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INTERNATIONAL REPERCUSSIONS OF THE U.S. BUDGET DEFICIT

by

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I. Introduction

The U.S. fiscal expansion that has been phased in over the past three years and the associated widening of the U.S. government budget deficit have been the subject of considerable international debate. On the one hand, the expansion has fueled a vigorous U.S. recovery from the 1982 recession and provided a significant stimulus to other countries. At the same time, the widening U.S. fiscal deficit has been cited as the major factor underlying high U.S. real interest rates and a strong dollar. It is argued that other major industrial countries, faced with downward pressure on their own currencies (and its potentially inflationary consequences), have been compelled to keep their own interest rates high, creating a significant drag on their own recoveries. Moreover, the strong dollar and the relative strength of the U.S. recovery have led to an unprecedented and probably unsustainable U.S. current account deficit.

The purpose of this paper is to provide a quantitative assessment of the international repercussions of the U.S. fiscal policy changes that have taken place since 1981. The policy changes include changes in the tax law, embodied in the Economic Recovery Tax Act of 1981 and the Tax Equity and Fiscal Responsibility Act of 1982, and changes in defense and nondefense spending. The analysis is undertaken with the Federal Reserve Board staff's Multicountry Model (MCM). It focuses on the relatively short-run (3-4 year) demand-side effects of these fiscal policy changes, partly because the MCM is best suited for analysis over this horizon, and partly because much of the debate to date has centered on these effects. The longer-run supply-side implications are not addressed, largely because of the difficulties involved in capturing these effects in the model.

Where possible, the MCM simulations are reviewed in light of results obtained with other models. Blinder (1983) and Cohen and Clark (1984) have simulated the effects of the Reagan Administration's fiscal program (or parts of it) on the U.S. economy using several different large U.S. macro models. Masson and Blundell-Wignall (1984) and Yoshitomi (1983) have simulated the transmission of U.S. fiscal shocks to other major industrial countries, using a simplified version of the OECD's interlink model and the Japanese Economic Planning Agency's World Econometric Model, respectively. The present study differs from these earlier efforts in that it considers the international transmission effects of the specific U.S. fiscal policy changes of the past three years. It also considers the effects of the U.S. fiscal shift under alternative assumptions about monetary policy in the United States and in other countries.

The paper is organized as follows. The next section provides an overview of the MCM and describes some of its important properties in comparison to those of other macro models. The major limitations to simulation analysis of the international effects of U.S. fiscal shocks are also reviewed. Section III then outlines the alternative policy scenarios and how they are implemented in the model. This section includes a description of the major changes in U.S. fiscal policy since 1981 and a brief review of monetary policy and the behavior of U.S. and foreign interest rates during this period. The latter review is undertaken to establish the basis for a range of assumptions about how U.S. and foreign monetary policy changed as a result of the fiscal expansion. The MCM simulation results are presented in Section IV, and a summary and conclusions are given in Section V.

II. The Model

This section gives an overview of the MCM and compares its important properties to other macro models. Because of the central role that exchange rates play in international repercussions of a U.S. fiscal shock, considerable attention is given to the exchange rate determination process used for the simulations in this paper. Some of the limitations of the model for this type of analysis are mentioned at the end of the section.

The MCM is a linked system of macroeconomic models of 5 major industrial countries plus abbreviated sectors for OPEC and the rest of the world.[1/] The U.S. model contains roughly 100 behavioral equations and 300 endogenous variables, while the models for Japan, Germany, the U.K. and Canada are each about two-thirds as large. The other sectors are much smaller, basically determining income, prices and bilateral trade flows.

Income in the industrial countries is effectively demand-determined in the short run in a Keynesian IS-LM framework. Expenditures on consumption, investment, imports and exports are all determined behaviorally. Government purchases are assumed to be exogenous in real terms, while taxes and transfers are treated endogenously. The monetary sector in the U.S. model is similar to that in the Federal Reserve Board staff's MPS model, in that the interest elasticity of money demand is relatively low. This yields a steep LM curve and significant "crowding-out" of private investment in the case of a fiscal expansion without monetary accommodation. That is, the fiscal expansion raises nominal GNP and the demand for money; with a fixed money supply, interest rates must rise to equilibrate the money market, and the rise in interest rates depresses private spending. While the MCM shares the MPS model's property of a relatively steep LM curve, private spending is less sensitive to interest rates in the MCM, so that crowding-out for a fiscal shock is less severe than in the MPS model.[2/] In the MCM's non-U.S. sectors, money demand is effectively more interest-elastic and crowding-out is less severe than in the U.S. sector.

Domestic prices are determined, from the supply side, as a markup over average costs, which are derived from a three-factor Cobb-Douglas production function that includes capital, labor and imported inputs. The markup is a function of capacity utilization. Supply is highly price-elastic in the MCM in the short run, as price expectations are adaptive and wages and prices tend to be sticky in the short run. Thus the near-term inflationary effects of a fiscal expansion are moderate, particularly when output is below potential. The MCM shares this property with most other large U.S. macro models.[3/] The short-run price effects can vary noticeably, however, depending upon the behavior of exchange rates, which directly affect the price of imports. This is particularly true for the smaller and more open countries modeled in the MCM.

Exchange rates among the major industrial countries in the MCM are treated endogenously. In the current version of the MCM, exchange rates are determined by factors affecting international asset demands, including relative interest rates, expected relative prices and wealth variables.[4/] Exchange rates are also directly influenced by current account flows, which affect both wealth and expectations about the equilibrium real exchange rate in the long run. During the past two years, the model has predicted a sharp drop in the dollar as the U.S. current account deficit has widened. This decline in the dollar has failed to materialize, either because factors not captured in the model have more than offset the influence of the current account, or because the historical relationship between exchange rates and current accounts have shifted, or both. Moreover, in simulating the effects of a U.S. fiscal expansion, the model shows only a small transitory positive impact on the dollar, because current accounts move in a direction that offsets the effects of changes in interest rates on the exchange rate. Since the present analysis focuses on a period when current accounts appear not to have been a significant factor influencing exchange rates, the MCM's exchange rate determination process has been altered to cut the links between current accounts and exchange rates. Nevertheless, many analysts believe that the U.S. current account deficit will eventually have a substantial negative impact on the dollar, and we will return to this point later.

The exchange rate relationship employed for the simulations reported below is derived from an open interest parity condition, following Isard (1982) and Shafer and Loopesko (1983). The expected appreciation of the home currency over the time horizon γ (in years) is assumed to equal the differential between foreign and home interest rates that span the same horizon:

(1) $$s_t^e - s_t = \gamma(i_t^* - i_t)$$

where s_t = log of the spot exchange rate (foreign currency ÷ home currency) in period t

s_t^e = expected value of s γ years ahead

i_t= log of 1 plus annual rate of interest on home bonds with a term to maturity of γ years

i_f^* = log of 1 plus annual rate of interest on foreign bonds with term of γ years.

(Note that (1) holds only as a logarithmic approximation of the expected percentage change in s.)

The expected future value of s depends on expected relative prices and the expected value of the real exchange rate, q_t^e, γ years ahead:

(2) $$s_t^e = p_t^{*e} - p_t^e + q_t^e$$

where all variables are expressed as logarithms. Equation (2) can be rewritten in terms of current price levels and expected inflation rates:

(3) $$s_t^e = p_t^* + \gamma\pi_t^{*e} - (p_t + \gamma\pi_t^e) + q_t^e$$

where p_t^* and p_t are the logs of foreign and home price levels in period t and π_t^{e*} and π_t^* are the logs of 1 plus the expected average annual rates of foreign and home inflation over the horizon γ. The right hand side of (3) can be substituted for s_t^e in (1) and the result rearranged to obtain:

(4) $$s_t - p_t^* + p_t = q_t^e + \gamma(i_t - \pi_t^e - i_t^* + \pi_t^{*e})$$

which expresses the log of the real exchange rate as a function of the expected real exchange rate and the real interest rate differential.

We are left with the task of explaining q_t^e. To greatly simplify the analysis, the horizon γ is assumed to be long enough for q_t to return to a constant long run equilibrium value, $\overline{q}$, following a shock to the system. Implicit in this assumption is some finite-horizon price-adjustment process. That is, prices adjust slowly but fully over the finite horizon γ following a shock.[5/] Thus, equation (4) becomes:

$$(5) \qquad s_t - p_t^* + p_t = \overline{q} + \gamma(i_t - \pi_t^e - i_t^* + \pi_t^{*e})$$

where the real exchange rate is expressed as a function of a constant term and the long term interest differential. Note that this relationship holds only for a unique long-term horizon. For shorter horizons, q_t^e is not constant and γ takes a different (smaller) value. This point will be considered again below.

We turn now to empirical implementation of equation (5). This is done using both long-term interest rates (as dictated by the theory underlying the equation) and short-term interest rates (as dictated by constraints in the MCM noted below). The assumption under which short-term interest rates can be substituted for long-term rates will also be noted.

A measure of the dollar's real exchange rate and two measures of the U.S.-foreign real interest differential are plotted in Chart 1 using quarterly data. The exchange rate is the Federal Reserve Board's multilateral-trade-weighted index of the dollar's value against ten major currencies. This index has been divided by the ratio of U.S. consumer prices to a consistently weighted average of consumer price indexes in the ten foreign countries. The interest differential in the top half of the chart is the U.S. 10-year government bond yield minus a weighted average of 5-10 year (depending upon data availability) government bond yields in the other ten countries. The real interest differential has been approximated by subtracting from the nominal differential the difference between a three-year centered moving average of the U.S. CPI inflation rate and a similar moving average of an index of inflation rates for the ten foreign countries.[6/] The short term real interest differential shown in the bottom half of Chart 1 was constructed in the same fashion, using 3-month commercial paper or interbank interest rates and, as a proxy for inflation expectations, 4-quarter moving averages of CPI inflation rates.

As is evident from the chart, the quarter-to-quarter relationship between the real exchange rate and real interest differentials varies considerably, particularly for the more volatile short term interest differentials. However, the longer-term swings in the dollar's real exchange rate index clearly followed the longer-term movements in both interest differentials. Peak-to-trough changes over two major swings during the floating rate period are shown in the top half of Table 1. Over these two periods, the dollar's real exchange rate index moved, on average, by approximately 5-1/2 percent for every 1 percent change in the long term real interest differential (100 x .28 ÷ 5.1), and by 3 percent for every 1 percent change in the short term differential (100 x .28 ÷ 9.1). As shown in the bottom half of Table 1, these estimates are consistent with the results of linear regressions of equation (5) above using the data in Chart 1. The regressions yielded coefficients of 5.9 and 3.7 on the long-term and short-term interest differentials, respectively.[7/]

The estimated relationship with the long term interest differential implies a 6-year expectations horizon (i.e., $\gamma = 5.9$). This is less than the 10-year horizon that would be consistent with the 10-year interest rates employed. But it is probably within reasonable tolerance limits, given that: 1) the proxies for inflation expectations used in calculating the long-term real interest differential are crude at best, 2) some of the foreign interest rates pertain to securities with less than 10 year maturities, and 3) possible distortions in the interest parity condition (due to tax differences across countries, etc.) were not taken into account.

Unfortunately, long-term interest rates are not adequately modeled in all of the MCM countries. The short-term interest differential can be substituted for the long-term interest differential under the strong assumption that the relationship between the two is stable over time. The results of a regression of the long-term real interest differential against a constant and the short-term real interest differential are given at the bottom of Table 1. This yields a coefficient of .5. That is, the long-term differential changes by half as much as the short-term differential, on average. (Lags on the short-term interest differential were also tested, but yielded coefficient estimates that were not significantly different from zero.) This term structure relationship is not particularly stable (it fails a Chow test with the sample split at 1978). But the coefficient of .5 is at least consistent with the relative magnitudes of the estimated coefficients on long-term and short-term interest differentials in the first two (real exchange rate) equations at the bottom of Table 1. That is, the real exchange rate responds by half as much to a change in the short-term interest differential as it does to a change in the long-term differential.

In principle γ should equal .25 when 3-month interest rates are used. However, equation (5) holds q_t^e constant at a level ($\overline{q}$) that is not necessarily consistent with its expected value three months ahead. In the context of a 6-year price adjustment horizon, for example, a term-structure of expected future real exchange rates can be defined in which expectations about the real exchange rate 3-months ahead may adjust almost as much as the current real rate in the event of a shock, whereas long-term expectations are tied down by an assumed constant $\overline{q}$. Had q_t^e been allowed to vary when short-term interest rates were used in equation (5), a coefficient much closer to .25 would have been obtained. By holding q_t^e constant, equation (5) using short-term interest rates becomes an approximation of the long-term relationship. In this case, the estimated coefficient on the short-term interest differential is a combination of the long-run horizon γ and the term-structure relationship between the short-term and long-term interest differentials.

Based on the above results, equation (5) was used to determine each of the bilateral exchange rates against the dollar, with a coefficient of 3.0 on the short term interest differential. This is based on an assumed value of γ equal to 6.0, and a term-structure coefficient of .5. Each of the bilateral rates was modeled the same way (for example, the real yen/dollar rate was expressed as a function of the U.S.-Japanese short-term real interest differential with a coefficient of 3.0, etc.) to insure cross-rate consistency.[8/]

This model is admittedly based on strong assumptions. To recap, it assumes a constant long-run equilibrium real exchange rate and stable interest rate term structures. Moreover, the possible "portfolio balance" effects of a fiscal expansion on exchange rates are not allowed for. That is, bonds denominated in different currencies are implicitly assumed to be perfect substitutes, so that an increase in the supply of dollar-denominated bonds associated with a debt-financed U.S. fiscal expansion does not directly affect the exchange rate. It is worth noting that significant empirical support for imperfect substitutability, based on structural models, has yet to be found.[9/] Moreover, as indicated in Chart 1, if anything, this simple model underpredicts the strength of the dollar during 1982-83. Allowing for possible portfolio-blance effects of the U.S. fiscal expansion during that period would cause the model to underpredict by an even wider margin.

Before turning to a description of the policy measures to be simulated, several other potential limitations of the model for this type of simulation analysis should be mentioned. First, with expectations treated adaptively, the effects of a fiscal policy shift do not depend on whether or not that shift is anticipated. Moreover, the structure of the model and its parameters are assumed to be unaffected by the shift in policy (the Lucas critique). Blinder (1983) has cast considerable doubt on the empirical importance of this point. His analysis suggests that the predictions of several large U.S. macro models following the recent fiscal shock were not significantly biased by the absence of rational expectations in those models.

Second, the supply side of the MCM is not yet well developed, and the model is not ideally suited to quantifying the longer-run supply-side effects of a fiscal shock. For this reason the present analysis focuses on the shorter-run demand-side effects of the fiscal policy changes. Finally, the MCM does not yet model financial flows to and from nonoil developing countries. While the focus of the analysis below is on foreign industrial countries, keep in mind that the model does not fully capture the implications of changes in interest rates for debt problems of and trade flows to developing countries.

III. Policy Assumptions

This section is divided into three parts. The first describes the major fiscal policy changes of the past three years and how they are implemented in the model. The second describes the stance of U.S. monetary policy during this period and considers how it might have differed in the absence of the fiscal policy changes. The third considers two alternative monetary policy reactions in other major industrial countries that could have taken place in response to the U.S. fiscal shift.

U.S. Fiscal Program

The important fiscal policy changes since 1981 that are addressed in this exercise include the major reductions in federal personal tax rates and effective federal corporate tax rates, increases in defense spending and reductions in the growth of nondefense spending.

The tax reductions were initially implemented by the Economic Recovery Tax Act of 1981 (ERTA). The major provisions of this act were:

--Reductions in personal tax rates: 5 percent beginning in the fourth quarter of 1981 and 10 percent beginning in the third quarters of both 1982 and 1983, for a total cut of 23 percent. Also, beginning in 1985 the personal exemptions will be indexed to consumer price inflation.

--An accelerated cost recovery system (ACRS) that substantially reduces the depreciable life of business investments, allowing for faster depreciation write-offs and sharply reducing the effective tax rates on earnings from new investments.

--A number of special incentives for personal savings, such as liberalization of IRA's and KEOGH plans.

ERTA was followed by the Tax Equity and Fiscal Responsibility Act of 1982 (TEFRA), which effectively recouped some of the revenue losses of the earlier act. TEFRA included a number of special provisions, such as instituting withholding on interest and dividend payments, strengthening compliance provisions, and modifying deductions for medical expenses and casualty losses, etc.

The combined effects of these two acts and several lesser pieces of legislation on both individual and corporate tax revenues have been estimated in considerable detail by the Bureau of Economic Analysis.[10/] An aggregation of these estimates is given in the top row of Table 2.[11/] These estimates were based on actual historical income and prices and the Administration's projections through 1985, without taking into account the effects of the tax changes on those variables. They provide a basis for estimating the net effects of the tax legislation on the aggregate tax rate parameter in the MCM U.S. model. The aggregate tax equation in the U.S. model contains the following tax shift equation:

$$T' = t_0 + t_1 \cdot T$$

where T is baseline aggregate tax revenues, t_0 is a constant shift parameter and t_1 is an average tax rate shift parameter. The tax rate shift parameter, t_1, which normally takes a value of 1.0, was set equal to 1.0 minus the ratio of the tax reductions (shown in Table 2) to total tax revenues. T' equals T in the baseline, when no tax shifts are assumed.

The tax shift also affected the user cost of capital in the private investment sector. The ACRS measures in ERTA had the effect of reducing the user cost of capital for producer durable equipment by an estimated 1 percentage point, and that for nonresidential structures by 3 percentage points. It also raised the cost for rental housing by 1/2 percentage point. In addition, the reduction of personal tax rates had the effect of reducing the value of deductions for mortgage interest expenses, and thereby raising the user cost of capital for owner-occupied housing by an estimated 1 percent.[12/] These changes were implemented in the model through exogenous shifts in investment expenditure, using the coefficient on the aggregate user cost of capital term in U.S. sector's investment equation.

Estimates of the changes in real federal spending are also given in Table 2. These are based on Blinder's (1983) estimates[13/] which, in turn, are based on a comparison of Wharton's projection of federal spending made in mid-1983 with its projection made in late 1980.

The difference in defense purchases about offsets the difference in nondefense purchases, while exogenous transfers and grants in aid showed a sizeable net decline. These estimates were implemented directly in the MCM as exogenous shifts in real government purchases and transfers. The net first-round effect of the tax and spending changes on the budget deficit amounts to about a $75 billion increase by 1984.

U.S. Monetary Policy

The simulated effects of the U.S. fiscal expansion on interest rates, and therefore on exchange rates and the rest of the world, depend importantly upon assumptions that are made about the underlying stance of monetary policy. Unfortunately, making judgements about how U.S. monetary policy would have differed in the absence of the fiscal expansion is frought with difficulty. After the shift in monetary operating procedures announced in October 1979, the Federal Reserve placed particular emphasis on specific monetary growth targets. However, in recent years financial innovations have substantially increased the usual difficulties involved in monetary targeting. The introduction and rapid growth of several new monetary instruments led to erratic behavior in the aggregates and greatly complicated the interpretation of their growth rates relative to the announced targets. These innovations have coincided with the shift in fiscal policy, making it difficult to isolate any possible response of monetary policy to the fiscal shift.

The target ranges and actual growth rates of M1 and M2 over the past few years are shown in Table 3. The growth of M1 was particularly erratic, as movements in that aggregate were distorted by shifts of funds into NOW accounts and other interest-bearing checkable deposits, as well as shifts of funds out of M1 into money market deposit accounts (MMDA's). Because of these distortions, in 1982 the FOMC explicitly deemphasized M1 as an operating guide to monetary policy in favor of broader aggregates. M2 growth has been less erratic, but it too was distorted in the first half of 1983 by a rapid shift into new MMDA's. The Federal Reserve has estimated that about one fifth of the $360 billion shift into MMDA's during this period came from outside M2.[14/] After allowing for this $72 billion shift into M2 due to financial innovation, M2 growth over the fiscal expansion period (beginning in the fourth quarter of 1984) was within its 6-9 percent target range.

One interpretation of these developments is that money growth was not affected by the fiscal expansion, since with some allowance for the effects of financial innovation, M2 was kept within its target range. This M2 path was still above the midpoint of the target range, however, and a more stringent interpretation might be that any growth above the midpoint reflected some degree of monetary accommodation of the fiscal expansion. While this more stringent interpretation assumes an unrealistically fine degree of control over the aggregates (as well as an unrealistically precise notion of the target), it does allow us to illustrate the sensitivity of the results to a plausible alternative monetary policy stance.[15/]

The simulations reported in the next section are therefore run under two alternative U.S. monetary policy assumptions. One, labeled "nonaccommodative", assumes that the U.S. fiscal expansion was accompanied by no change in money growth. In this case, U.S. money growth was held to its actual historical path when the fiscal shock was imposed. The second, labeled "partial accommodation", assumes that the fiscal expansion was accompanied by an increase in money growth equal to the difference between the actual M2 growth path (minus the $72 billion structural shift into MMDA's in early 1983) and the midpoint of a 6-9 percent target range for the period 1981-85. Under this assumption, the fiscal shock was accompanied by a 2-1/2 percent increase in the money stock above its historical baseline path between the fourth quarter of 1981 and the first quarter of 1984.

Monetary Policy Abroad

Monetary policy reaction functions in the MCM vary across the different countries in the model. Canadian authorities are assumed to tie their interest rates to U.S. interest rates as a matter of policy, while Germany is assumed to target central bank money, and the U.K. and Japan are assumed to use the central bank's discount rate to affect market interest rates directly. Under these assumptions, foreign interest rates (other than Canada's) for the most part move independently of U.S. rates in the case of a U.S. fiscal shock.

As an alternative to the MCM's working assumptions about monetary policy abroad, the simulations reported in the next section were also run under the assumption that all four countries pegged their interest rates to U.S. rates in order to limit the depreciations of their currencies against the dollar. The evidence on the degree to which foreign interest rates actually did move with U.S. rates beginning in late 1981 is mixed. U.S. short-term and long-term rates compared with those of each of the four other MCM industrial countries are illustrated on the next 4 charts. Canadian rates clearly moved with U.S. rates; German and U.K. rates declined with U.S. rates during 1982; thereafter, as U.S. rates rose in 1983 and early 1984, German rates rose slightly, but U.K. rates continued to fall. Japanese rates were relatively flat, declining slightly throughout the period. It is difficult to say exactly how the non-Canadian foreign rates might have differed in the absense of the U.S. fiscal shock. While interest rates in these countries do not appear to have moved closely with U.S. rates since 1982, they may still have been significantly higher than they would have been in the absence of the U.S. fiscal shock. Nevertheless, the actual outcome is likely to be encompassed within the relatively wide range of foreign monetary policy assumptions chosen for the simulations.

IV. Simulation Results

As outlined in the previous section, four simulations have been run. Each involves the same combined U.S. tax and spending shock, and a different U.S. or foreign monetary policy assumption. The four scenarios are outlined in Table 4. In the first simulation, U.S. monetary policy is not accommodating (M1 growth is held to its actual historical path) and foreign interest rates are not linked to U.S. rates as a matter of policy (except for Canada).[16/] In the second, U.S. monetary policy is partially accommodating--the stock of M1 is increased by 2-1/2 percent over the period from fall 1981Q4 to 1984Q1. The third and fourth simulations involve, respectively, the first and second U.S. monetary policy assumptions, but with changes in short-term interest rates in the other MCM countries assumed to be tied to changes in U.S. rates by the monetary authorities in those countries.

The results of the four simulations are reported in Tables 5-9, respectively. Each table gives impacts on GNP, consumer prices, interest rates, exchange rates, trade balances and current accounts in each of the five MCM countries. The results are all given in terms of either percentage or level deviations from a model control path.[17/] The discussion that follows refers to these tables. It begins with a description of the impacts on the U.S. economy, then compares these impacts with results obtained in other studies, and finally discusses the foreign repercussions.

U.S. Impacts

In the absence of U.S. monetary accommodation and with foreign interest rates unlinked to U.S. rates, the impact on U.S. real GNP reaches 2.2 percent above control by 1983 (refer to the bottom section of Table 5). Thereafter the GNP effect diminishes as crowding-out occurs. With fixed money growth, the stimulus to nominal income and money demand causes short-term interest rates to rise by 2 percentage points. Besides crowding out domestic investment, the rise in interest rates leads to an appreciation of the dollar of about 9 percent, on average, against the major foreign currencies in nominal terms, and roughly 8 percent in real terms.

The appreciation of the dollar, in turn, has two important effects on the U.S. economy. First, by reducing import prices, it offsets the domestic inflationary impact of the fiscal expansion, so that the consumer price level and inflation rate rise very little. In fact, U.S. inflation falls slightly in 1982, as the dollar appreciation initially dominates the inflationary effect of the expansion. The appreciation, along with the higher U.S. growth, also eventually contributes to more than a $20 billion decline in the U.S. trade balance and a $30 billion decline in the current account (both at annual rates). The decline in real net exports strengthens the crowding-out of GNP. The decline in the current account amounts to nearly half of a simulated $65 billion increase in the U.S. government budget deficit by mid-1984.[18/]

With partial monetary accommodation (Table 6), U.S. interest rates rise only half as much as they do without accommodation, so that less crowding out takes place. As a result the impact on GNP is more than one percentage point greater, reaching a peak of nearly 3-1/2 percent by 1983. The dollar appreciates by less than one-third as much (by 2-1/2 percent in nominal terms), and the CPI inflation rate is increased, on average, by about 1/2 percentage point at an annual rate from 1983 to 1985. The smaller dollar appreciation eventually reduces the decline in U.S. external balances by several billion dollars, more than offsetting the increase in imports due to higher GNP. The net increase in the budget deficit by mid-1984 is reduced by $15 billion, to $50 billion, as higher GNP raises tax revenues, and lower interest rates reduce interest payments on the national debt.

When foreign interest rates are pegged to U.S. rates, (Tables 7 and 8), the stimulus to U.S. GNP is increased by 1/4 to 1/2 percentage point by 1983, but then is reduced slightly by 1985. With foreign interest rates rising in line with U.S. rates, the dollar no longer appreciates. In fact, it actually depreciates slightly as U.S. inflation rises (and real interest rates fall) relative to foreign inflation (and real rates). This raises U.S. real net exports initially. Eventually, the decline in income offsets the exchange rate stimulus to U.S. net exports. The lower dollar contributes further to the higher U.S. inflation rate during 1983-85. And it eventually reduces the impact of the fiscal shock on the external deficits by $5-10 billion, relative to the case where foreign interest rates are not pegged to U.S. rates.

Comparison with other U.S. Models

Blinder (1983) has reported the results of simulations with several U.S. models which involved roughly the same fiscal shock as discussed above, with no monetary accommodation. Blinder's results are given in Table 9, along with comparable MCM results. The MCM's peak impact on U.S. real GNP is about the same as that obtained with the DRI, MPS and Wharton models in Blinder's simulations, but the timing of the effects and degree of crowding out differ substantially from the other models. Neither Wharton (WEFA) nor DRI show crowding-out effects, and the positive effects on GNP grow relatively slowly, reaching a peak of about 2 percent by 1989. The MPS simulation peaks at a slightly lower level (1-3/4 percent), but at the same time as the MCM (1983). However, GNP declines much more sharply thereafter in the MPS simulation, since crowding-out effects are stronger in that model (as discussed in Section II). This result is consistent with the comparative MCM-MPS simulations reported by Cohen and Clark (1984).

Both the WEFA and DRI models show negligible impacts on domestic prices--even lower than the MCM's estimate. The MPS model, however, shows more than a 1 percentage point increase in the inflation rate during 1983-85. The MPS inflationary impact is substantially higher than the MCM impact, largely because the dollar depreciates in the MPS simulation--due to the rise in the current account deficit--and pushes up import prices.

It is clear that one can get very different results with different models. Some show greater and quicker crowding-out effects; others show much smaller and slower effects. To the extent that one believes the fiscal expansion contributed to the current U.S. cyclical recovery, the MCM pattern appears to coincide at least as well as other models with the actual pattern of U.S. GNP growth during this period. The GNP effect peaks in 1983, when the recovery from the 1982 recession began, and remains strong through mid-1984 when U.S. growth continued at a brisk pace. The MCM's timing is not exact, as the simulated growth stimulus began in 1982, when actual U.S. GNP was still declining. But in the DRI model, for example, the rise in GNP appears to come well after the acceleration of actual GNP during 1983-84, and in the MPS model crowding out is stronger during the rapid growth period, 1983-84, than in the MCM.

The MCM probably does differ significantly from other models in the process of exchange rate determination assumed for these simulations. The other models generally assume that expansion of the U.S. trade or current account deficit would tend to depress the dollar. This connection has been deliberately removed from the MCM for purposes of the relatively short-run analysis presented here, because the dollar has continued to rise despite the emergence of a record U.S. current account deficit during the past two years. Many observers believe the dollar eventually will fall, and the assumption made here might not be the most plausible for a longer-run simulation.

Foreign Repercussions

The impacts of the U.S. fiscal expansion abroad differ substantially across countries. This is especially noticeable in the first two simulations, in which foreign interest rates (except Canada's) were not tied to U.S. rates. In Canada, interest rates were assumed to rise in line with U.S. rates, and in the absence of U.S. monetary accommodation (Table 5) the rise in interest rates depresses the level of Canadian GNP by about 1 percent in 1984 and half again as much in 1985. For Canada, the combined effect of reduced domestic spending (due to higher interest rates) and reduced net exports to non-U.S. countries (due to the appreciation of the Canadian dollar against non-dollar currencies), more than offset the effects of higher U.S. GNP and increased Canadian exports to the United States. With partial U.S. monetary accommodation (Table 6), interest rates rise less, and the U.S. fiscal shock results in roughly a 1/2 percent increase in Canadian GNP by mid-1984. The impact on Canadian inflation follows the impact on aggregate demand (it falls when GNP falls, etc.), as the Canadian dollar remains about unchanged in real terms.

The German, Japanese and U.K. results show quite a different picture. Interest rates in these countries are not linked to U.S. rates and their monetary policies are effectively at least partially accommodating. As shown in Table 5, real GNP is 2 to 2-1/2 percent higher in Germany and Japan by 1984, and 3-1/2 percent higher in the United Kingdom. It is perhaps surprising that the U.S. fiscal expansion should raise GNP in these countries proportionately more than it raises U.S. GNP. This can be explained by several factors. Most of the initial stimulus to German, Japanese and U.K. GNP is through increased exports, to both the United States and to other countries stimulated by the U.S. expansion. The growth of net exports in these countries is stimulated significantly further by the real depreciation of home currencies against the dollar (whereas U.S. real net exports are depressed by the dollar's rise). Also, crowding out is much less severe in these countries, as monetary policy is assumed to be more accommodating than in the United States.

The depreciations of home currencies against the dollar, initially induced by the increase in U.S. interest rates relative to foreign domestic interest rates, also lead to significant increases in domestic prices abroad. The level of Japanese consumer prices increased by 1.2 percent over the simulation period, the level of German prices by 2.4 percent and the level of U.K. prices by over 4 percent. These price level effects involve transitory increases in inflation rates ranging from 1/2 to 1 percent (at annual rates) over the simulation period. The impact on prices in these countries is large relative to that in the United States, partly because exchange rate effects and aggregate demand effects are working in the same direction rather than in offsetting directions. Home currency depreciations against the dollar and resulting increases in import prices augment the inflationary effect of increased aggregate demand. In addition, monetary policies in these countries are effectively more accommodating than in the United States in this simulation, and their economies are relatively more open. The rise in domestic prices leads to some "vicious circling"--particularly noticeable for the United Kingdom--as higher prices lead to lower exchange rates, which feed back to even higher prices, and so forth.

U.S. monetary accommodation (Table 6) actually reduces the effect of the fiscal expansion on GNP in these countries, although it remains significantly positive. This is largely because the smaller rise in U.S. interest rates yields a substantially smaller depreciation of home currencies against the dollar, with a correspondingly smaller stimulus to net exports. The smaller depreciations also yield a noticeably lower impact on domestic inflation in these countries.

The impacts of the U.S. fiscal expansion on Germany, Japan and the United Kingdom change dramatically when these countries are assumed to peg changes in their interest rates to changes in U.S. rates. Whether or not the United States follows a partially accommodating monetary policy, the impact on real GNP in these three countries is moderately positive initially and then turns moderately negative. (See Tables 7 and 8.) The eventual negative impact on the level of GNP is generally less than 1 percent. The impact on domestic prices also changes direction, becomming slightly negative. This is due in part to the eventual reduction of real GNP and in part to slight appreciations of home currencies against the dollar.

When foreign interest rates are pegged to U.S. rates, the effects of a change in assumptions about U.S. monetary policy are small, but the direction of the effects is opposite to that observed when foreign rates are not pegged. Partial U.S. monetary accommodation (Table 8) now results in slightly larger increases (or smaller declines) in GNP in the other countries, as compared with the effects in the absense of U.S. accommodation (Table 7). This is because exchange rates change much less in the pegged case, so that the net positive GNP effects of the smaller rise in interest rates under U.S. accommodation is not offset by the negative effects of a greater appreciation of home currencies against the dollar.

Some perspective for these results is provided by simulations run with other linked models. Yoshitomi (1984) has reported the effects of an increase in U.S. government spending equal to 1 percent of real GNP, based on simulations with the Japanese Economic Planning Agency's (EPA) World Model. He assumes U.S. monetary policy is non-accommodating and interest rates in other countries are not linked to U.S. rates. His results (summarized in the top half of Table 10) are qualitatively similar to those reported in Table 5 for the MCM. U.S. real GNP rises and then is crowded out gradually, though more gradually than in the MCM. The increase in GNP in other countries eventually exceeds the increase in U.S. GNP. The dollar appreciates in the EPA simulations, contributing to the positive impact on GNP in other countries. However, it appreciates less than in the MCM simulation because current accounts influence exchange rates in the EPA model.

Masson and Blundell-Wignall have simulated the effect of a $50 billion (at 1982 prices) reduction in U.S. government spending using a simplified version of the OECD's Interlink system, "Minilink". The purpose of their analysis was partly to illustrate the effect of forward-looking expectations (as compared with static expectations) about interest rates and exchange rates in the simulations. (Price expectations were assumed to be adaptive in both cases.) They also assumed that monetary policy was non-accommodating, with all countries following the same exogenous money growth target.

The impact on U.S. GNP under static expectations (given in the bottom half of Table 10) shows a gradual "crowding-out" effect on U.S. real GNP. This effect is accelerated in the forward-looking (rational) expectations case. With rational expectations and identical money growth targets, interest rates in other countries tend to move in line with U.S. interest rates. GNP in other countries moves in the same direction, although the impacts were generally smaller than for the United States. (The impacts on other countries were reported only for the rational expectations case.) It is perhaps surprising, in light of the MCM results, that the OECD simulations show GNP in the non-U.S.

countries moving as much as it does. The MCM simulations with interest rates abroad tied to U.S. rates suggest that GNP in other countries would have moved (at least slightly) in the opposite direction to U.S. GNP.

Finally, the Masson and Blundell-Wignall results suggest that the absence of forward-looking expectations may not have been a significant drawback in the MCM. If anything, this would have accelerated the crowding-out effects in the MCM, so that the simulated increase in U.S. growth would have led the actual GNP expansion by a wider margin than it did.

V. Summary and Conclusions

This paper has analysed the effects on the economies of major industrial countries of the net expansionary fiscal policy changes undertaken in the United States since 1981. The measures considered contributed about $75 billion to the increase in the structural U.S. budget deficit. The analysis was based on simulations with the Federal Reserve Board Staff's Multicountry Model (MCM).

The simulated impacts on the U.S. economy were found to be within the relatively wide range of results obtained with several other large U.S. models, and possibly more in line than others with the actual pattern of U.S. GNP growth in recent years. Under the assumption of a nonaccommodating U.S. monetary policy, the fiscal expansion raised U.S. GNP by about 2 percent, after which the impact declined as private spending was crowded out by higher interest rates and net exports were crowded out by a higher dollar. U.S. interest rates rose by about 2 percentage points and the dollar appreciated by about 10 percent at most. The simulated increase in U.S. GNP was achieved at very little cost in terms of higher U.S. inflation in the short run, partly because the dollar appreication depressed import prices.

If U.S. monetary policy was partially accommodating, with interest rates rising about half as much, the impact on GNP was somewhat greater, while the dollar rose much less and inflation was somewhat higher. In either case, the U.S. current account deficit was eventually increased by about $30 billion. These results suggest that the U.S. fiscal expansion can explain some of the U.S. recovery, the dollar's appreciation, and the rise in the current account deficit, but the fiscal expansion falls short of fully explaining any of these developments.

The simulated impacts on four other major industrial countries varied considerably, depending upon what was assumed about monetary policy reaction functions in these countries. If interest rates were tied to U.S. rates to avoid home currency depreciation against the dollar (and its inflationary consequences), real GNP in Canada, Germany, Japan and the United Kingdom was reduced by the U.S. fiscal expansion. The reduction would have been moderate (generally by less than 1 percent) in all but Canada.

If monetary policies were less restrictive, and home interest rates had been largely unaffected by the rise in U.S. rates, the simulations suggest that real GNP in these countries would have been as much as 2-3 percent <u>higher</u> by 1984 as a result of the U.S. fiscal expansion. But the level of domestic prices also would have been raised by 2-3 percent. The positive effect on GNP could be overstated somewhat, inasmuch as the effects of higher interest rates on exports to debt-burdened developing countries were not taken into account explicitly in these simulations. Nevertheless, simulations reported by other multicountry modelers tend to confirm the results obtained here. Indeed, analysis undertaken with the OECD's "Minilink" model suggests that the U.S. fiscal expansion would have resulted in an increase in GNP in other industrial countries even if their interest rates had risen with U.S. rates.

A review of the behavior of actual interest rates since late 1981 was undertaken; the evidence on the degree of linkage of foreign interest rates to U.S. rates was mixed. Canadian rates were clearly tied closely to U.S. rates. However, Japanese and U.K. rates appeared to move in directions opposite to U.S. rates for much of the period. The behavior of German rates was somewhere between these two extremes. This leads one to the conclusion that the U.S. fiscal expansion did not, in general, result in a significant decline in real GNP abroad (with the exception of Canada). Indeed, it appears to have been a source of some net stimulus to these countries.

Finally, the simulation results suggest that the behavior of exchange rates was a significant factor underlying the quantitative estimates of foreign repercussions. In particular, real depreciations of other currencies against the dollar when interest rates were not pegged to U.S. rates provided an important stimulus to the net exports and GNP's of these countries. All simulations were run under the assumption that the substantial widening of the U.S. current account deficit as a result of the U.S. fiscal expansion would not influence the dollar over the relatively short-run horizon of the analysis. A sharp drop in the dollar in response to the U.S. current account deficit would significantly diminish the estimated positive effect of the U.S. fiscal expansion on real growth abroad.

TABLE 1

Relationship Between the Dollar's Real Exchange Rate
and Real Interest Differentials

Major Changes over Floating Rate Period

	Log of Real Exchange Rate (Log Level)	Long Term Real Interest Differential (Percentage Points)	Short Term Real Interest Differential (Percentage Points)
Peak-to-Trough Change (1975-80)	-.17	-4.3	-8.7
Trough-to-Peak Change (1980-1983)	+.39	+5.8	+9.4
Average Absolute Change for two periods	.28	5.1	9.1

Regression Results
(Estimated period 1974Q2 - 1983Q4)

Dependent Variable	Estimated Coefficients */			$\bar{R}^2$	D.W.
	Constant	L-T Real Int. Diff.	S-T Real Int. Diff		
Log of Real Exchange Rate (x100)	457. (.9)	5.9 (.5)	-	.80	.70
Log of Real Exchange Rate (x100)	453. (1.9)	-	3.7 (.8)	.31	.39
Long Term Real Interest Differential	-.8 (.3)	-	.5 (.2)	.24	.25

*/ Standard errors in parentheses.

Table 2

Estimated Tax Revenue and Spending Effects of Changes in U.S. Fiscal Policy Since 1981.

	1981	1982	1983	1984	1985
Tax Revenues					
(billions of current dollars)	-8.0	-40.3	-80.0	-101.3	
Spending					
(billions of 1972 dollars)					
Nondefense Purchases	-	-	-1.8	-3.7	-5.7
Defense Purchases	-	-	1.9	4.0	6.2
Transfers and Grants	-	-	-7.6	-12.5	-17.4
Total (billions of current dollars)	-	-	-16.1	-27.5	-40.0
Budget Deficit					
(billions of current dollars)	8.0	40.3	63.9	73.8	

Source (Tax revenues): Wakefield and Ziemer (1984), Table 7, pp. 12-14.

(Spending): Blinder (1983), Table 1, p. 13a; estimate of total spending in current dollars was derived by multiplying Blinder's constant dollar estimates by the MCM's baseline GNP deflator. Unemployment benefits are not included in the estimates for transfers and grants.

Table 3

Growth of U.S. Monetary Aggregates 1979 - 1984

(Fourth quarter to fourth quarter percent changes, unless otherwise specified)

	M1		M2	
	Target Range	Actual	Target Range	Actual
1980	4 - 6-1/2	7.4	6 - 9	9.0
1981	6 - 8-1/2	5.1	6 - 9	9.3
1982	2-1/2 - 5-1/2	8.7	6 - 9	9.6
1983	4 - 8	10.0	7 - 10*	5.9* (12.1)
1984	4 - 8	5.7**	6 - 9	6.4**

*Target and actual growth from February - March 1983 to the fourth quarter of 1983; the number in parenthesis is actual growth for 1982Q4 - 1983Q4.

**Actual growth 1983Q4 - 1984Q2 at an annual rate.

Source: Federal Reserve Bulletin, various issues.

Table 4

Policy Settings for Alternative Simulations

Simulation Run

	Sim. 1 (Table 5)	Sim. 2 (Table 6)	Sim. 3 (Table 7)	Sim. 4 (Table 8)
U.S. Fiscal Policy				
Tax Cuts and Spending Changes Described in Section III.	X	X	X	X
U.S. Monetary Policy				
Non Accommodating	X		X	
Partially Accommodating		X		X
Monetary Policy Abroad				
Interest Rates Unlinked	X	X		
Interest Rates Linked to U.S. Rates			X	X

Table 5

Foreign Interest Rates not Linked to US Rates
No M1 Accomodation
(Shock minus Control)*

	1982	1983	1984	1985
Canada				
GNP(%)	.1	-.2	-.9	-1.4
CPI(%)	-.0	-.1	-.3	-.8
Interest Rate	1.2	2.0	1.9	1.7
Exch. Rate(%)	-.2	-.1	.4	1.0
Trade Balance	1.2	2.1	2.1	2.0
Cur Ac Balance	.6	.3	-.5	-1.2
Germany				
GNP(%)	.5	1.7	2.6	2.3
CPI(%)	.7	1.9	2.1	2.4
Interest Rate	.0	.1	.1	.1
Exch. Rate(%)	-6.3	-11.2	-7.0	-7.4
Trade Balance	-1.7	.7	3.9	.8
Cur Ac Balance	-1.0	1.3	4.0	.8
Japan				
GNP(%)	.6	1.8	2.2	2.3
CPI(%)	.5	.9	1.0	1.2
Interest Rate	.0	.1	.1	.1
Exch. Rate(%)	-6.1	-7.2	-6.6	-5.6
Trade Balance	1.3	7.3	6.3	6.8
Cur Ac Balance	1.7	9.6	11.1	13.5
U.K.				
GNP(%)	.5	1.9	3.5	3.9
CPI(%)	.2	1.2	2.9	4.4
Interest Rate	.1	.1	.1	.1
Exch. Rate(%)	-4.3	-10.0	-12.1	-12.2
Trade Balance	-.1	.4	2.3	1.3
Cur Ac Balance	.9	3.5	7.6	7.5
U.S.				
GNP(%)	1.9	2.2	1.5	1.0
CPI(%)	-.2	-.2	.1	.2
Interest Rate	1.2	2.0	1.9	1.7
Exch. Rate(%)	5.3	8.9	7.4	7.2
Trade Balance	-11.8	-22.5	-19.6	-14.1
Cur Ac Balance	-15.2	-30.4	-29.7	-27.9

*Interest Rate Impacts in '00 Basis Points,
Trade and Current Account Balances in Billions of $US AR

Table 6

Foreign Interest Rates not Linked to US Rates
Partial M1 Accomodation
(Shock minus Control)*

	1982	1983	1984	1985
Canada				
GNP(%)	.4	.8	.4	-.2
CPI(%)	.1	.3	.5	.4
Interest Rate	.2	.8	1.2	.9
Exch. Rate(%)	-.1	-.2	.2	.6
Trade Balance	1.4	2.3	1.8	1.6
Cur Ac Balance	1.2	1.2	-.2	-.7
Germany				
GNP(%)	.4	1.1	1.5	1.2
CPI(%)	.1	.6	.9	1.0
Interest Rate	.0	.0	.0	.0
Exch. Rate(%)	-.9	-3.5	-2.9	-2.4
Trade Balance	.2	.5	1.1	.9
Cur Ac Balance	.8	1.3	1.8	1.4
Japan				
GNP(%)	.3	1.1	1.2	1.2
CPI(%)	.1	.4	.5	.4
Interest Rate	.0	.0	.0	.0
Exch. Rate(%)	-.7	-2.6	-2.3	-.6
Trade Balance	1.9	4.4	3.3	4.0
Cur Ac Balance	2.1	6.0	6.2	7.8
U.K.				
GNP(%)	.3	.9	1.3	1.2
CPI(%)	.0	.3	.7	1.1
Interest Rate	.0	.1	.1	.1
Exch. Rate(%)	-.7	-2.2	-3.1	-3.2
Trade Balance	.5	1.2	.8	.1
Cur Ac Balance	1.0	2.6	3.1	2.8
U.S.				
GNP(%)	2.3	3.4	2.2	1.4
CPI(%)	-.1	.1	.7	1.0
Interest Rate	.2	.8	1.2	.9
Exch. Rate(%)	.8	2.5	2.4	1.7
Trade Balance	-12.5	-23.7	-19.6	-12.1
Cur Ac Balance	-13.6	-28.5	-28.5	-23.8

*Interest Rate Impacts in '00 Basis Points,
Trade and Current Account Balances in Billions of $US AR

Table 7

Foreign Interest Rates Linked to US Rates
No M1 Accomodation
(Shock minus Control)*

	1982	1983	1984	1985
Canada				
GNP(%)	.1	-.3	-1.3	-2.0
CPI(%)	.0	.1	-.2	-.8
Interest Rate	1.5	2.9	2.8	2.3
Exch. Rate(%)	-.1	.2	1.0	1.9
Trade Balance	1.5	2.5	2.4	2.4
Cur Ac Balance	.7	.2	-1.0	-1.5
Germany				
GNP(%)	.3	.4	.1	-.3
CPI(%)	.0	-.1	-.3	-.1
Interest Rate	1.5	2.9	2.8	2.3
Exch. Rate(%)	-.2	1.5	3.0	.3
Trade Balance	.6	1.4	.1	-1.6
Cur Ac Balance	1.3	2.4	1.1	-.4
Japan				
GNP(%)	.1	-.2	-.7	-.6
CPI(%)	-.1	-.2	-.2	-.0
Interest Rate	1.5	2.8	2.7	2.3
Exch. Rate(%)	.2	1.4	2.1	.1
Trade Balance	1.9	2.5	1.3	.4
Cur Ac Balance	1.1	3.0	2.6	2.9
U.K.				
GNP(%)	-.0	-.2	-.6	-.6
CPI(%)	.	-.1	-.5	-1.1
Interest Rate	1.6	2.9	2.9	2.4
Exch. Rate(%)	.1	1.8	4.0	4.0
Trade Balance	1.0	2.2	1.4	-.2
Cur Ac Balance	1.8	3.7	3.0	1.3
U.S.				
GNP(%)	2.1	2.6	1.6	.8
CPI(%)	-.0	.3	.8	1.1
Interest Rate	1.5	2.9	2.8	2.3
Exch. Rate(%)	.0	-1.3	-2.6	-1.3
Trade Balance	-11.6	-19.0	-13.0	-5.0
Cur Ac Balance	-14.6	-27.7	-25.4	-20.5

*Interest Rate Impacts in '00 Basis Points,
Trade and Current Account Balances in Billions of $US AR

Table 8

Foreign Interest Rates Linked to US Rates
Partial M1 Accomodation
(Shock minus Control)*

	1982	1983	1984	1985
Canada				
GNP(%)	.4	.8	.3	-.4
CPI(%)	.1	.3	.6	.5
Interest Rate	.2	1.1	1.7	1.2
Exch. Rate(%)	-.1	-.0	.5	1.0
Trade Balance	1.4	2.5	2.0	1.8
Cur Ac Balance	1.2	1.2	-.3	-.9
Germany				
GNP(%)	.4	.8	.4	-.2
CPI(%)	.0	-.1	-.4	-.3
Interest Rate	.2	1.1	1.7	1.2
Exch. Rate(%)	-.2	1.9	4.6	1.9
Trade Balance	.6	1.7	.4	-1.9
Cur Ac Balance	1.1	2.5	1.4	-.7
Japan				
GNP(%)	.3	.4	-.2	-.3
CPI(%)	.0	-.2	-.2	-.1
Interest Rate	.2	1.1	1.7	1.2
Exch. Rate(%)	-.2	2.4	3.0	1.7
Trade Balance	2.0	3.1	.9	-.2
Cur Ac Balance	2.1	3.9	2.1	2.0
U.K.				
GNP(%)	.2	.3	-.4	-1.1
CPI(%)	.0	-.0	-.5	-1.3
Interest Rate	.2	1.2	1.8	1.3
Exch. Rate(%)	-.1	1.8	5.2	6.2
Trade Balance	.8	1.9	1.3	-.0
Cur Ac Balance	1.3	2.9	2.3	.2
U.S.				
GNP(%)	2.3	3.6	2.4	1.4
CPI(%)	-.0	.3	1.1	1.5
Interest Rate	.2	1.1	1.7	1.2
Exch. Rate(%)	.2	-1.7	-3.5	-2.6
Trade Balance	-12.4	-23.3	-17.5	-6.2
Cur Ac Balance	-13.4	-28.2	-27.4	-19.8

*Interest Rate Impacts in '00 Basis Points,
Trade and Current Account Balances in Billions of $US AR

Table 9

Impacts of U.S. Fiscal Expansion on U.S. Economy:

Model Comparisons

(% deviation from control)

Model	1983	1985	1987	1989
DRI				
Real GNP	0	.7	1.4	2.2
GNP deflator	-.3	-.3	-.1	.1
Wharton				
Real GNP	.9	1.3	1.4	1.8
GNP deflator	-.1	-.1	.1	.1
MPS				
Real GNP	1.7	.1	-4.8	NA
GNP deflator	.7	3.4	2.2	NA
MCM				
Real GNP	2.2	1.0	NA	NA
GNP deflator	-.2	.4	NA	NA

Source (DRI, Wharton, MPS): Blinder (1983), Table 2, p. 22a.

Table 10

U.S. Fiscal Shocks with Other Linked Models

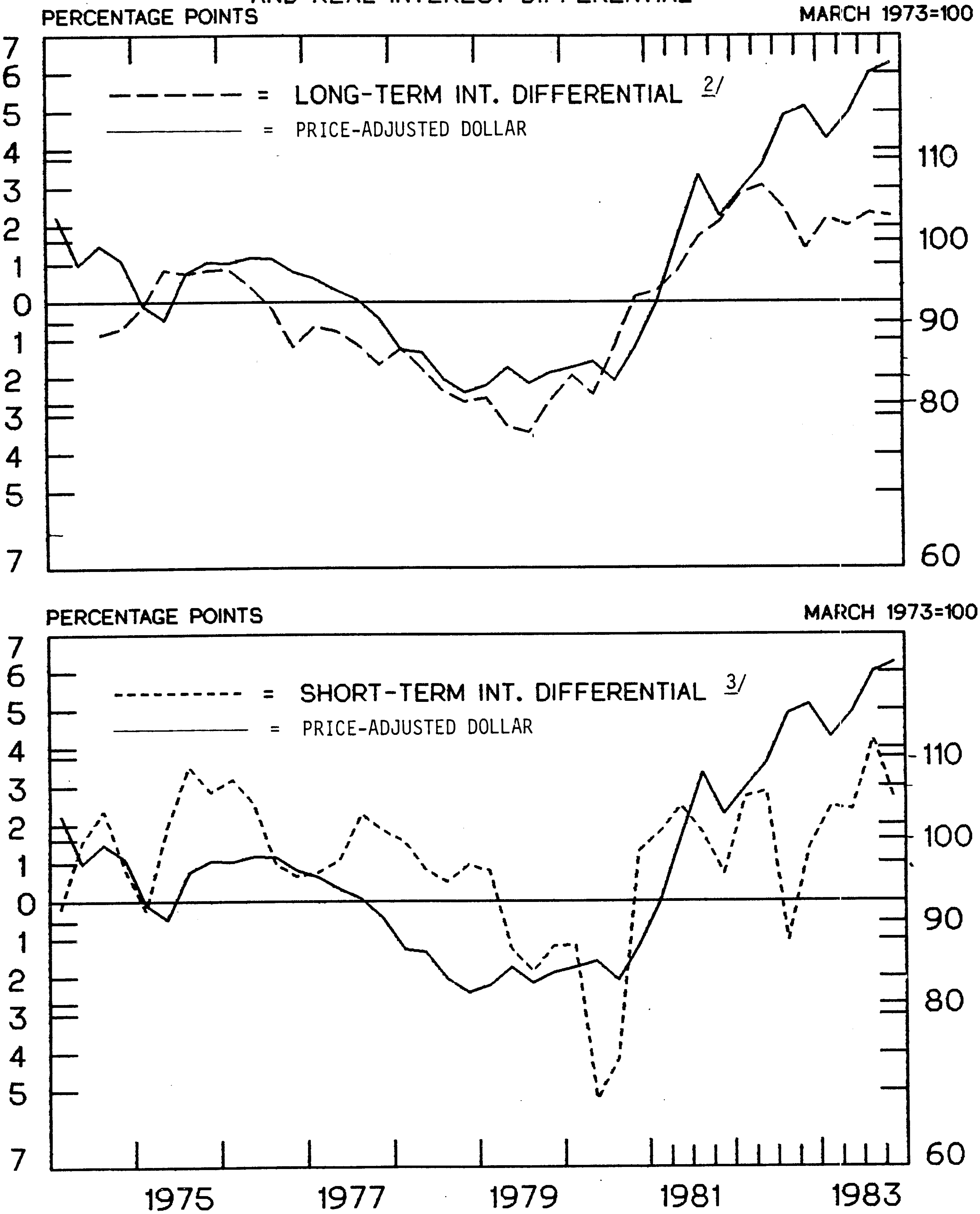
	Number of years after onset of shock					
1. EPA Model	1	2	3	4	5	6
(Increase in U.S. government equal to 1 percent of real GNP)						
Impact on:						
Canada GNP (%)	.5	1.6	1.0	-	-	-.4
Germany GNP (%)	.2	.6	1.0	-	-	1.8
Japan GNP (%)	.2	.6	.9	-	-	1.6
U.K. GNP (%)	.1	.6	1.0	-	-	2.6
U.S. GNP (%)	2.0	2.0	1.8	-	-	1.1
2. OECD MINILINK						
($50 billion (1982 dollars) reduction in U.S. government spending)						
Canada GNP (%)						
R*/	-.4	-.6	-.4	-.1	-.2	-
S						
Germany GNP (%)						
R	-.3	-.5	-.6	-.5	-.2	-
S						
U.K. GNP (%)						
R	-.3	-.7	-.8	-.8	-.7	0
S						
U.S. GNP (%)						
R	-1.6	-1.0	-.8	-.7	-.7	-
S	-2.1	-2.0	-1.8	-1.7	-1.7	-

*/ "R" refers to rational expectations simulations and "S" to static expectations.

Source:
EPA: Yoshitomi (1984), Table 8-A.
OECD: Masson and Blundell-Wignall, Table 4, p. 32 and Table 7, p. 33.

CHART 1

DOLLAR'S REAL EXCHANGE RATE [1/]
AND REAL INTEREST DIFFERENTIAL



(Footnotes on next page.)

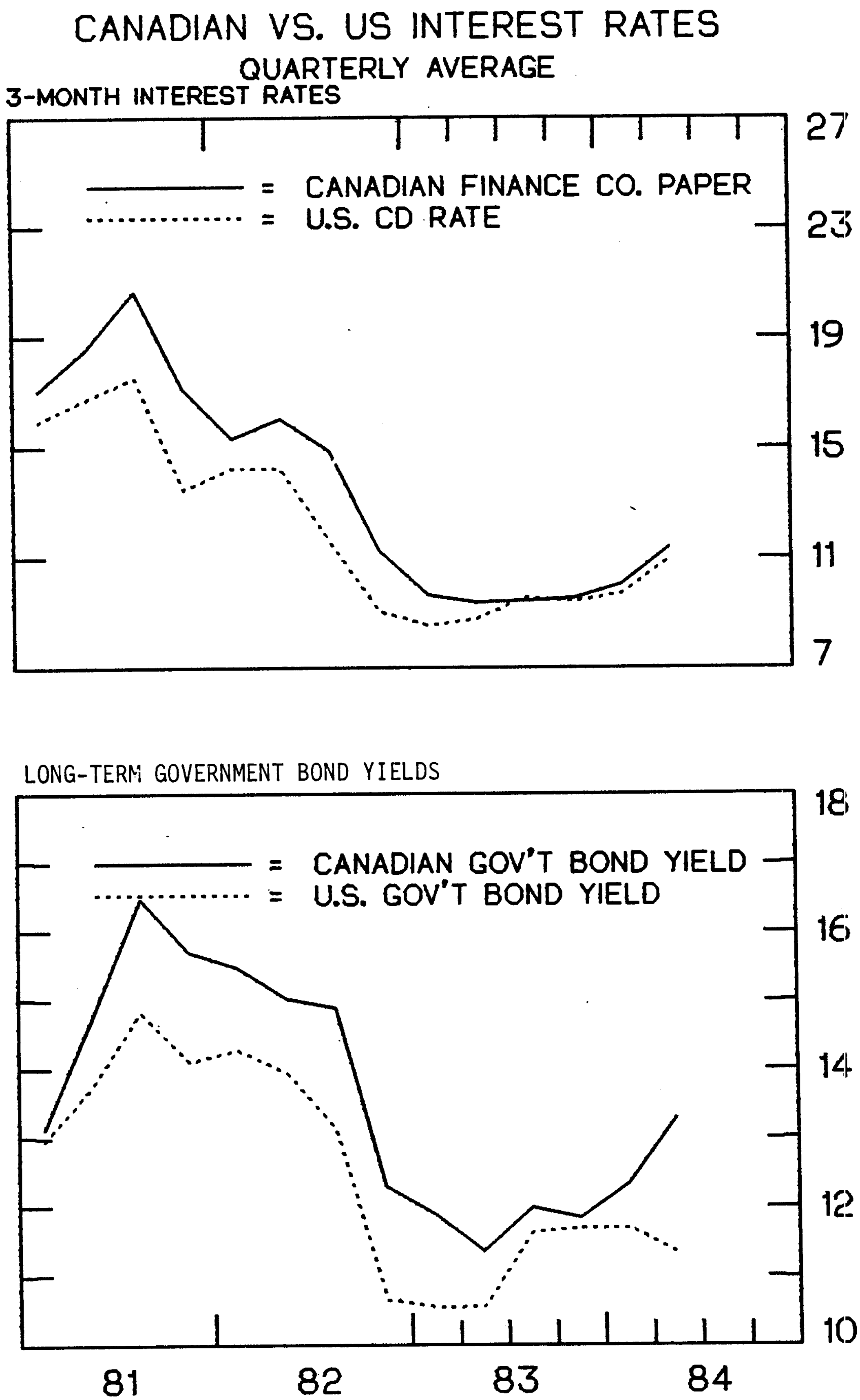
FOOTNOTES TO CHART 1

1/ All data are quarterly averages. The price-adjusted dollar is the Federal Reserve Board's weighted average index of the exchange value of the dollar against the currencies of the foreign Group-of-Ten countries plus Switzerland, where nominal exchange rates are multiplied by relative levels of consumer price indexes. Weights are proportional to each foreign country's share in world exports plus imports during 1972-1976.

2/ Long-term real U.S. interest rate minus weighted average of long-term real foreign-country interest rates, based on weights described in note 1. The long-term real interest rate for each country is a Government bond yield or nearest equivalent minus an assumed measure of inflation expectations constructed as a 12-quarter centered moving average of changes in the country's consumer price index.

3/ Short-term real U.S. interest rate minus weighted average of short-term real foreign-country rates based on weights described in note 1. The short term real interest rate for each country is a 3-month commercial paper or interbank rate or nearest equivalent, minus an assumed measure of inflation expectations constructed as a 4-quarter moving average of changes in the country's consumer price index.

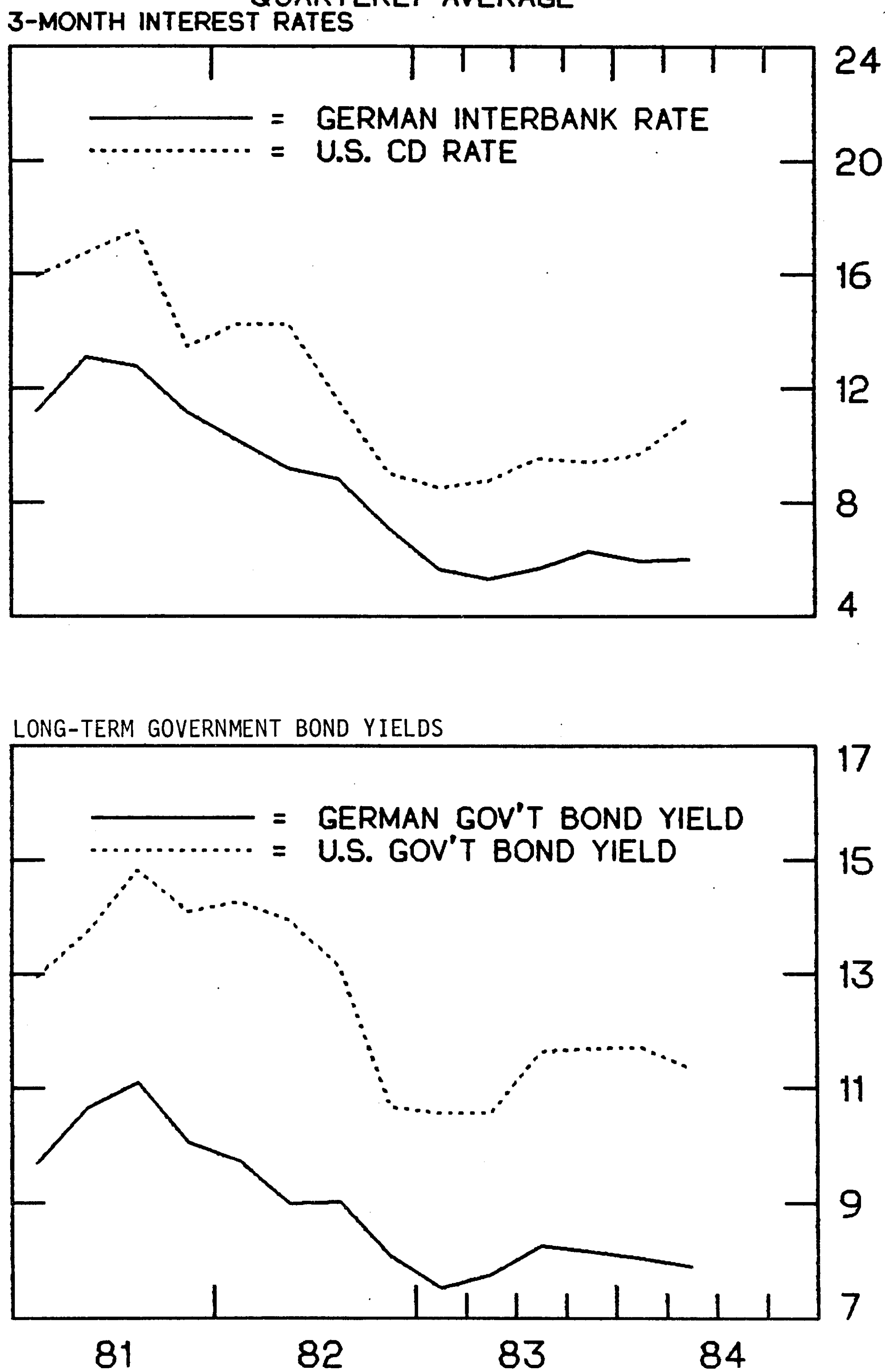
CHART 2



SOURCE: FRB MACRO DATA LIBRARY

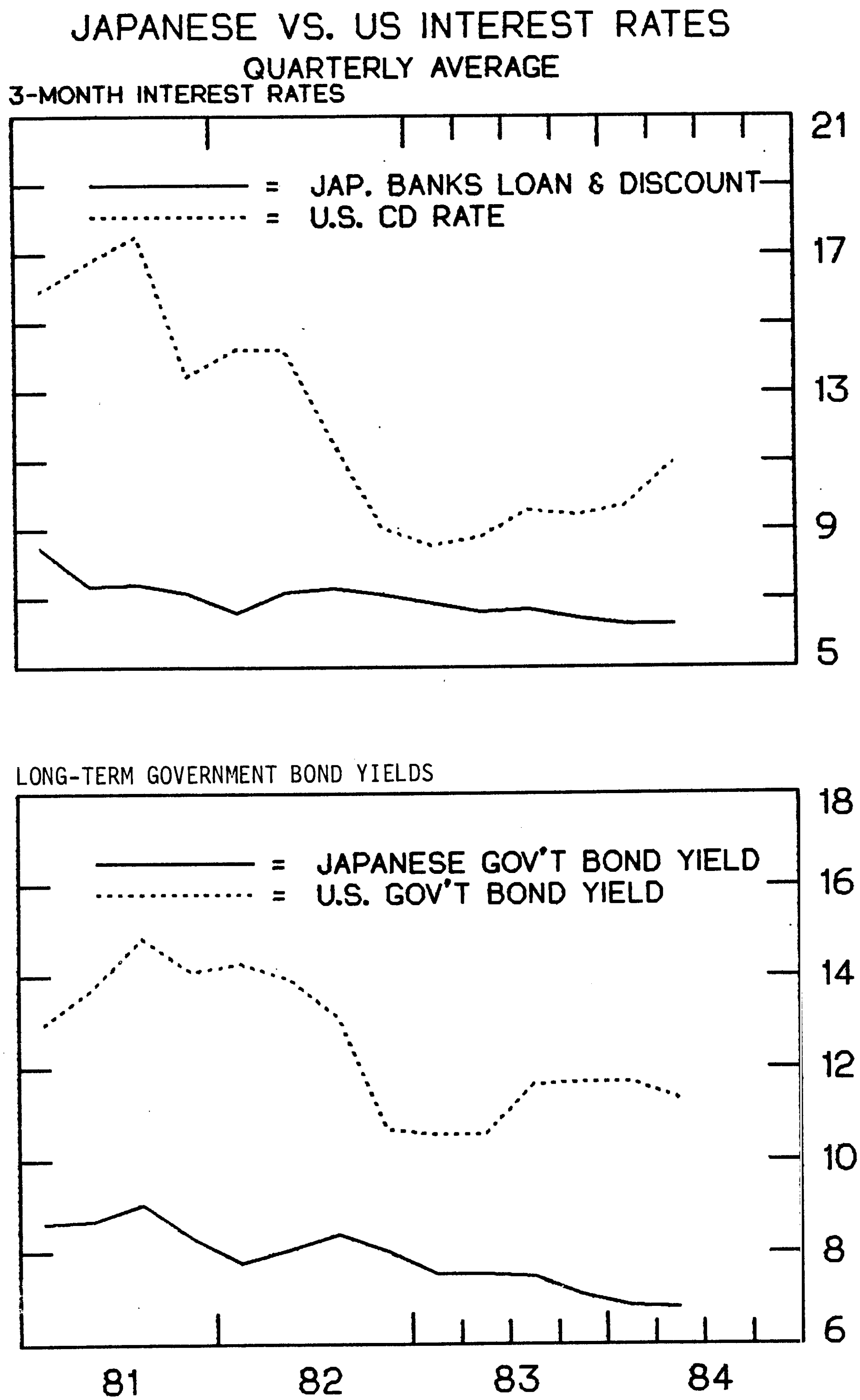
CHART 3

GERMAN VS. US INTEREST RATES
QUARTERLY AVERAGE



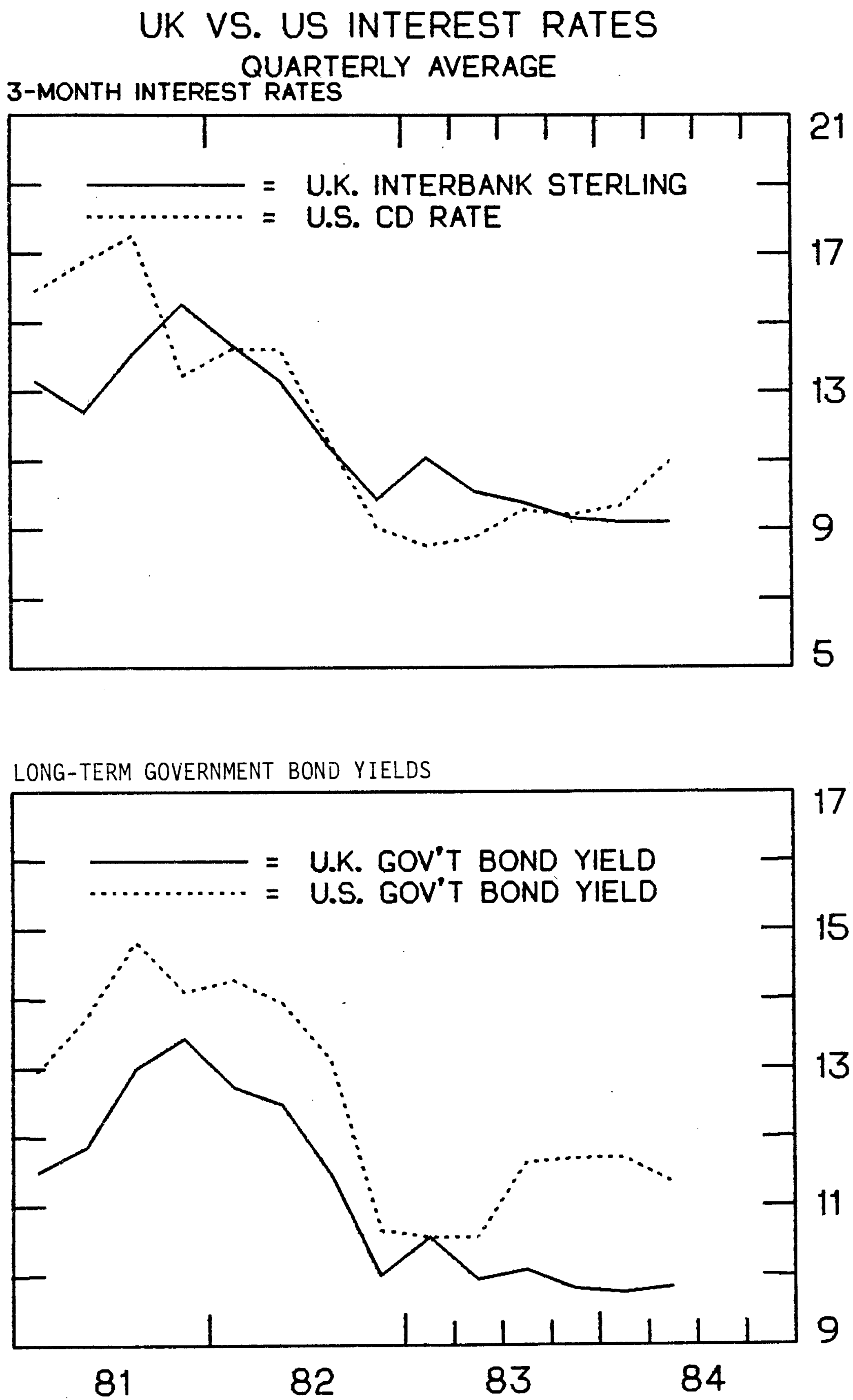
SOURCE: FRB MACRO DATA LIBRARY

CHART 4



SOURCE: FRB MACRO DATA LIBRARY

CHART 5



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Footnotes

*/ The author has benefitted from discussions with a number of his colleagues at the Federal Reserve Board. Helpful comments on earlier drafts were provided by Peter B. Clark, Hali Edison, Dick Freeman, Dale Henderson, Bonnie Loopesko, Jaime Marquez, Caryl McNeilly, Larry Promisel, Ken Rogoff, Guy Stevens and Steve Symansky. Sean Doyle made a significant contribution in running and tabulating the simulations, and Kathy Krasney in typing the several drafts. The views expressed here are the author's and do not necessarily reflect those of the Federal Reserve Board or other members of its staff. Any errors that remain are the author's responsibility.

1/ The stucture of the MCM is described in detail in Stevens, et. al. (1984). Its more recent simulation properties are analysed in Haas and Symansky (1983).

2/ The LM curves in the MPS and MCM U.S. models appear to be significantly steeper than in other large U.S. macro models. The DRI and Whartons models, for example, exhibit noticeably less crowding out, especially after three to four years, as reported by Blinder (1983), pp. 24-25. However, results reported by Hickman (1983), pp. 25-26, suggest that the DRI model exhibits significantly stronger crowding-out of private investment than the MCM and MPS models within one to two years after the fiscal shock, possibly reflecting a substantially greater interest-elasticity of investment demand in the short run.

3/ These include models maintained by the Department of Commerce's Bureau of Economic Analysis, Chase Econometrics, Data Resources Incorporated, the University of Michigan, Wharton and the MPS model. See Hickman (1983), pp. 22-25.

4/ The exchange rate determination process used in the original and current versions of the MCM are described in Hooper, et. al. (1983).

5/ In principle, to complete the analysis an explicit price adjustment rule should be developed. This rule would have to yield a term structure of expected future real exchange rates that is consistent with the term structure of real interest differentials, given a constant long run equilibrium value of q and a finite expectations horizon γ. For now I shall assume that such a rule does exist and that it is embedded implicitly in the model presented. The derivation of an explicit rule is left to future research.

6/ The foreign interest rates and inflation rates are weighted the same as the exchange rate index (by shares of each of the 10 countries in the total world trade of these countries). The three-year moving averages of inflation rates are centered at the current quarter, so that they range from six quarters in the past to six quarters in the future. The centered moving average serves as a proxy for inflation expectations that incorporates both forward-looking and adaptive features. A purely adaptive proxy (moving average of past rates only) yields a very similar picture. See Hooper (1983) for a further discussion of this and other proxies.

7/ The exchange rate equations in Table 1 suffer from a significant degree of serial correlation. Correction for an MA1 error process yielded about the same coefficient estimates and significantly reduced evidence of serial correlation.

8/ That is, for example, if a 1 percent change in the U.S.-Japanese interest differential is constrained to have the same impact on the \$/yen exchange rate that a 1 percent change in the U.S.-German interest differential has on the \$/DM exchange rate, changes in the German and Japanese interest rates will have the same effect (with opposite sign) on the yen/DM exchange rate.

9/ See Tryon (1983).

10/ See Wakefield and Ziemer (1984).

11/ The total shown in the Table differs from Wakefield and Ziemer's in that it excludes the effects of social security tax increases that had been passed prior to 1981 and the effects of proposed legislation that has not yet been passed.

12/ These estimates are based on calculations made by Eileen Mauskopf of the MPS model staff.

13/ Blinder did not provide an estimate for 1984; this has been interpolated from his 1983 and 1985 estimates.

14/ Federal Reserve Board, Annual Report, 1983, p.17.

15/ Some analysts have suggested that U.S. monetary policy was even more accommodating than indicated by this alternative assumption. Chouragni and Price (1984), for example, came to this conclusion based on the substantial increase in the growth of real U.S. M2 during 1982-83. Conversely, one might argue that in the absence of the fiscal expansion money growth targets would have been higher in order to keep nominal GNP from falling too far below a desired path.

16/ U.S. M1 is targeted rather than M2 in the MCM because of some difficulties involved in treating M2 exogenously in simulations. The rise in U.S. interest rates would have been slightly greater than reported below if M2 had been targeted.

17/ The control path was constrained to follow historical values of the model's endogenous variables through the first or second quarter of 1984 (depending on data availability). Thereafter, the model was constrained to forecast paths for key variables that were based on a recent Blue Chip survey of economic forecasts.

18/ The simulated impact on the budget deficit by 1984 is only slightly lower than the first-round effects given at the bottom of Table 1, as an induced rise in tax receipts due to higher income is nearly matched by a rise in interest payments on the national debt due to higher interest rates.

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