar from depreciating, which magnifies the consequent decline in output and thus the decline in interest rates.

Overall, as noted in section IV.2 of the main text, there is a remarkable consensus among these simulation studies regarding the fiscal effects on interest rates. All of the studies examined here find that a fiscal contraction would reduce interest rates, and most of them show that rates fall by more than 1 percentage point after one or two years. They also show, however, that a more precise quantitative assessment of the impact depends on a very detailed specification of the type of fiscal policy to be examined and a careful statement of the assumptions to be made about other policies and economic conditions.

6. Effects on the term structure of interest rates

As noted above, the two studies that specifically test for effects of changes in the fiscal deficit on the term structure of interest rates--Frankel (1983) and Plosser (1982)--conclude that there is no significant effect. Thus, whatever effect fiscal policies have on the level of interest rates would be expected to fall equally on short- and long-term rates. 1/ This conclusion is broadly supported by the rest of the studies examined in this appendix, in two ways. First, those studies that estimate effects separately on short- and long-term rates appear to be about as likely to find larger effects on long-term rates as they are to find them on short-term rates. Second, the range of estimates for effects on long-term rates from all of the studies reviewed here is not much different from the range of effects on short-term rates (see Table 4 of the main text for a representative sample).

Several single equation studies include estimates for interest rates of two different maturities, but the results are anything but robust. Dewald (1983) and Galli and Massera (1983) find significant positive effects only on long-term rates, while Tatom finds a significant negative coefficient only on short-term rates. Evans (1985) finds insignificant effects on both short- and long-term rates.

1/ In the context of the models specified by Frankel and Plosser, fiscal policy would have no effect on the level of interest rates unless is also affected the term structure.

Simulations by Friedman (1982) and Roley (1983) using their extended version of the MPS model produce a larger change in treasury bond rates than in treasury bill rates, while simulations by Sinai and Rathjens (1983) and Brinner (1984) using the DRI model produce a relatively large change in short-term rates. Blinder's (1984) study shows relatively large effects on short-term rates for all three of the models that he examines. Fair (1984) shows a relatively large effect on short-term rates during the first two years of the simulation, but the effects equalize after three years. Caprio et al. (1983) find a larger effect on treasury bill rates than on treasury bonds, but by the fourth year of their simulation, yields on corporate bonds rise by more than either of the other two rates. Brayton and Clark (1984) also find a relatively large impact on short-term rates that gets equalized after about four years.

On balance, the simulation studies suggest that there might be a relatively large initial impact on short-term rates, but the evidence is somewhat mixed. Overall, it appears that changes in short- and long-term interest rates resulting from a general policy of fiscal restraint would probably be of similar magnitude. This finding suggests that the term-structure effects on exchange rates discussed in the main text (see especially Sections III.3 and IV.4) may be quite important. In practice, however, as noted in Section IV.2 of the text, the effects of a specific program of fiscal restraint on the term structure of interest rates would depend on the extent to which it was initially perceived to be permanent. The lack of a clear relationship in empirical studies may be due in large part to the sensitivity of the term structure to shifts in expectations that are very difficult to quantify.

APPENDIX III

Recent Studies of the Short-run Effect of Fiscal Policy on Domestic Economic Activity

(Appendix to Section IV.3)

This appendix examines in greater detail the evidence that is summarized in Section IV.3 on the short-run effects of changes in fiscal policy on economic activity. Specifically, it addresses the evidence on the questions of whether a reduction in government spending, or an increase in tax rates, would reduce output; and, if so, by how much and for how long a time. On the first question, recent empirical studies offer all but unanimous agreement that fiscal restraint would tend to reduce the rate of growth of actual output in the United States, relative to potential output, in the short run. The magnitude and duration of these effects on output are, however, more difficult to assess. The first part of this appendix surveys recent studies that make use of single-equation techniques, while the second examines recent simulations with large-scale structural models. The final section reviews studies that provide evidence relating to the effects of fiscal policies on business fixed investment and housing expenditures.

1. Single-equation studies

Almost all of the single-equation studies that have been reviewed for this paper find that fiscal policy actions have statistically significant effects on output, but they are less uniform in their conclusions about the magnitude and duration of the effects. 1/ The one single-equation study that explicitly attempts to measure the time profile of fiscal effects--Batten and Thornton (1983)--finds only a temporary impact. The Batten and Thornton study is in the framework of the model developed at the Federal Reserve Bank of St. Louis. It is an example of what has come to be known as the St. Louis equation, in which changes in nominal income are regressed on current and past changes in monetary growth and high-employment federal government expenditures. In the current form of the equation, all variables are expressed as changes in natural logarithms. 2/

1/ As with the interest rate studies described in Appendix II, it is difficult to make direct quantitative comparisons among the various studies, owing to different specifications of the fiscal variables and of the dependent variables (for example, using nominal or real GNP), as well as different methodology.

2/ Prior to 1978, the St. Louis equation was specified in terms of absolute changes. In 1977, Benjamin Friedman published a study showing that--in contrast to results published by the Federal Reserve Bank of St. Louis--updated estimates indicated that fiscal policy did have a significantly positive effect on income. In response, Carlson (1978) showed that the conventional formulation led to heteroskedastic residuals, but that a loglinear specification did not. The loglinear form, as estimated by Carlson, indicated that the effect of fiscal policy on income was insignificant.

Batten and Thornton's estimates, using quarterly data from 1962 through 1982 with various polynomial distributed lags (PDLs) on money and government spending, suggest that the cumulated effect of government spending is statistically insignificant. Nonetheless, in all cases they show a significant short-run effect with a multiplier of about 0.5. 1/ When they restrict the PDL to a short (four-quarter) lag, the cumulative multiplier is also on the order of 0.5.

The study by Batten and Thornton does not directly address the issue of how large an effect a change in the real value of government spending would have on real output. If a reduction in government spending were to reduce the rate of inflation associated with a given rate of monetary growth, then the contractionary effect on real output would be correspondingly smaller. The magnitude of this reduction is probably quite small in practice, so that the nominal multiplier may be taken as a reasonable approximation of the real multiplier as well. 2/

The only study under review that finds an insignificant short-run effect on income from a change in government spending is Evans (1984). Evans begins with a function that had been specified by Barro (1981), in which an increase in government spending does exert a significant stimulative effect on economic activity. In Barro's formulation, real output is a function of real government spending, unanticipated changes in the stock of money (measured as the residuals from an equation explaining M1), and a time trend. In that equation (which was estimated using quarterly data from 1949 through 1978), the fiscal variable is significant and has a steady-state multiplier of about 0.3, which is not too far below the short-run effect estimated by Batten and Thornton. Evans, however, reestimates this equation, adding the lagged value of real output as an explanatory variable, and finds that now the coefficient on government spending is insignificantly different from zero; based on his point estimate, the steady-state multiplier is about 0.2. 3/

1/ Batten and Thornton estimate a constant elasticity of nominal GNP to government expenditure. For purposes of comparison, their elasticities--as well as others calculated from loglinear relationships--have been converted into unit multipliers using the 1982 ratio of cyclically-adjusted federal government expenditures to trend GNP (0.235); this number is from deLeeuw and Holloway (1983).

2/ The term "multiplier" is used throughout this paper to refer to the ratio of the change in output (or income) to the change in the fiscal variable. In cases where the fiscal variable is government spending, a multiplier of less than one implies that the effect on private activity is negative; that is, a reduction in government spending would lead to an increase in private activity. In the case of a tax change, the multiplier measures the change in private activity alone.

3/ Evans also extends Barro's equation by adding measures of the volatility of money growth and interest rates. The estimated effects of changes in government spending are similar in the extended model to those just described.

A possible problem with Evans' specification is that the inclusion of the lagged value of the dependent variable imposes a Koyck lag structure on the equation. With this structure, the long-run effect is necessarily larger than the short-run effect, as the impulse accumulates over time. For example, in Evans's function, the first-quarter multiplier is only 0.15. Most distributed-lag studies, however, suggest that the effect of fiscal actions on output is relatively large in the short run, tapering off over time. This apparent misspecification may bias downward the coefficient in Evans' equation. A second possible problem is that the lagged value of real GNP may be highly collinear with current government spending, thus serving in effect as a proxy for fiscal policy.

Canarella and Garston (1983) obtain results similar to Barro's, estimating an equation in which real output depends on real government spending, as well as on anticipated and unanticipated changes in the stocks of narrowly defined money and of publicly held government debt. Using annual data (1949-1976), their estimates suggest that government spending has a multiplier effect of just under 0.3 on real output, and that unanticipated--but not anticipated--increases in the stock of debt also significantly raise output.

Another recent study that makes use of the distinction between normal (and thereby presumably anticipated) and abnormal (unanticipated) changes in fiscal variables is Laumas and McMillin (1984). These authors, like Canarella and Garston, argue that fully anticipated policies may affect output if prices and wages are less than perfectly flexible, owing to the existence of multiperiod contracts. They specify an equation in which the rate of growth of real output depends only on anticipated and unanticipated changes in the ratio of the real high-employment surplus to real potential output. The fiscal variable thus is adjusted for cyclical influences as well as being disaggregated into anticipated and unanticipated components. The absence of other explanatory variables--notably the omission of any measure of monetary policy--casts some doubt on these estimates; nonetheless, they do indicate that both of the included variables have significant effects on output.

DeLeeuw and Holloway (1985) estimate a relationship in which nominal income depends on levels of and changes in the monetary base and the cyclically-adjusted nominal stock of federal government debt, using estimates of the latter prepared by the authors for the U.S. Department of Commerce. Equations are estimated using annual data (1956-1983), with all explanatory variables lagged one year. 1/ They find that levels, but not changes, in the stock of debt are significant determinants of nominal income, which implies that portfolio effects may be more important than demand effects in this context.

1/ They also estimate an equation without lags, but the results are less satisfactory.

McElhatten (1982) also employs cyclically adjusted data, but she separates the high-employment real levels of spending and tax receipts rather than taking the difference between them (i.e., the high-employment deficit or surplus). In her model, deviations in real income from trend values are explained by deviations from trend in the nominal stock of money (M1) as well as in the two aforementioned fiscal variables. Using quarterly data (1966-1979), this equation suggests--somewhat oddly--that tax policies have a larger and more significant effect than do expenditure policies. The differences between the two, however, are not very great. 1/ In contrast to Batten and Thornton's results, McElhatten's more extended model--which, like Batten and Thornton's, uses PDLs to estimate lagged effects--has effects from both types of fiscal policy that are estimated to be sustained over a four-year period.

Yet another approach to the problem is taken by Feldstein in the 1982 study discussed in Appendix I. Rather than estimating the total effects of fiscal policy on output, Feldstein estimates a consumption function in which the levels of general government spending, tax revenues, 2/ transfer payments, and net debt are included as explanatory variables along with permanent income and the market value of household wealth (with all variables measured in real per capita values). Feldstein argues that if fiscal policy were completely impotent, then one would expect to find a coefficient of -1 on government spending (so that households would fully offset the direct effect of a change in government spending on aggregate demand), coefficients of zero on tax revenues and transfer payments, and a coefficient on government debt equal to the negative of the coefficient on household wealth (which is defined to include holdings of government securities). 3/

1/ The coefficient on high-employment tax receipts is -1.3 and is significant at the .05 level. The coefficient on high-employment expenditures is 1.1 and is significant at the .1 level. These coefficients are long-run effects; the equation is estimated using 16-quarter PDLs.

2/ Feldstein corrects for the endogeneity of tax revenues by using instrumental-variables estimation. As noted in the discussion of Evans (1985) in Appendix II, this technique may not adequately compensate for cyclical influences. In contrast to Evans, Feldstein does present OLS estimates along with those estimated by instrumental variables and discusses (p. 13) the limitations of the approach. Most of the qualitative conclusions relating to fiscal effects are unaffected by the choice of technique, although the null hypotheses (those implying that fiscal policies are impotent) are rejected with somewhat greater statistical confidence when instrumental variables are used.

3/ For a further description of the rationale for these hypotheses, see Appendix I.

Feldstein's parameter estimates, using annual data for 1930 to 1977 (omitting 1941-1946), indicate that the coefficients on spending, taxes, and debt are insignificantly different from zero, and that the coefficient on transfer payments is significantly positive. These findings imply that little if any crowding out of spending effects occurs through the household sector and that the stimulus to private demand that arises from the level of wealth is not diminished by the existence of future tax liabilities associated with the government debt.

Eisner and Pieper (1984) examine more closely the issue of the types of adjustment that should be made to debt or deficit data for purposes of assessing fiscal effects on economic activity. Specifically, they argue that real output should be affected by the cyclically-adjusted real fiscal deficit, including only real rather than nominal interest payments. This measure corresponds roughly to the change in the real market value of the government debt, adjusted for cyclical factors. 1/ Their empirical results, using annual data (1967-1982), indicate that the adjustment for price effects is quite important, but the adjustment for interest effects does not clearly improve the results. 2/ The price- and cyclically-adjusted deficit has a significantly positive effect on the growth rate of real output with a one-year lag.

2. Simulation studies

The timing of fiscal effects can perhaps be better judged through simulation studies based on large-scale models than through single-equation estimates, given the complex interactions that are involved. A number of recent studies using large models are available, and they have been described in more detail in Appendix II. The general nature of the models and the simulation results has also been discussed at various points in Sections IV and V of the text. The purpose of this part of the appendix is to summarize in somewhat greater detail the findings of the individual studies.

1/ That the correspondence is only approximate is due to the exclusion of off-budget items from the deficit. Eisner and Pieper adjust interest payments to a real basis indirectly, by deducting from the deficit the increase in the outstanding debt that has resulted from inflation. This procedure is equivalent to using ex post rather than ex ante inflation to measure real interest rates.

2/ The interest effect is calculated as the difference between the change in the par value of the debt and the change in the market value. Eisner and Pieper hypothesize that economic activity is affected by market rather than par values, but their results are ambiguous on this point.

In general, the simulation studies indicate that the multiplier effects of fiscal policy on real output--holding monetary growth constant--are around unity or less after one year, and that the effects taper off thereafter. 1/ This central tendency is broadly consistent with most of the single-equation studies described above. There is, however, a substantial dispersion among the simulation results.

Three simulations of the U.S. model of Data Resources Incorporated (DRI) give rather different impressions of the effect of fiscal policies on output, reflecting different specifications of the fiscal shock, initial conditions, and even some of the model's equations. First, Brinner (1984) finds that the fiscal multiplier on real output after four quarters ranges from 0.4 for a change in income tax rates to 1.1 for a change in real military expenditures. After 16 quarters, the multipliers are diminished but still positive; the multiplier for military spending, for example, is 0.5.

Second, Sinai and Rathjens (1983) estimate that the output multiplier for a change in government spending is 0.6 after one year and 0.2 after four years. This effect is smaller than Brinner's, apparently because Sinai and Rathjens use an equation in which interest rates depend on expected deficits rather than the existing stock of debt (see Appendix II). This change gives a larger effect on interest rates and causes a larger offsetting response in private expenditures--principally on housing--, reducing the fiscal multiplier.

Third, Blinder (1984) estimates effects using the DRI model that imply that the fiscal multiplier is negative after one year but then becomes positive and rises steadily through the end of the seven-year simulation. Although Blinder's simulations are based on a complex fiscal policy designed to correspond to the actual policies adopted in 1981-82, whereas both of the other simulations with the DRI model refer to hypothetical changes, this difference does not appear to account sufficiently for the difference in outcome. 2/ In any event, Blinder's simulations with this model appear to be inconsistent both with other simulations using the same model or different models and with the predictions of theoretical models.

1/ For convenience, multipliers from simulations of tax policy effects will be discussed here as positive numbers; that is, they describe the positive effect on income from a reduction in tax rates.

2/ The multipliers described here for Blinder's simulations, and for others in which tax rates are changed, are actually ratios of the change in income to the change in the fiscal deficit (or to tax revenues). The denominator thus includes an endogenous element, so they are not true multipliers. Correcting for this difference, however, would not be likely to alter the qualitative pattern of results.

Another model that has been subjected to extensive analysis is the MIT-Penn-SSRC (MPS) model. Cohen and Clark (1984) estimate a tax multiplier 1/ that reaches 0.8 after four quarters but becomes negative after twelve quarters. Blinder, using a combination policy in which tax changes play a dominant role, obtains much larger effects, with a short-run multiplier of about 2.5; however, he also finds that the multiplier becomes negative eventually (after five years). Friedman (1982) estimates a first-year spending multiplier of 1.6. However, when he extends the model by incorporating a detailed corporate bond market and the government budget constraint, the multiplier is cut by more than half, to 0.7. Roley (1983), using the same extended MPS model, obtains similar but somewhat smaller effects, with a four-quarter spending multiplier of 0.3 to 0.4, depending on the date of the simulation. Thus, overall it appears that the MPS model--at least in some versions--gives somewhat larger short-term multipliers than does the DRI model; however, it also implies complete rather than partial crowding out of private activity after three years or so. 2/

Cohen and Clark (1984) also conducted simulations with the Federal Reserve Board's multi-country model (MCM), with results for output that were qualitatively similar to those using the MPS model. In this case, the tax multiplier rises to 1.0 after four quarters and then declines to approximately zero after eight quarters. Simulations with the same model in Caprio et al. (1983), for which the fiscal shock is a change in the real level of government spending, show real output multipliers that are both larger and more sustained: 1.1 after four quarters and 0.1 after sixteen quarters. Brayton and Clark (1984) show very similar results with this model in simulating the effects of the ERTA tax cuts. Finally, Hooper's (1984) simulations with the MCM find that the real output multiplier for the 1981-1983 policy actions is about 1.4 after one year and 0.5 after three years. 3/ These multipliers increase slightly if foreign

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1/ The change in real GNP divided by the change in the deficit associated with a cut in personal income taxes.

2/ The sources of differences among models are, of course, difficult to isolate. Nonetheless, Blinder notes that the MPS model displays a relatively strong cyclical pattern in response to policy shocks, which he attributes to the steepness of the LM curve. Blinder holds M2 growth fixed in his simulations, and the demand for M2 is almost totally interest-inelastic in the MPS model, implying a very steep LM curve. This fact generates relatively large interest rate movements to restore short-term equilibrium, producing overshooting and subsequent cyclical behavior in the model.

3/ As with Blinder's simulations, the multipliers reported here are actually ratios of the change in real GNP to the (partly endogenous) change in the fiscal deficit.

monetary authorities allow their own interest rates to rise pari passu with the rise in U.S. rates, because in that case fiscal expansion no longer causes an appreciation of the U.S. dollar and thus no longer brings a deterioration of the trade balance.

Simulations with other models support the general conclusions described so far. Blinder's simulations with the Wharton model produce multipliers that are around unity, though--in contrast to most other results--these multipliers do not decline, even after a seven-year simulation. Fair (1984) simulates his model with a change in the level of real government spending, but his results are not strictly comparable to the other studies described here, since he allows monetary growth to respond endogenously to offset some of the stimulus from an expansionary fiscal policy. For the simulations in which this offset is smallest, he finds a fiscal multiplier on real GNP of 1.2 after four quarters and 0.5 after twelve quarters.

Finally, Masson and Blundell-Wignall (1984) conduct simulations of the effects of a change in real government spending using the OECD's MINILINK system under two sets of assumptions: first with perfect foresight and then with static expectations on the part of private market participants. For the short-run fiscal multiplier on real output, the two simulations give similar results (1.3 with perfect foresight and 1.6 with static expectations). However, with perfect foresight the economy returns much more quickly to its potential growth path, so the longer-run multipliers are quite a bit smaller (0.6 after 5 years, compared with 1.7 under static expectations).

3. Fiscal effects on investment and housing expenditures

Up to this point, this appendix has focused on the effects of fiscal policy on total output. Also of interest for this paper are the effects on specific categories of aggregate domestic demand such as business investment spending and housing construction. Although a thorough survey of evidence on such distributional effects would go beyond the scope of this paper, a general overview may be gleaned from the studies reviewed above.

Turning first to studies of the effect of fiscal policies on investment expenditures, there is broad agreement that fiscal contraction would lead, at least in the short run, to a reduction in investment. Apparently, the contractionary effects of the slowdown in aggregate demand and the increased tax burden initially outweigh the expansionary effects of declining interest rates on this category of spending. Brinner's simulations with the DRI model, for example, show that business investment would be reduced, though by a smaller percentage than the reduction in output; an exception arises if the contraction is in the form of a cut in

transfer payments, for which the reduction in output is small enough that investment actually rises. Even more clearly, Blinder's simulations with three large-scale models show a strong positive correlation between the stimulus to output and the stimulus to business fixed investment resulting from the 1981-1982 tax changes. Blinder emphasizes the incentive effects resulting especially from the 1981 tax act as a dominant factor producing an investment boom that exceeds the growth in output.

Cohen and Clark's (1984) simulations with the MPS model, as well as Brayton and Clark's (1984), indicate that investment would decline along with output in response to an increase in personal income tax rates, owing to the strength of accelerator effects in the model. However, after some 2 1/2 years, the interest rate effects would take over, and both investment and output would rise above their baseline paths. Friedman (1982) and Roley (1983) also find a short-run decline with their extended version of the MPS model.

McMillin and Laumas (1984) estimate a reduced-form relationship between real gross private domestic investment and the measures of anticipated and unanticipated fiscal policy that they developed in their earlier paper (Laumas and McMillin), as described above. Their tests suggest a much shorter time span for the short-run decline in investment: less than one year if the policy is anticipated and about two years otherwise. After that initial decline, investment responds inversely to fiscal policy.

The only study among those surveyed that does not show at least a short-run decline in investment is the Sinai-Rathjens (1983) version of the DRI model. Their simulations show real output to be below its baseline path for four years in response to fiscal contraction, while business fixed investment rises each year. The difference between this finding and those derived from other studies using the DRI model appears to be attributable to the larger interest rate effects in the Sinai-Rathjens version, which in turn result from their introduction of expected deficits into the interest rate equation.

Even greater agreement may be found regarding the effect of fiscal policies on housing outlays. The housing market is highly sensitive to changes in interest rates, and it constitutes a principal channel by which fiscal actions crowd out private activity. Models in which fiscal contraction leads to a relatively large decline in interest rates also tend to show a relatively strong recovery in housing, but even those with weak interest rate responses show at least a small housing decline. This relationship is found in the simulation studies of Blinder (1984), Brinner (1984), Friedman (1982), and Sinai and Rathjens (1983).

International Linkages

(Appendix to Section V.1)

1. The Geographic Pattern of U.S. Trade

An understanding of recent developments in the level and geographic distribution of U.S. trade provides important background for the evaluation in Section V of the foreign trade multipliers yielded by the various internationally-linked macroeconometric models, and for assessing the quantitative conclusions of these models about how changes in U.S. fiscal policy are transmitted internationally.

While merchandise trade is very large for the United States, non-merchandise trade is also of considerable importance. Recorded non-factor service receipts made up 15 percent of U.S. goods and services exports in 1983, while non-factor service payments were 12 percent of U.S. total imports. Data on the geographic distribution of U.S. services trade are limited, but since many services are closely linked to visible trade, data on the latter may serve to illustrate the geographic distribution of U.S. total trade. As a simple indicator of U.S. merchandise trade linkages, Table 15 provides data on the relative importance of various countries as markets for U.S. exports and as suppliers of U.S. imports during the period 1970-84. U.S. exports to and imports from each partner country or region are given as percentages of total U.S. exports and imports, respectively. Thus these columns show changes in the geographic distribution of U.S. merchandise trade, but they do not reflect the importance of competition between the U.S. and other countries in third-country markets. The final column of the table lists the weights that are used in constructing the IMF indicator of the international cost and price competitiveness for the U.S. manufacturing sector vis-à-vis 13 other major industrial countries. These weights are derived from data that reflect not only the importance of U.S. bilateral trade with each of these countries, but also the extent to which they compete with the United States in markets for manufactures in third countries. 1/

Table 15 provides a number of insights into the nature and extent of trade linkages between the United States and the rest of the world. On the export side, the broad geographic distribution of U.S. merchandise exports among major country groups has not changed greatly since 1970. The share of total exports that goes to other industrial countries declined

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1/ Data on the geographical distribution of exports and imports are from International Monetary Fund, Direction of Trade; competitiveness weights are those used in the indicators of international competitiveness published in International Monetary Fund, International Financial Statistics.

Table 15. Geographic Distribution of United States Merchandise Trade

	Exports (In percent of total U.S. exports)							Imports (In percent of total U.S. imports)							Weights in U.S. Competitiveness Index
	1970	1975	1980	1981	1982	1983	1984 1/	1970	1975	1980	1981	1982	1983	1984 1/	
Industrial Countries	66.0	57.3	56.8	55.5	55.2	58.7	60.4	71.4	55.2	49.2	52.4	56.4	57.2	59.8	
Six Large Industrial Countries	50.5	43.6	42.0	41.4	40.7	44.6	47.0	61.2	47.2	41.9	45.2	48.7	49.8	51.7	
Japan	10.8	8.9	9.4	9.3	9.9	10.9	10.8	14.6	11.7	12.8	14.6	15.7	16.1	17.7	16.6
Germany	6.3	4.8	5.0	4.4	4.4	4.4	4.2	7.8	5.5	4.8	4.4	4.9	4.9	5.2	18.0
France	3.4	2.8	3.4	3.1	3.3	3.0	2.8	2.4	2.2	2.2	2.2	2.3	2.3	2.5	12.6
Italy	3.1	2.7	2.5	2.3	2.2	1.9	2.0	3.3	2.5	1.8	2.0	2.2	2.2	2.5	7.1
United Kingdom	5.9	4.2	5.7	5.3	5.0	5.3	5.6	5.5	3.8	4.0	4.9	5.3	4.8	4.4	11.1
Canada	21.0	20.2	16.0	16.9	15.9	19.1	21.6	27.6	21.6	16.3	17.1	18.4	19.5	19.4	18.5
Other	15.4	13.7	14.7	14.1	14.5	14.1	13.2	10.3	8.0	7.2	7.2	7.6	7.4	8.0	
Austria	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.2	0.2	0.1	0.2	0.2	0.2	1.4
Australia	2.3	1.7	1.9	2.2	2.1	2.0	2.3	1.5	1.2	1.1	1.0	1.0	0.9	0.8	
Belgium	2.8	2.2	3.0	2.5	2.5	2.5	2.4	1.7	1.2	0.8	0.9	1.0	0.9	1.0	3.2
Denmark	0.5	0.4	0.4	0.4	0.3	0.3	0.3	0.7	0.5	0.3	0.3	0.4	0.4	0.4	1.1
Finland	0.2	0.2	0.2	0.3	0.2	0.2	0.2	0.3	0.2	0.2	0.2	0.2	0.2	0.3	
Iceland	.0	.0	.0	.0	.0	.0	.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	
Ireland	0.3	0.2	0.4	0.4	0.5	0.6	0.6	0.3	0.2	0.2	0.2	0.2	0.2	0.3	
Netherlands	3.8	3.9	3.9	3.7	4.1	3.9	3.5	1.3	1.1	0.8	0.9	1.0	1.2	1.3	4.7
Norway	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	1.1	0.9	0.8	0.5	0.6	0.7
Spain	1.7	2.1	1.5	1.5	1.7	1.4	1.2	0.9	0.9	0.5	0.6	0.6	0.6	0.8	
Sweden	1.3	0.9	0.8	0.8	0.8	0.8	0.7	1.0	0.9	0.7	0.7	0.8	0.9	1.0	3.1
Switzerland	1.6	1.1	1.7	1.3	1.3	1.5	1.2	1.2	0.9	1.1	0.9	0.9	0.9	0.9	1.9
New Zealand	0.3	0.4	0.3	0.4	0.4	0.3	0.3	0.6	0.3	0.3	0.3	0.3	0.3	0.3	
EMS	20.3	17.1	18.6	16.8	17.2	16.5	16.1	17.6	13.1	10.8	11.0	12.0	12.1	12.7	
EEC	26.6	21.7	24.7	22.4	22.6	22.1	21.6	23.2	17.0	14.9	16.0	17.4	17.0	17.6	
Developing Countries	32.2	38.3	39.4	40.6	40.9	37.6	35.7	26.6	42.1	47.5	44.1	39.6	38.0	35.3	
Oil Countries	4.4	9.6	7.7	8.9	10.4	8.2	6.3	4.2	18.8	22.2	18.5	12.2	9.1	7.6	
Non-Oil Countries	27.8	28.7	31.7	31.8	30.5	29.4	29.4	22.4	23.3	25.3	25.6	27.4	28.9	27.7	
Africa	2.7	2.6	2.2	2.4	2.2	2.1	2.2	2.4	2.8	3.1	2.7	2.9	2.7	2.5	
Asia	7.6	7.5	9.9	9.3	10.3	11.1	10.9	6.7	6.6	7.9	8.6	9.5	10.6	11.0	
Europe	2.1	2.0	1.8	1.7	1.6	1.8	1.6	0.8	0.9	0.7	0.8	0.7	0.8	0.9	
Middle East	1.9	2.8	2.3	2.6	3.0	3.0	2.7	0.5	0.5	0.6	0.7	0.7	0.6	0.6	
Western Hemisphere	13.4	13.8	15.5	15.7	13.4	11.4	12.0	11.9	12.5	13.0	12.8	13.6	14.2	12.7	
Ten Major Debtor Countries	14.3	16.4	18.1	18.6	17.4	15.1	15.3	10.9	13.5	14.2	15.2	16.1	17.4	16.4	
Brazil	1.9	2.8	2.0	1.6	1.6	1.3	1.2	1.7	1.5	1.6	1.8	1.8	2.0	2.4	
Mexico	3.9	4.8	6.9	7.6	5.6	4.5	5.5	3.0	2.9	5.0	5.1	6.2	6.3	5.4	
Argentina	1.0	0.6	1.2	0.9	0.6	0.5	0.4	0.4	0.2	0.3	0.4	0.5	0.3	0.3	
Korea	1.5	1.6	2.1	2.2	2.6	3.0	2.7	0.9	1.5	1.7	2.0	2.4	2.8	3.0	
Indonesia	0.6	0.8	0.7	0.6	1.0	0.7	0.6	0.5	2.4	2.2	2.3	1.8	2.1	1.7	
Venezuela	1.8	2.1	2.1	2.3	2.5	1.4	1.5	2.9	3.8	2.2	2.1	1.9	1.9	2.0	
Israel	1.4	1.4	0.9	1.1	1.1	1.0	1.0	0.4	0.3	0.4	0.5	0.5	0.5	0.5	
India	1.3	1.2	0.8	0.7	0.8	0.9	0.7	0.7	0.6	0.5	0.5	0.6	0.9	0.8	
Chile	0.7	0.5	0.6	0.6	0.4	0.4	0.4	0.4	0.1	0.2	0.2	0.3	0.4	0.3	
Egypt	0.2	0.6	0.8	0.9	1.4	1.4	1.3	0.1	.0	0.2	0.2	0.2	0.1	0.1	

Source: IMF, Direction of Trade. Competitiveness weights are derived from staff estimates.

1/ Coverage of data for 1984 is from January to November 1984.

gradually during the 1970s, but this decline has been partially reversed during the past few years. The share that goes to developing countries has fluctuated correspondingly, rising from 32 to 41 percent from 1970 to 1982, mainly owing to the jump in the share of U.S. goods going to the oil exporting countries in the three years following the first oil price increase in 1973-74; and then declining back to 36 percent in 1984.

Canada remains by far the most important destination for U.S. exports (with a share of almost 22 percent), followed by Japan with about 11 percent. The share of U.S. exports to the EEC has declined slightly over the years since 1970, but remains around 22 percent. As the data indicate, U.S. exports to the EEC are quite widely dispersed geographically--only five EEC countries 1/ account individually for more than 2 percent of U.S. exports, and no EEC country accounts for more than 6 percent. As Table 15 shows, the most significant developments in the pattern of U.S. exports since 1981 have been the increase in the share that goes to Canada and the sharp drop (more than 3 percentage points) in the proportion of total U.S. merchandise exports that goes to the group of major LDC debtors, with Mexico alone accounting for 2 percentage points of this decline.

On the import side, changes in the geographic distribution of U.S. merchandise trade appear at first sight to be more striking: U.S. imports from industrial countries fell from over 70 per cent of the total value of U.S. imports in 1970 to less than 50 percent in 1980, before rising back to 60 percent in 1984. However, much of this fluctuation is the result of shifts in the value of oil imports (both from the countries listed as "oil countries" and from Mexico), owing to the sharp increases in oil prices that occurred between 1972 and 1981 and to the subsequent decreases.

2. An Overview of the Major Internationally-Linked Econometric Models

In order to obtain a quantitative impression of the extent to which a change in U.S. fiscal policy might be transmitted internationally, Section V of the paper makes frequent use of results from research projects that have analyzed interdependence among the major industrial countries using internationally-linked macroeconometric models. The models considered here fall into three broad categories: (1) attempts to link together available national macroeconomic models (LINK); (2) structural models designed with monetary and exchange rate linkages specifically in mind (MCM, EPA); and (3) projects that focus mainly on trade linkages and foreign trade multipliers (INTERLINK). These models are described in a summary fashion in Table 16.

1/ Germany, France, the United Kingdom, Belgium, and the Netherlands.

Table 16. Features of Major Internationally-Linked Macroeconometric Models 1/

Model Name (Short Title)	Description	Exchange Rates	Country Cover
Project LINK (LINK)	Project designed to link together existing national econometric models that are regularly used for independent domestic forecasting. National models vary greatly in size, theoretical conception, and in specification of international financial linkages.	Fixed (in long-term simulations), floating according to reaction functions or purchasing power parity	18 industrial countries; 7 socialist countries; 4 developing-country regions
Japan Economic Planning Agency World Econometric Model (EPA)	Structural model designed specifically with financial and exchange rate linkages in mind; designed to emphasize channels of international transmission under alternative exchange rate regimes.	Fixed or managed float with exchange rate bounds and reserve flow target	9 countries (U.S., U.K., France, Germany, Italy, Canada, Japan, Australia, Korea) and 6 aggregate regions
Federal Reserve Multi-country Model (MCM)	(Same as for EPA, above) Bilateral trade flows and endogenous capital movements.	Fixed or flexible with inverted capital-flow account, portfolio-balance equation	U.S., Canada, Japan, U.K., Germany, and the rest of the world
OECD INTERLINK (INTERLINK)	Sets of country models with a common structure, linked by trade (volume and price) equations, with exogenous exchange rates and limited monetary and capital account linkages.	Fixed but adjustable	23 OECD countries plus 8 regions

Source: Helliwell and Padmore (1982), pp. 2-10 and Table 3.1.

3. Domestic and international effects of a change in U.S. tax rates

A simulation experiment using the Federal Reserve's MCM model (reported in Cohen and Clark, 1984) is useful in determining the domestic and international effects of a change in the U.S. fiscal position owing to an adjustment in tax rates rather than government expenditure. In this experiment, the domestic implications of which are discussed in Appendices II and III, the MCM model was used to simulate the effects over a five-year period of a reduction in personal income tax rates beginning in the third quarter of 1982, 1/ which initially results in a decline in tax revenues equal to 1 percent of GNP. M1 growth is assumed to remain unchanged (at 5 percent in 1982 and 4.5 percent per year in 1983-86). Consistently with the conditions of 1982, the simulation assumes that the economy is initially operating at less than full employment. Table 17 is based on the simulations reported in Cohen and Clark. There is a large rise in real GNP after one year of simulation owing mainly to a large increase in consumption supported by some rise in private fixed capital formation. As a result of these developments, the fiscal deficit initially rises by some $15 billion (compared to the base-line simulation) in the first year after the fiscal shock, and then gradually increases by an additional 2 percent of GNP over the following three years of simulation.

These developments cause the U.S. treasury bill rate to rise by nearly 2 1/2 percentage points during the first year after the tax reduction occurs. As in the simulation of the EPA model, the sharp rise in U.S. interest rates relative to those prevailing abroad induces an ex ante capital inflow that more than offsets the effect of the deterioration (equivalent to some $7 billion in 1983) in the current account balance and induces an appreciation of the value of the U.S. dollar in the foreign exchange market, equivalent to about 1.7 percent. The U.S. dollar remains above its level in the control simulation for 2 1/2 years after the fiscal shock, but thereafter it begins to fall as the rise in U.S. liabilities to nonresidents reduces the surplus on net service payments. As with the EPA model, the MCM model implies that an expansionary fiscal policy (this time resulting from a tax reduction) tends to raise the real exchange rate in the short run and to cause it to depreciate over the longer term.

1/ This is essentially equivalent to the tax reduction that became effective as part of ERTA on July 1, 1982; the model results apply to this tax change only and do not reflect the subsequent personal income tax reduction that occurred in July 1983.

Table 17. *Federal Reserve Multi-Country Model:* Simulated Effects on the U.S. Economy of a Sustained Reduction in Tax Revenue Initially Equal to 1 Percent of GNP

(Percent deviation from the control solution) 1/

	Effects on:			
Year	Real GNP	Prices (GNP Deflator)	Interest Rate (Percentage Points)	Trade-weighted Exchange Rate
1	0.6	-1.3	2.3	1.7
2	-0.1	1.3	2.5	1.2
3	0	1.3	1.7	-0.4
4	0	1.3	1.6	-0.5

Source: *Based on Table 2 in Cohen and Clark (1984).*

1/ In the table each positive entry means that the effect operates in the opposite direction to the shock (e.g., in year 1 a decrease in taxes would appreciate the U.S. dollar by 1.7 percent and raise GNP by 0.6 percent.

The Calculation of Short-run Changes in Import Volume in the Non-oil Developing Countries

(Appendix to Section V.2)

This appendix describes the simple approach that has been used for the calculations that are summarized in Table 11 of the text, as well as the more detailed results for specific country groups that are included here as Tables 19-28. These tables present estimates of how much import volumes for non-oil developing countries (NODCs) could change in response to changes in interest rates, the exchange rate between the U.S. dollar and other industrial-country currencies, and industrial country activity, under the assumption of no net change in NODC borrowing in real terms. In addition, Table 18 in this appendix describes the data used in Section V.2.

The analysis is based on the balance of payments identity for a given group of developing countries, which may be written as:

$$T + S \equiv DNK \qquad (6)$$

where

T = the balance of trade, measured in U.S. dollars,

S = the service balance, measured in U.S. dollars, and

DNK = the net change in claims on nonresidents, measured in U.S. dollars.

Equation (6) can be rewritten as

$$P_x X - P_m M - rD - r'D'e + NIS \equiv A^* - NB \qquad (7)$$

where

A^* = total amortization, measured in U.S. dollars

P_x = the U.S. dollar price of exports

P_m = the U.S. dollar price of imports

X = the volume of exports

M = the volume of imports

r = the interest rate on U.S. dollar-denominated assets

r' = the interest rate on assets denominated in currencies other than the U.S. dollar

D = stock of U.S. dollar gross external debt less official U.S. dollar assets

NB = new borrowing

NIS = the non-interest related service balance

D' = stock of non-dollar gross external debt less official non-dollar assets (measured in other industrial-country currency) 1/

e = the weighted-average exchange rate between the U.S. dollar and other industrial-country currencies (expressed as dollars per unit of other currency)

The condition that there be no net change in borrowing, in real terms, by the NODCs is satisfied by changing import volumes such that the initial current account less amortization, scaled by nominal exports, is kept constant whenever the environmental variables (interest rates, the exchange rate, industrial country activity, etc.) change. That is,

$$\frac{C-A^*}{P_xX} = \frac{P_xX - P_mM - rD - r'D'e - A - A'e}{P_xX} = k \qquad (8)$$

where C = the current account, measured in U.S. dollars

A = amortization of U.S. dollar debt

A' = amortization of non-dollar debt (measured in other industrial-country currency)

and k indicates that the ratio is constant.

The current account less amortization could be deflated in several ways. The use of nominal exports for this purpose underlines the similarities in either keeping import volumes constant and letting the debt service ratio vary, or allowing no additional lending in real terms while allowing import volumes to change in the face of a disturbance to any one of the environmental variables. These are the two cases analyzed in the text and summarized in Table 11. In particular, if trade is balanced, then the value of k in equation (8) is equal to the debt service ratio. In this instance, the two polar cases involve either keeping the debt service ratio constant and letting imports adjust or the reverse.

1/ That is, D'e is the net stock of external debt that is denominated in currencies other than the U.S. dollar, measured in U.S. dollars.

The relative import volume changes required in order for equation (6) to hold, given changes in the other variables, can be readily calculated for each of the three effects considered in the text.

1. The interest rate effect

Taking the first difference of equation (16) and noting that

$$\Delta D = \Delta D' = \Delta A = \Delta A' = \Delta e = \Delta X = \Delta P_x = \Delta P_m = \Delta k = 0$$

yields

$$P_m \Delta M = \alpha(D\Delta r + D'e\Delta r') \tag{9}$$

which in turn becomes

$$P_m M \cdot \frac{\Delta M}{M} = \alpha(D\Delta r + D'e\Delta r') \quad \text{or}$$

$$\hat{M} = \alpha \frac{(D\Delta r + D'e\Delta r')}{P_m M} \tag{10}$$

where the circumflex indicates a proportional change, and α is the proportion of total external debt contracted at floating interest rates. Equation (10) is the relationship used to calculate the percentage change in imports shown in column 1 of Table 11 and in Tables 19 to 28.

2. The exchange rate effect

The effect of a change in the U.S. dollar's exchange rate against other industrial-country currencies is calculated in a similar fashion. Noting that

$$\Delta D = \Delta D' = \Delta A = \Delta A' = \Delta r = \Delta r' = \Delta k = 0,$$

equation (8) is first-differenced to yield

$$(1-k)(P_x\Delta X + X\Delta P_x + \Delta X\Delta P_x) - M\Delta P_m - P_m\Delta M - \Delta P_M\Delta M - \Delta e(r'D' + A') = 0$$

which can be rewritten in terms of proportional changes and solved for $\hat{M}$ 1/

$$\hat{M} = [1/(P_mM+P_mMP_m)][(1-k)XP_X(\hat{X}+\hat{P}_X+\hat{X}\hat{P}_X) - MP_m\hat{P}_m - \hat{e}(r'D'e+A'e)] \quad (11)$$

Equation (11) permits export growth ($\hat{X}$) to be non-zero. However, it is assumed in the text that there is no supply effect of NODC exports from a change in their real effective exchange rates. Thus, (11) becomes (12), the equation used to calculate the import volume effects given in column 3 of Table 11 and in Tables 19 to 28.

$$\hat{M} = [1/(P_mM+P_mMP_m)][(1-k)XP_X\hat{P}_X-MP_mP_m - \hat{e}(r'D'e+A'e)] \quad (12)$$

If the assumption of a constant NODC real effective exchange rate is not warranted and there is some supply effect, then the analysis would have to be modified in accordance with the results presented in the appendix to Ridler and Yandle (1972).

3. The activity effect

The effects of diminished industrial country activity are calculated for the relative price and export growth terms in equation (8). The effect of changes in these variables on import volume growth, under the assumption of no additional lending in real terms, can be found by first-differencing equation (8) and solving for $\hat{M}$. Noting that

$$\Delta D = \Delta D' = \Delta A = \Delta A' = \Delta r = \Delta r' = \Delta e = \Delta k = 0,$$

we obtain

$$\hat{M} = [1/(P_mM+P_mMP_m)][(1-k)XP_X(\hat{P}_X+\hat{X}+\hat{P}_X\hat{X}) - MP_m\hat{P}_m] \quad (13)$$

Equation (13) is the relationship used to calculate the change in import volume reported in column 3 of Table 11 and in Tables 19 to 22. In the calculations actually presented, $\hat{P}_m$ is taken to be zero. All of the terms of trade effect is assumed to take place by decreasing P_X. Equal values of $\hat{P}_X$ and $\hat{P}_m$ tend to offset each another, thus making $\hat{M}$ relatively robust with respect to different import and export price assumptions that are consistent with the same terms of trade shift.

1/ Thus, for example, $P_X\Delta X = P_XX(\Delta X/X) = P_XX \cdot \hat{X}$.

Equations (10)-(13) demonstrate that the results in Table 11 and the tables in this appendix depend not only on the changed variables (e, P_x, X, r, etc.) but also on the initial values of the trade and debt variables. Depending on the environmental variable that is changing, potential import expansion will be higher, the stronger is the initial trade balance, the larger is the level of indebtedness, and the larger is the proportion of debt that is denominated in U.S. dollars and contracted at floating rates. Table 18 presents the initial values of all of the variables, not only for NODCs taken as a group, but also for five geographic subgroups and four analytical subgroups. The aggregation of all NODCs together masks pronounced differences among them. The importance of these differences can be seen in Tables 19 to 28, which show the interest rate and exchange rate shocks for all of the subgroups, and also the activity effects for each of the analytical subgroups shown in Tables 19 to 22 (there are no separate activity elasticities available for the geographic subgroups).

Several results emerge from these tables. An increase in interest rates on U.S. dollar assets has a particularly strong effect on the external position of the Western Hemisphere NODCs, which hold relatively large amounts of floating rate debt. The effect is also strong in low-income countries, in percentage terms. The effect of a depreciation of the U.S. dollar against other industrial country currencies is also relatively strong in the Western Hemisphere NODCs. Potentially large increases in imports result from an initial trade surplus coupled with the assumption of equal increases in import and export prices. With respect to the NODC analytical subgroups, there is a relatively strong effect from both exchange rate and activity changes for exporters of manufactures and for net oil exporters.

Table 18. Non-oil Developing Countries: Trade and External Debt, 1984 1/

	Imports	Exports	External Debt 2/	Amortization	Interest Rate	Share of Non-Dollar Debt in Total External Debt
	(In billions of U.S. dollars)				(In percent) 3/	
All NODCs	384.6	374.1	594.7	42.5	8.7	15.9
Geographic regions						
Western Hemisphere	60.0	85.4	276.7	13.8	...	7.4
Argentina, Brazil, Chile, Mexico, and Venezuela 4/	50.9	80.1	258.1	12.5	...	...
Other	324.6	288.7	318.0	28.7	...	22.5
Africa	45.2	45.4	99.7	7.0	...	...
Asia	190.1	177.7	109.1	11.1	...	...
Europe	57.2	50.0	69.7	7.4	...	...
Middle East	34.6	16.7	50.5	3.4	...	...
Analytical groups 5/						
Exporters of Manufactures	178.8	187.1	219.8	15.7	10.1	10.0
Net oil exporters	53.4	64.1	148.8	11.9	9.9	10.0
Low income	26.8	15.6	60.9	2.5	3.2	25.5
Other	88.5	74.1	156.2	10.8	8.0	25.5

1/ All data are staff estimates, except for the non-dollar share of debt, which is based on data from the Bank for International Settlements.
2/ Net of official foreign exchange reserves.
3/ Dots indicate that data are not available.
4/ Venezuela, an oil exporting country, is not included in the total figures.
5/ Excluding India and the People's Republic of China.

Table 19. Effects of Environmental Changes on NODC Exporters of Manufactures 1/

	A 1 Percentage Point Decrease in the Interest Rate	A 10 Percent Depreciation of the U.S. Dollar Against Other Industrial-Country Currencies 2/	A Decrease in the Growth Rates of Industrial Country Real GDP (-1 percent for the United States, -0.1 percent elsewhere)
Change in:			
Export value (In billions of dollars)	0	15.0	-3.29
Export volume (In percent)	0	0	-1.21
Export price (In percent)	0	8	-.54
Import value (In billions of dollars)	0	14.3	0
Import volume (In percent)	0	0	0
Import price (In percent)	0	8	0
Interest payments (In billions of dollars)	-1.47	4	0
Current account balance (In billions of dollars)	1.47	3	-3.29
Ratio of debt service to exports, as a percentage change from the baseline value 3/	-3.9	-7.9	1.8
Change in import volume implied by no additional real borrowing: 4/			
In percent	.8	1.3	-2.1
In billions of constant dollars	1.47	2.4	-3.8
In billions of current dollars	1.47	17.9	-3.9

1/ Effects after one year, under the assumption that the import volume of NODCs remains unchanged.

2/ It is assumed that the real effective exchange rates of the NODCs remain constant.

3/ For example, if the initial debt service/export ratio is .25, a decrease of 4 percent is equivalent to a change of 1 percentage point.

4/ This effect is calculated by solving for the import volume that will keep the ratio of the current account (less amortization) to total exports constant.

Table 20. Effects of Environmental Changes on NODC Net Oil Exporters 1/

	A 1 Percentage Point Decrease in the Interest Rate	A 10 Percent Depreciation of the U.S. Dollar Against Other Industrial-Country Currencies 2/	A Decrease in the Growth Rates of Industrial Country Real GDP (-1 percent for the United States, -0.1 percent elsewhere)
Change in:			
Export value (In billions of dollars)	0	5.1	-1.60
Export volume (In percent)	0	0	-.82
Export price (In percent)	0	8	-1.66
Import value (In billions of dollars)	0	4.3	0
Import volume (In percent)	0	0	0
Import price (In percent)	0	8	0
Interest payments (In billions of dollars)	-.99	.3	0
Current account balance (In billions of dollars)	3.7	.5	-1.60
Ratio of debt service to exports, as a percentage change from the baseline value 3/	-3.7	-6.9	2.60
Change in import volume implied by no additional real borrowing: 4/			
In percent	1.9	3.2	-3.80
In billions of constant dollars	.99	1.7	-2.00
In billions of current dollars	.99	6.5	-2.10

1/ Effects after one year, under the assumption that the import volume of NODCs remains unchanged.

2/ It is assumed that the real effective exchange rates of the NODCs remain constant.

3/ For example, if the initial debt service/export ratio is .25, a decrease of 4 percent is equivalent to a change of 1 percentage point.

4/ This effect is calculated by solving for the import volume that will keep the ratio of the current account (less amortization) to total exports constant.

Table 21. Effects of Environmental Changes on NODC Low Income Countries 1/

	A 1 Percentage Point Decrease in the Interest Rate	A 10 Percent Depreciation of the U.S. Dollar Against Other Industrial-Country Currencies 2/	A Decrease in the Growth Rates of Industrial Country Real GDP (-1 percent for the United States, -0.1 percent elsewhere)
Change in:			
Export value (In billions of dollars)	0	1.2	-.23
Export volume (In percent)	0	0	-.53
Export price (In percent)	0	8	-.96
Import value (In billions of dollars)	0	2.1	0
Import volume (In percent)	0	0	0
Import price (In percent)	0	8	0
Interest payments (In billions of dollars)	-.4	.1	0
Current account balance (In billions of dollars)	.4	-1.0	-.23
Ratio of debt service to exports, as a percentage change from the baseline value 4/	-9.1	-5.4	1.5
Change in import volume implied by no additional real borrowing: 5/			
In percent	1.5	.007	-1.76
In billions of constant dollars	.4	.2	-.47
In billions of current dollars	.4	2.5	-.49

1/ Effects after one year, under the assumption that the import volume of NODCs remains unchanged.

2/ It is assumed that the real effective exchange rates of the NODCs remain constant.

3/ For example, if the initial debt service/export ratio is .25, a decrease of 4 percent is equivalent to a change of 1 percentage point.

4/ This effect is calculated by solving for the import volume that will keep the ratio of the current account (less amortization) to total exports constant.

Table 22. Effects of Environmental Changes on Other NODC Countries 1/

	A 1 Percentage Point Decrease in the Interest Rate	A 10 Percent Depreciation of the U.S. Dollar Against Other Industrial-Country Currencies 2/	A Decrease in the Growth Rates of Industrial Country Real GDP (-1 percent for the United States, -0.1 percent elsewhere)
Change in:			
Export value (In billions of dollars)	0	5.9	-.95
Export volume (In percent)	0	0	-.59
Export price (In percent)	0	8	-.69
Import value (In billions of dollars)	0	7.1	0
Import volume (In percent)	0	0	0
Import price (In percent)	0	8	0
Interest payments (In billions of dollars)	-1.04	.6	0
Current account balance (In billions of dollars)	1.04	-1.8	-.95
Ratio of debt service to exports, as a percentage change from the baseline value 3/	-4.5	-6.9	1.3
Change in import volume implied by no additional real borrowing: 4/			
In percent	1.2	1	-1.64
In billions of constant dollars	1.04	1.1	-1.4
In billions of current dollars	1.04	8.8	-1.5

1/ Effects after one year, under the assumption that the import volume of NODCs remains unchanged. The countries included in this table are those that are not included in the other analytical groups of NODC countries.

2/ It is assumed that the real effective exchange rates of the NODCs remain constant.

3/ For example, if the initial debt service/export ratio is .25, a decrease of 4 percent is equivalent to a change of 1 percentage point.

4/ This effect is calculated by solving for the import volume that will keep the ratio of the current account (less amortization) to total exports constant.

Table 23. Effects of Environmental Changes on NODCs in Africa 1/

	A 1 Percentage Point Decrease in the Interest Rate	A 10 Percent Depreciation of the U.S. Dollar Against Other Industrial-Country Currencies 2/
Change in:		
Export value (In billions of dollars)	0	3.6
Export volume (In percent)	0	0
Export price (In percent)	0	8
Import value (In billions of dollars)	0	3.6
Import volume (In percent)	0	0
Import price (In percent)	0	8
Interest payments (In billions of dollars)	-.66	.4
Current account balance (In billions of dollars)	.66	-.4
Ratio of debt service to exports, as a percentage change from the baseline value 3/	-4.2	-5.7
Change in import volume implied by no additional real borrowing: 4/		
In percent	1.5	1.7
In billions of constant dollars	.66	.8
In billions of current dollars	.66	4.8

1/ Effects after one year, under the assumption that the import volume of NODCs remains unchanged.

2/ It is assumed that the real effective exchange rates of the NODCs remain constant.

3/ For example, if the initial debt service/ratio is .25, a decrease of 4 percent is equivalent to a change of 1 percentage point.

4/ This effects is calculated by solving for the import volume that will keep the ratio of the current account (less amortization) to total exports constant.

Table 24. Effects of Environmental Changes on NODCs in Asia 1/

	A 1 Percentage Point Decrease in the Interest Rate	A 10 Percent Depreciation of the Dollar Against Other Industrial Country Currencies 2/
Change in:		
Export value (In billions of dollars)	0	14.2
Export volume (In percent)	0	0
Export price (In percent)	0	8
Import value (In billions of dollars)	0	15.2
Import volume (In percent)	0	0
Import price (In percent)	0	8
Interest payments (In billions of dollars)	-.73	.5
Current Account balance (In billions of dollars)	.73	-1.5
Ratio of debt service to exports, as a percentage change from the baseline value 3/	-3.5	-5.7
Change in import volume implied by no additional real borrowing: 4/		
In percent	.4	.5
In billions of constant dollars	.73	1
In billions of current dollars	.73	17.3

1/ Effects after one year, under the assumption that the import volume of NODCs remains unchanged.

2/ It is assumed that the real effective exchange rates of the NODCs remain constant.

3/ For example, if the initial debt service/ratio is .25, a decrease of 4 percent is equivalent to a change of 1 percentage point.

4/ This effects is calculated by solving for the import volume that will keep the ratio of the current account (less amortization) to total exports constant.

Table 25. Effects of Environmental Changes on NODCs in Europe 1/

	A 1 Percentage Point Decrease in the Interest Rate	A 10 Percent Depreciation of the Dollar Against Other Industrial Country Currencies 2/
Change in:		
Export value (In billions of dollars)	0	4
Export volume (In percent)	0	0
Export price (In percent)	0	8
Import value (In billions of dollars)	0	4.6
Import volume (In percent)	0	0
Import price (In percent)	0	8
Interest payments (In billions of dollars)	-.46	.3
Current Account balance (In billions of dollars)	.46	-.9
Ratio of debt service to exports, as a percentage change from the baseline value 3/	-3.5	-5.7
Change in import volume implied by no additional real borrowing: 4/		
In percent	.8	1.2
In billions of constant dollars	.46	.7
In billions of current dollars	.46	5.7

1/ Effects after one year, under the assumption that the import volume of NODCs remains unchanged.

2/ It is assumed that the real effective exchange rates of the NODCs remain constant.

3/ For example, if the initial debt service/ratio is .25, a decrease of 4 percent is equivalent to a change of 1 percentage point.

4/ This effects is calculated by solving for the import volume that will keep the ratio of the current account (less amortization) to total exports constant.

Table 26. Effects of Environmental Changes on NODCs in the Middle East 1/

	A 1 Percentage Point Decrease in the Interest Rate	A 10 Percent Depreciation of the Dollar Against Other Industrial Country Currencies 2/
Change in:		
Export value (In billions of dollars)	0	1.3
Export volume (In percent)	0	0
Export price (In percent)	0	8
Import value (In billions of dollars)	0	2.8
Import volume (In percent)	0	0
Import price (In percent)	0	8
Interest payments (In billions of dollars)	-.37	.2
Current Account balance (In billions of dollars)	.37	-1.7
Ratio of debt service to exports, as a percentage change from the baseline value 3/	-4.3	-5.7
Change in import volume implied by no additional real borrowing: 4/		
In percent	1.0	1.1
In billions of constant dollars	.37	.4
In billions of current dollars	.37	3.4

1/ Effects after one year, under the assumption that the import volume of NODCs remains unchanged.

2/ It is assumed that the real effective exchange rates of the NODCs remain constant.

3/ For example, if the initial debt service/ratio is .25, a decrease of 4 percent is equivalent to a change of 1 percentage point.

4/ This effects is calculated by solving for the import volume that will keep the ratio of the current account (less amortization) to total exports constant.

Table 27. Effects of Environmental Changes on NODCs in the Western Hemisphere 1/

	A 1 Percentage Point Decrease in the Interest Rate	A 10 Percent Depreciation of the Dollar Against Other Industrial Country Currencies 2/
Change in:		
Export value (In billions of dollars)	0	6.8
Export volume (In percent)	0	0
Export price (In percent)	0	8
Import value (In billions of dollars)	0	4.8
Import volume (In percent)	0	0
Import price (In percent)	0	8
Interest payments (In billions of dollars)	-1.84	.3
Current Account balance (In billions of dollars)	1.84	1.7
Rate of debt service to exports, as a percentage change from the baseline value 3/	-4.9	-7.2
Change in import volume implied by no additional real borrowing: 4/		
In percent	3.1	4.2
In billions of constant dollars	1.84	2.5
In billions of current dollars	1.84	8

1/ Effects after one year, under the assumption that the import volume of NODCs remains unchanged.

2/ It is assumed that the real effective exchange rates of the NODCs remain constant.

3/ For example, if the initial debt service/ratio is .25, a decrease of 4 percent is equivalent to a change of 1 percentage point.

4/ This effects is calculated by solving for the import volume that will keep the ratio of the current account (less amortization) to total exports constant.

Table 28. Effects of Environmental Changes on Argentina, Brazil, Chile, Mexico, and Venezuela 1/

	A 1 Percentage Point Decrease in the Interest Rate	A 10 Percent Depreciation of the Dollar Against Other Industrial Country Currencies 2/
Change in:		
Export value (In billions of dollars)	0	6.4
Export volume (In percent)	0	0
Export price (In percent)	0	8
Import value (In billions of dollars)	0	4.1
Import volume (In percent)	0	0
Import price (In percent)	0	8
Interest payments (In billions of dollars)	-1.72	.3
Current account balance (In billions of dollars)	1.72	2
Ratio of debt service to exports, as a percentage change from the baseline value 3/	-4.9	-7.2
Change in import volume implied by no additional real borrowing: 4/		
In percent	3.4	4.5
In billions of constant dollars	1.72	2.3
In billions of current dollars	1.72	7.0

1/ Effects after one year, under the assumption that the import volume of NODCs remains unchanged.

2/ It is assumed that the real effective exchange rates of the NODCs remain constant.

3/ For example, if the initial debt service/ratio is .25, a decrease of 4 percent is equivalent to a change of 1 percentage point.

4/ This effects is calculated by solving for the import volume that will keep the ratio of the current account (less amortization) to total exports constant.

References

Amano, Akihiro, "The EPA World Economic Model: An Overview" (unpublished, Kobe University and Economic Planning Agency).

Amano, Akihiro, "Exchange Rate Modelling in the EPA World Econometric Model," prepared for International Workshop on Exchange Rates in Multi-country Econometric Models, University of Leuven, Belgium, November 26-28, 1981.

Artus, Jacques R., "Monetary Stabilization With and Without Government Credibility," IMF Staff Papers, Vol. 28 (September 1981), pp. 495-533.

_____ and Anne Kenny McGuirk, "A Revised Version of the Multilateral Exchange Rate Model," IMF Staff Papers, Vol. 28 (June 1981), pp. 275-309.

Aschauer, David Alan, "Fiscal Policy and Aggregate Demand," American Economic Review, Vol. 75 (March 1985), pp. 117-127.

Atkinson, Anthony B. and Joseph E. Stiglitz, Lectures on Public Economics, New York (McGraw-Hill, 1980).

Auerbach, Alan J. and Laurence J. Kotlikoff, "An Examination of Empirical Tests of Social Security and Savings," in Elhanan Helpman, et al. (editors), Social Policy Evaluation: An Economic Perspective, New York and London (Academic Press, 1983), pp. 161-179.

Bailey, Martin J., National Income and the Price Level. New York (McGraw-Hill, 1962, 1971).

Barro, Robert J., "Are Government Bonds Net Wealth?" Journal of Political Economy, Vol. 82 (November/December 1974).

_____, Money, Expectations, and Business Cycles: Essays in Macroeconomics (Academic Press, 1981).

Barth, James R., George Iden, and Frank S. Russek, "Do Federal Deficits Really Matter?" Paper prepared for the Western Economic Association Meeting, Las Vegas, Nevada, June 1984.

Batten, Dallas S. and James E. Kamphoefner, "The Strong U.S. Dollar: A Dilemma for Foreign Monetary Authorities," Federal Reserve Bank of St. Louis Review, Vol 64, (August/September 1982), pp. 3-12.

Batten, Dallas S. and Daniel L. Thornton, "Polynomial Distributed Lags and the Estimation of the St. Louis Equation," Federal Bank of St. Louis Review, Vol. 65 (April 1983), pp. 13-25.

Bhandari, Jagdeep S. and Bluford H. Putnam (editors), Economic Interdependence and Flexible Exchange Rates, Cambridge (MIT Press, 1983).

Black, Stanley W., "The Use of Monetary Policy for Internal and External Balance in Ten Industrial Countries," in Jacob A. Frenkel (editor), Exchange Rates and International Macroeconomics, National Bureau of Economic Research (University of Chicago Press, 1983).

Blanchard, O. and R. Dornbusch, "U.S. Deficits, the Dollar and Europe," Banca Nazionale del Lavoro Quarterly Review, (March 1984), pp. 89-113.

Blanchard, Olivier J. and Lawrence H. Summers, "Perspectives on High World Real Interest Rates" Brookings Papers on Economic Activity, No. 2 (1984), pp. 273-324.

Blinder, Alan S., "Reaganomics and Growth: The Message in the Models," in Charles R. Hulten and Isabel V. Sawhill (editors), The Legacy of Reaganomics: Prospects for Long-term Growth (Washington: The Urban Institute, 1984).

Blundell-Wignall, A., et al., "Monetary Policy in the OECD Interlink Model," Working Paper No. 16, Paris (OECD, September 1984).

Bond, Marian, "An Analysis of Export Demand and Supply for Groups of Non-Oil Developing Countries," (manuscript, May 1984).

Boughton, James M., "Stable Monetary Growth and Exchange Rates as Policy Targets," IMF Staff Papers, Vol. 29 (December 1982), pp. 495-526.

_____, "Exchange Rate Movements and Adjustment in Financial Markets: Quarterly Estimates for Major Countries," IMF Staff Papers, Vol. 31 (September 1984), pp. 445-468.

Branson, William H., "Economic Structure and Policy for External Balance," IMF Staff Papers, Vol. 30 (March 1983), pp. 39-66.

Brayton, Flint and Peter B. Clark, "The Macroeconomic and Sectoral Effects of ERTA: Some Simulation Results" (manuscript, November 1984).

Brinner, Roger E., "Republic Fears: A Growth Recession?" in Data Resources, Inc., "U.S. Forecast Summary," (September 1984).

Buiter, Willem H., "Comment on T.J. Sargent and N. Wallace: "Some Unpleasant Monetarist Arithmetic," NBER Working Paper No. 867 (March 1982).

_____ , "Fiscal Policy in Open Interdependent Economies," NBER Working Paper No. 1429 (August 1984).

_____ and James Tobin, "Debt Neutrality: A Brief Review of Doctrine and Evidence," in George von Furstenberg (editor), Chapter 2 in Social Security Versus Private Savings in Post-Industrial Societies, Cambridge, Mass. (Ballinger, 1979).

Canarella, Giorgio and Neil Garston, "Monetary and Public Debt Shocks: Tests and Efficient Estimates," Journal of Money, Credit and Banking, Vol. 15 (May 1983), pp. 199-211.

Canto, Victor A. and Donald Rapp, "The 'Crowding-Out' Controversy: Arguments and Evidence," Federal Reserve Bank of Atlanta Economic Review (August 1982).

Caprio, Gerard, Dale W. Henderson, Peter Hooper, Raymond Lubitz, and Steven A. Symansky, "Deficit-Savings Ratios as Indicators of Interest-Rate Pressure: A Collection of Notes," International Finance Discussion Paper No. 234, Board of Governors of the Federal Reserve System (December 1983).

Carlson, Jack, "The Relationship Between Federal Deficits and Interest Rates," statement presented to the Joint Economic Committee of the U.S. Congress, October 21, 1983.

Carlson, Keith M., "Does the St. Louis Equation Now Believe in Fiscal Policy?" Federal Reserve Bank of St. Louis Review, Vol. 60 (February 1978), pp. 13-19.

Carmichael, Jeffrey, "Pitfalls in Testing the Ricardian Equivalence Theorem," (manuscript, 1983).

Chu, Ke-young and T.K. Morrison, "The 1981-82 Recession and Non-Oil Primary Commodity Prices," IMF Staff Papers, Vol. 31 (March 1984).

Clarida, Richard H. and Benjamin M. Friedman, "The Behavior of U.S. Short-Term Interest Rates Since October 1979," NBER Working Paper No. 1273 (February 1984).

Cohen, Darrel and Peter B. Clark, "The Effects of Fiscal Policy on the U.S. Economy," Staff Study No. 136, Board of Governors of the Federal Reserve System (January 1984).

Cooper, Richard, et al., U.S. General Accounting Office Symposium on Floating Exchange Rates in an Interdependent World (Washington, April 20, 1984).

Cumby, Robert E. and Frederic S. Mishkin, "The International Linkage of Real Interest Rates: The European-U.S. Connection," NBER Working Paper No. 1423 (August 1984).

Darby, Michael R., "Some Pleasant Monetarist Arithmetic," Federal Reserve Bank of Minneapolis Quarterly Review (Spring 1984).

DeLeeuw, Frank and Thomas M. Holloway, "Cyclical Adjustment of the Federal Budget and Federal Debt," Survey of Current Business, Vol. 63 (December 1983).

DeLeeuw, Frank and Thomas M. Holloway, "The Measurement and Significance of the Cylically Adjusted Federal Budget and Debt," Journal of Money, Credit and Banking, Vol. 17 (May 1985, forthcoming).

Denison, Edward F., Accounting for Slower Economic Growth: The United States in the 1970s, Washington (The Brookings Institution, 1979).

Dewald, William G., "Federal Deficits and Real Interest Rates: Theory and Evidence," Federal Reserve Bank of Atlanta Economic Review, Vol. 68 (January 1983), pp. 20-29.

Dornbusch, Rudiger, "Flexible Exchange Rates and Interdependence," IMF Staff Papers, Vol. 30 (March 1983), pp. 3-30.

_____, "The Effects of OECD Macro-Economic Policies on Non-Oil LDCs: A Review," (manuscript, MIT, September 1984).

Eckstein, Otto, Edward W. Green, and Allen Sinai, "The Data Resources Model: Uses, Structure and Analysis of the U.S. Economy," International Economic Review (October 1974).

Eisner, R. and P.J. Pieper, "A New View of the Federal Debt and Budget Deficits," American Economic Review, Vol. 74 (March 1984), pp. 11-29.

Evans, Paul, "Do Large Deficits Produce High Interest Rates?", American Economic Review, Vol. 75 (March 1985), pp. 68-87.

_____, "The Effects on Output of Money Growth and Interest Rate Volatility in the United States," Journal of Political Economy, Vol. 92 (April 1984), pp. 204-222.

Fackler, James S. and W. Douglas McMillin, "Government Debt and Macro-economic Activity," paper prepared for the Southern Economic Association Meetings, Washington, D.C., November 1983.

Fair, Ray C., "Effects of Expected Future Government Deficits on Current Economic Activity," NBER Working Paper No. 1293 (March 1984).

Feldstein, Martin, "Government Deficits and Aggregate Demand," Journal of Monetary Economics, Vol. 9 (January 1982).

_____, "Domestic Saving and International Capital Movements in the Long Run and the Short Run," European Economic Review, Vol. 21, Amsterdam, (March/April 1983), pp. 129-51.

Feldstein, Martin S., and Otto Eckstein, "The Fundamental Determinants of the Interest Rate," Review of Economics and Statistics (November 1970).

Feldstein, Martin S., and C. Horioka, "Domestic Savings and International Capital Flows," Economic Journal, Vol. 90, London (June 1980), pp. 314-29.

Filatov, Victor, Bert G. Hickman, and Lawrence R. Klein, "Long-term Simulations with the Project Link System, 1978-1985," in Bert G. Hickman (editor), Global International Economic Models. Proceedings of the Eighth IIASA Symposium on Global Modeling, 1982.

Fischer, Stanley, "Long-Term Contracts, Rational Expectations, and the Optimal Money Supply," Journal of Political Economy, Vol. 85 (February 1977), pp. 191-205.

Frankel, Jeffrey A., "The Desirability of a Dollar Appreciation, Given a Contractionary U.S. Monetary Policy," NBER Working Paper No. 1110 (April 1983).

Frankel, Jeffrey A., "A Test of Portfolio Crowding-Out and Related Issues in Finance," NBER Working Paper No. 1205 (September 1983).

Fraumeni, Barbara M. and Dale W. Jorgenson, "The Role of Capital in U.S. Economic Growth, 1948-1976," in George M. von Furstenberg (editor), Capital, Efficiency and Growth (Ballinger, 1980).

Frenkel, Jacob A., and Michael L. Mussa, "Asset Markets, Exchange Rates and the Balance of Payments," NBER Working Paper No. 1287 (March 1984).

Frenkel, Jacob A. and Assaf Razin, "Fiscal Policies, Debt, and International Economic Interdependence," NBER Working Paper No. 1266 (January 1984).

_____, "Budget Deficits and Rates of Interest in the World Economy," NBER Working Paper No. 1354 (May 1984).

Friedman, Benjamin M., "Even the St. Louis Model Now Believes in Fiscal Policy," Journal of Money, Credit and Banking, Vol. 9 (May 1977), pp. 365-367.

_____, "Crowding Out or Crowding In? Economic Consequences of Financing Government Deficits," Brookings Papers on Economic Activity, Vol. 3 (1978), pp. 593-641.

_____, "Interest Rate Implications for Fiscal and Monetary Policies: A Postscript on the Government Budget Constraint," Journal of Money, Credit and Banking, Vol. 14 (August 1982), pp. 407-412.

Friend, Irwin and Joel Hasbrouck, "Saving and After-Tax Rates of Return," Review of Economics and Statistics, Vol. 65, No. 4 (November 1983), pp. 537-43.

Galli, G. and R.S. Masera, "Real Rates of Interest and Public Sector Deficits: An Empirical Investigation," Economic Notes by Monte Dei Paschi Di Siena, No. 3 (1983).

Green, R. Jeffery, "Investment Determinants and Tax Factors in Major Macroeconometric Models," in George M. von Furstenberg (editor), The Government and Capital Formation (Ballinger, 1980).

Hall, Robert, "Stochastic Implications of the Life Cycle-Permanent Income Hypothesis: Theory and Evidence," Journal of Political Economy, Vol. 86 (December 1978), pp. 971-987.

Hausman, Jerry A., "Income and Payroll Tax Policy and Labor Supply." In Lawrence H. Meyer (editor), The Supply-Side Effects of Economic Policy, (St. Louis, 1981a).

_____, "The Effect of Taxes on Labor Supply," in H. Aaron and J. Pechman (editors), How Taxes Affect Economic Behavior, Washington D.C. (Brookings Institution, 1981b).

Helliwell, John F. and Tim Padmore, "Empirical Studies of Macroeconomic Interdependence," NBER Working Paper No. 1021 (November 1982).

Henderson, Dale W., "Canadian Post-War Balance of Payments and Exchange-Rate Experience: Comment," in Douglas Purvis (editor) The Canadian Balance of Payments: Perspectives and Policy Issues, (The Institute for Research on Public Policy, 1983).

Hernandez-Cata, Ernesto, "The Impact of Fiscal Variables on Personal Consumption: an Interpretation of the Empirical Evidence," (manuscript, International Monetary Fund, July 1982).

Hoelscher, Gregory P., "Federal Borrowing and Short-Term Interest Rates," Southern Economic Journal, Vol. 50 (October 1983).

Hooper, Peter, "International Repercussions of the U.S. Budget Deficit," International Finance Discussion Paper No. 246, Board of Governors of the Federal Reserve System (September 1984).

Hooper, Peter and John Morton, "Fluctuations in the Dollar: A Model of Nominal and Real Exchange Rate Determination," Journal of International Money and Finance, Vol. 1 (1982), pp. 39-56.

International Monetary Fund, World Economic Outlook, Occasional Paper 21 (May 1983).

_____, World Economic Outlook, Occasional Paper 27 (April 1984).

Jaffee, Dwight M. and Kenneth T. Rosen, "Mortgage Credit Availability and Residential Construction," Brookings Papers on Economic Activity, No. 2 (1979), pp. 333-376.

Khan, Mohsin S. and Malcolm D. Knight, "Determinants of Current Account Balances of Non-Oil Developing Countries in the 1970s: An Empirical Analysis," IMF Staff Papers, Vol. 30 (December 1983), pp. 819-842.

Knight, Malcolm D. and Donald J. Mathieson, "Model of an Industrial Country under Fixed and Flexible Exchange Rates," in John P. Martin and Alasdair Smith (editors), Trade and Payments Adjustment under Flexible Exchange Rates, London (Macmillan, 1979).

_____, "Economic Change and Policy Response in Canada under Fixed and Flexible Exchange Rates" in Jagdeep S. Bhandari and Bluford H. Putnam (editors), Economic Interdependence and Flexible Exchange Rates, Cambridge (MIT Press, 1983).

Kochin, Levis A., "Are Future Taxes Anticipated by Consumers?," Journal of Money, Credit and Banking, Vol. VI, No. 3 (August, 1974).

Kormendi, Roger C., "Government Debt, Government Spending, and Private Sector Behavior," American Economic Review, Vol. 73 (1983), pp. 994-1010.

Kudlow, Lawrence A., Statement to the Committee on the Budget of the United States Senate, September 16, 1981.

Lal, Deepak and Sweder van Wijnbergen, "Government Deficits, the Real Rate and LDC Debt: On Global Crowding Out" (manuscript, July 1984).

Larsen, Flemming, and others, "International Economic Linkages," OECD Economic Studies No. 1, Paris (OECD, Autumn 1983), pp. 43-91.

Laumas, G.S. and W.D. McMillin, "Anticipated Fiscal Policy and Real Output," Review of Economics and Statistics, Vol. 66 (August 1984), pp. 468-471.

Layard, R., et al., "Europe: The Case for Unsustainable Growth," Report of the CEPS Macroeconomic Policy Group, Economic Paper No. 31, Commission of the European Communities (April 1984).

Lucas, Robert E., Jr., "Econometric Policy Evaluation: A Critique," in Karl Brunner and Allan H. Meltzer (editors), The Phillips Curve and Labor Markets, Carnegie-Rochester Conference Series on Public Policy, Vol. 1 (North-Holland, 1976).

Makin, John H., "Real Interest, Money Surprises, Anticipated Inflation and Fiscal Deficits," The Review of Economics and Statistics, Vol. 65 (August 1983), pp. 374-384.

_____ and Vito Tanzi, "The Level and Volatility of Interest Rates in the United States: The Role of Expected Inflation, Real Rates, and Taxes" NBER Working Paper No. 1167 (July 1983).

Mascaro, Angelo and Allan H. Meltzer, "Long- and Short-Term Interest Rates in a Risky World," Journal of Monetary Economics, Vol. 12 (November 1983).

Masson, Paul and Adrian Blundell-Wignall, "Fiscal Policy and the Exchange Rate in the Big Seven: Transmission of U.S. Government Spending Shocks." Paper prepared for the International Seminar on Macro-Economics, Perugia, Italy, June 1984.

Masson, Paul, and Peter Richardson, "Exchange Rate Expectations and Current Balances in the OECD INTERLINK System" (manuscript, OECD, December 1983).

McElhattan, Rose, "On Federal Deficits and Their Economic Impact," Federal Reserve Bank of San Francisco Economic Review, (Summer 1982).

McMillin, W.D. and G.S. Laumas, "The Sectoral Effects of Anticipated and Unanticipated Policy Actions," (manuscript, 1984).

Mehra, Yash, "The Tax Effect, and the Recent Behaviour of the After-Tax Real Rate: Is it Too High?" Federal Reserve Bank of Richmond Economic Review, Vol. 70 (July/August 1984), pp. 8-20.

Miller, Preston J., "Examining the Proposition That Federal Budget Deficits Matter," in Laurence H. Meyer (editor), The Economic Consequences of Government Deficits (Kluwer-Nijhoff, 1983).

Motley, Brian, "Real Interest Rates, Money and Government Deficits," Federal Reserve Bank of San Francisco Economic Review, (Summer 1983).

Muller, Patrice and Robert W.R. Price, "Structural Budget Deficits and Fiscal Stance," OECD Working Paper No. 15 (July 1984).

Muller, Patrice and Robert Price, "Public Sector Indebtedness and Long-Term Interest Rates." Paper prepared for the World Bank/Brookings Institution Seminar on the International Consequences of Budgetary Deficits and the Monetary-Fiscal Policy Mix in the OECD, September 1984.

Musgrave, John C., "Fixed Reproducible Tangible Wealth in the United States," Survey of Current Business, Vol. 64 (August 1984), pp. 54-57.

Oudiz, Gilles and Jeffrey Sachs, "International Policy Coordination in Dynamic Macroeconomic Models," NBER Working Paper No. 1417 (August 1984).

Penati, Alessandro and Michael Dooley, "Current Account Imbalances and Capital Formation in Industrial Countries, 1949-81," IMF Staff Papers, Vol. 31 (March 1984), pp. 1-24.

Pigott, Charles, et al., "Estimating the Inflationary Effects of Exchange Rate Changes" (manuscript, January 1984).

Plosser, Charles I., "Government Financing Decisions and Asset Returns," Journal of Monetary Economics, Vol. 9 (May 1982).

Price, Robert W.R. and Jean-Claude Chouraqui, "Public Sector Deficits: Problems and Policy Implications," OECD Economic Outlook: Occasional Studies (June 1983).

Protopapadakis, Aris and Jeremy J. Siegel, "Government Debt, the Money Supply, and Inflation: Theory and Evidence for Seven Industrialized Economies" (manuscript, June 1984).

Ridler, D. and C.A. Yandle, "A Simplified Method for Analyzing the Effects of Exchange Rate Changes on Exports of a Primary Commodity, IMF Staff Papers, Vol. 19 (November 1972).

Roley, V. Vance, "Asset Substitutability and the Impact of Federal Deficits," in Laurence H. Meyer (editor), The Economic Consequences of Government Deficits (Kluwer-Nijhoff, 1983).

Sachs, Jeffrey and Warwick McKibbin, "Macroeconomic Policies in the OECD and LDC External Adjustment," paper prepared for the World Bank/ Brookings Institution Seminar on the International Consequences of Budget Deficits and the Monetary-Fiscal Policy Mix in the OECD, September 1984.

Sachs, Jeffrey and Charles Wyplosz, "Real Exchange Rate Effects of Fiscal Policy," NBER Working Paper No. 1255 (January 1984).

Sargent, Thomas J., "Interpreting Time Series," Journal of Political Economy, Vol. 89 (April 1981), pp. 213-248.

Sargent, Thomas J. and Neil Wallace, "Some Unpleasant Monetarist Arithmetic," Federal Reserve Bank of Mineapolis Quarterly Review, (Fall 1981).

Shafer, Jeffrey R. and Bonnie E. Loopesko, "Floating Exchange Rates After Ten Years," Brookings Papers on Economic Activity, Vol. 1, 1983, pp. 1-70.

Sinai, Allan and Peter Rathjens, "Deficits, Interest Rates, and the Economy," statement to the Finance Subcommittee on Telecommunications, Consumer Protection, and Finance of the U.S. House of Representatives, April 14, 1983.

Spencer, Roger W. and William P. Yohe, "The 'Crowding Out' of Private Expenditures by Fiscal Policy Actions," Federal Reserve Bank of St. Louis Review, Vol. 52 (October 1970), pp. 12-24.

Stevens, Guy V.G., et al., The U.S. Economy in an Interdependent World: A Multicountry Model, Board of Governors of the Federal Reserve System, Washington (1984).

Swoboda, Alexander K., "Exchange Rate Regimes and U.S.-European Policy Interdependence," IMF Staff Papers, Vol. 30 (March 1983), p. 75-102.

Symansky, Steven A. and Richard D. Haas, "Alternative Financial Strategies: The Results of Some Policy Simulations with the Multi-Country Model," International Finance Discussion Paper No. 235, Board of Governors of the Federal Reserve System, Washington (December 1983).

Tanner, Ernest, "An Empirical Investigation of Tax Discounting," Journal of Money, Credit and Banking, Vol. 11, No. 2 (May 1979).

Tanzi, Vito, "The Deficit Experience in Industrial Countries," International Monetary Fund, (DM/85/10, 2/11/85).

Tatom, John A., "A Perspective on the Federal Deficit Problem," Federal Bank of St. Louis Review, Vol. 66 (June/July 1984), pp. 5-17.

Tobin, James, Asset Accumulation and Economic Activity, Chicago (The University of Chicago Press, 1980).

Tobin, James and Willem Buiter, "Fiscal and Monetary Policies, Capital Formation, and Economic Activity," in George M. von Furstenberg (editor), The Government and Capital Formation (Ballinger, 1980).

U.S. Board of Governors of the Federal Reserve System, "FRB Multicountry Model: Version of August 1983," Washington (1983).

U.S. Congress, Congressional Budget Office, "The Economic and Budget Outlook: An Update" (August 1984).

_____, "The Economic and Budget Outlook: Fiscal Years 1986-1990" (February 1985).

U.S. Council of Economic Advisers, Annual Report (February 1984).

U.S. Office of Management and Budget, Budget of the United States Government: Fiscal Year 1986 (February 1985).

U.S. Treasury Department, Office of the Assistant Secretary for Economic Policy, "The Effects of Deficits on Prices of Financial Assets: Theory and Evidence" (March 1984).

Wyplosz, Charles, "International Aspects of the Policy Mix in Six OECD Countries," paper prepared for the World Bank/Brookings Institution Seminar on the International Consequences of Budgetary Deficits and the Monetary-Fiscal Policy Mix in the OECD (September 1984).

Yandle, C.A., "Using the Commodity Method for Analyzing the Effects of Exchange Rate Changes: Some Considerations," in Peter B. Clark, Dennis E. Logue, and Richard James Sweeney (editors), The Effects of Exchange Rate Adjustments, U.S. Treasury Department (Washington, D.C., 1974).

Yoshitomi, Masaru, "The Insulation and Transmission Mechanisms of Floating Exchange Rates Analyzed by the EPA World Econometric Model," paper presented at the EPA International Symposium on "The Mechanism for Tranmission of and Insulation from Economic Disturbances under Floating Exchange Rates - Comparisons between Theories and Multipliers of the EPA World Econometric Model," in Tokyo, March 13-15, 1984.