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THE U.S. EXTERNAL DEFICIT IN THE 1980s: AN EMPIRICAL ANALYSIS

by

William L. Helkie and Peter Hooper

Abstract

This paper presents an empirical analysis of the factors that contributed to the unprecedented widening of the U.S. external deficit between 1980 and 1986. The paper presents an empirical model of the U.S. current account that is used to assess the relative importance of changes in U.S. price competitiveness and changes in U.S. and foreign growth as determinants of the deficit. We find that while both factors were significant, the decline in U.S. competitiveness associated with the appreciation of the dollar was the dominant factor. The analysis is also pursued at a more fundamental level, using the results of various multicountry model simulations. We find that shifts in U.S. and foreign fiscal policy could account for over half of the widening of the deficit, but only part of the rise in the dollar. Given the importance of the dollar's appreciation to the widening of the deficit, we ask, finally, why the deficit (particularly in real terms) has been so slow to respond to the dollar's decline since early 1985. Several possible explanations are considered and we conclude that the delay can be attributed largely to normal lags in the response of trade prices and volumes to exchange rate changes. Moreover, the real net export deficit would have widened substantially further in the absence of the depreciation.

The U.S. External Deficit in the 1980s

An Empirical Analysis

by

William L. Helkie and Peter Hooper[1]

1. Introduction and Summary

This paper presents an empirical analysis of the factors that contributed to the unprecedented widening of the U.S. external deficit during the first half of the 1980s. The analysis is pursued at two levels. First, using a partial-equilibrium current account model we consider the relative importance of price competitiveness and comparative U.S. - foreign GNP growth as factors underlying the widening of the deficit. Then, at a more fundamental level, we draw on the results of international macroeconomic model simulations (obtained from a variety of different multicountry models) to consider the extent to which shifts in fiscal policies in the United States and other industrial countries contributed to the U.S. external deficit.

The results of the analysis indicate that the decline in U.S. price competitiveness associated with the appreciation of the dollar was the dominant partial-equilibrium factor underlying the widening of the deficit. Other factors, including a somewhat faster rate of growth in

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1. Paper prepared for January 1987 Brookings Workshop on the U.S. Current Account Imbalance. The views presented are the authors', and should not be taken to represent the views of the Board of Governors of the Federal Reserve System or other members of its staff. The paper benefits from comments and suggestions provided at international macroeconomic workshops at the Federal Reserve Board and the Department of Economics at MIT, as well as comments on earlier drafts by Ralph C. Bryant, David Howard, Paul Krugman, Catherine Mann, Larry Promisel and Edwin M. Truman. Michelle Link provide valuable research assistance.

the United States than abroad also contributed significantly. At the more fundamental level, both fiscal expansion in the United States and fiscal contraction abroad were significant causal factors (probably accounting for over half of the rise in the deficit), with the U.S. fiscal policy shift the more important quantitatively. According to the model simulations, however, shifts in fiscal policy leave much of the real appreciation of the dollar unexplained. One must either disagree with the models or appeal to factors in addition to shifts in fiscal policy that would have raised the relative attractiveness of dollar denominated assets and caused the dollar to appreciate. The effects of changes in monetary policy (beyond what is captured in interest rates) and various other factors affecting investor preferences and exchange market dynamics are obvious candidates but unfortunately are not readily quantifiable.

Given the importance of the decline in U.S. price competitiveness to the widening of the U.S. deficit, it is reasonable to ask why the U.S. deficit has been so slow to turn around following the dollar's sharp decline since early 1985. A number of explanations have been offered, including: 1) the dollar really hasn't declined much (if you take into account the currencies of developing countries), 2) the dollar really hasn't declined in real terms (against the yen in particular, if you take into account Japan's relatively high productivity growth in manufacturing), and 3) foreign firms have cut their profit margins and diminished the gain in price competitiveness to U.S. firms that the decline in the dollar would otherwise have produced.

Based on a review of available data we largely discount the first two explanations. The dollar has declined significantly in real terms against a basket of industrial country and developing country

currencies, and Japanese manufacturing unit labor costs in dollars have risen substantially faster than U.S. unit labor costs over the past year and a half. With respect to the third explanation, we have reviewed comparative export price data as well as cost data for the United States, Germany and Japan. (Over the first nine months of 1986 Germany's and Japan's current account surpluses combined amounted to about 75 percent of the U.S. deficit, and any significant reduction in the U.S. deficit is likely to involve a significant gain in price competitiveness against those two countries.) The data suggest that Japanese exporters may have been squeezing their profit margins, but that German exporters have not. Indeed, apparent gains in U.S. price competitiveness against German producers have kept pace with the dollar's depreciation against the mark.

Our own explanation for the delay in the response of the U.S. trade balance to the dollar's decline rests on:

1. Some normal transitory flexibility in the profit margins of foreign exporters -- on average over the past two decades, we find that exchange rates have influenced U.S. import prices with a total distributed lag of about eight quarters (although the mean lag may be considerably shorter).

2. Distributed lags of two years or more in the response of both import and export volumes to price changes (reflecting both recognition-response lags and order-delivery lags).

3. J-curve effects as import prices rise before import volumes fall.

4. The fact that the dollar's decline, which began in mid-March 1985, followed an equally sharp rise during 1984-early 1985.

Because of the lags involved, the continuing effects of the dollar's earlier rise appear to have offset gains due to the dollar's decline at least through mid-1986. Past empirical relationships suggested that U.S. real net exports would begin to respond positively to the depreciation sometime in the latter part of 1986, and that the nominal trade balance would begin to adjust (though less significantly) in 1987.

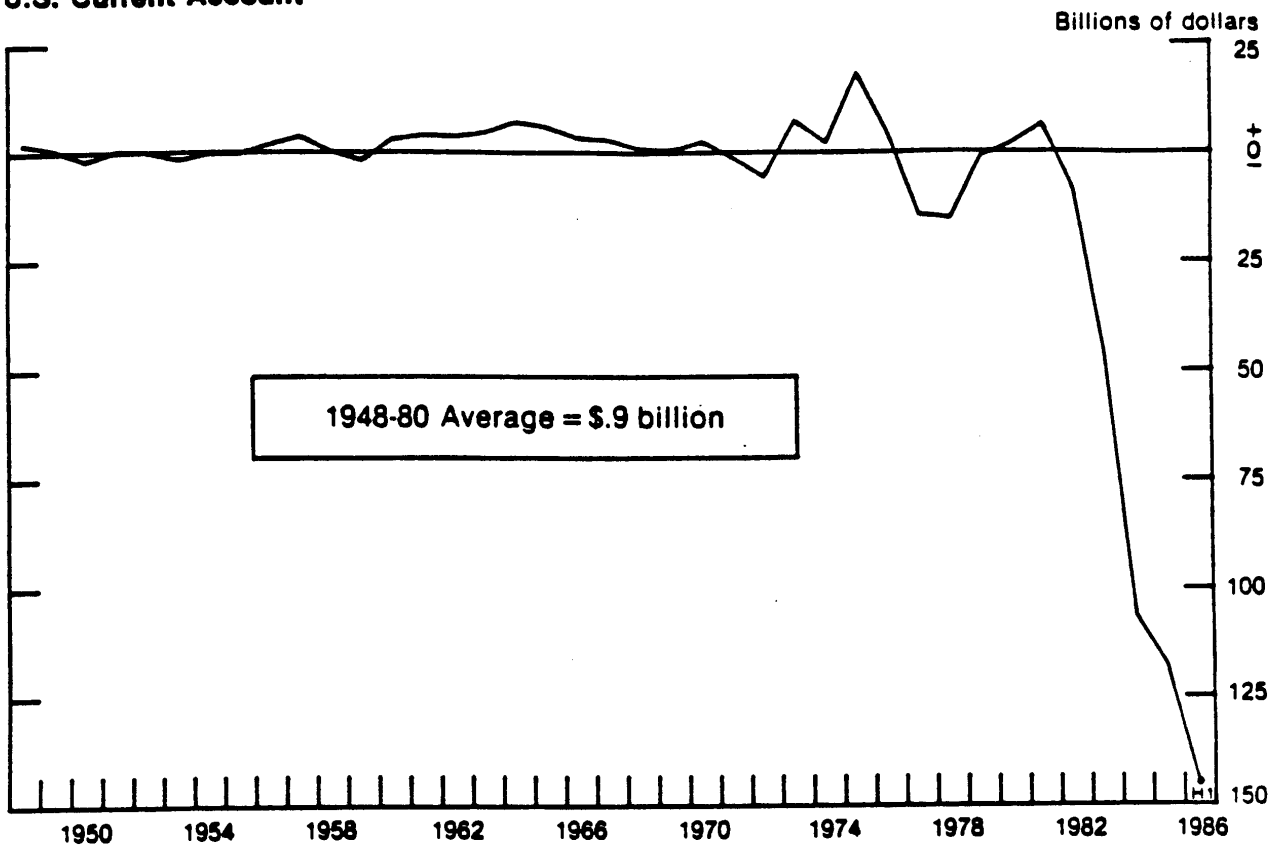
In what follows we begin with a brief review of the recent history of the U.S. external position in Section II. Section III presents an empirical model of the U.S. current account and reviews its recent historical predictive performance. Section IV then provides an accounting of the contribution of "proximate determinants" to the current account deficit using this model. In Section V we consider the predictions of a group of empirical multicountry models concerning the contribution of changes in U.S. and foreign fiscal policy to the U.S. external deficit. Finally, in Section VI we review some data on developments in U.S. price competitiveness during the dollar's appreciation and subsequent depreciation over the past six years.

II. Recent History

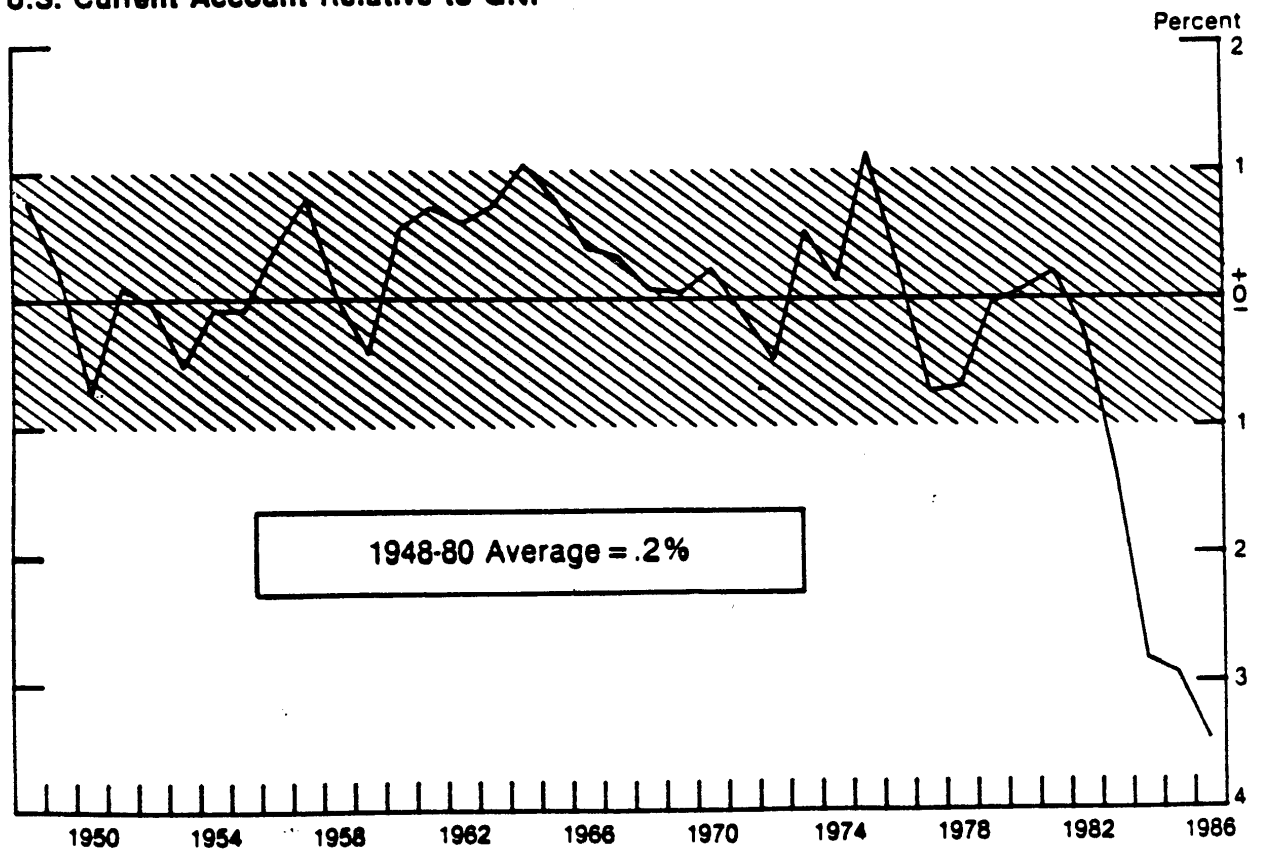
As indicated in the top half of Chart 1 in the appendix, the United States ran a small net current account surplus on average during the two decades prior to 1980. The decline in the current account to a $145 billion deficit (at an annual rate) in the first half of 1986 is clearly unprecedented in post-war history. Even when scaled for increases in nominal activity (nominal GNP), as shown in the bottom of Chart 1, the recent decline is well outside previous post-war experience.

Chart 1

U.S. Current Account



U.S. Current Account Relative to GNP



NOTE: 1986 data are H1 estimates at an annual rate.

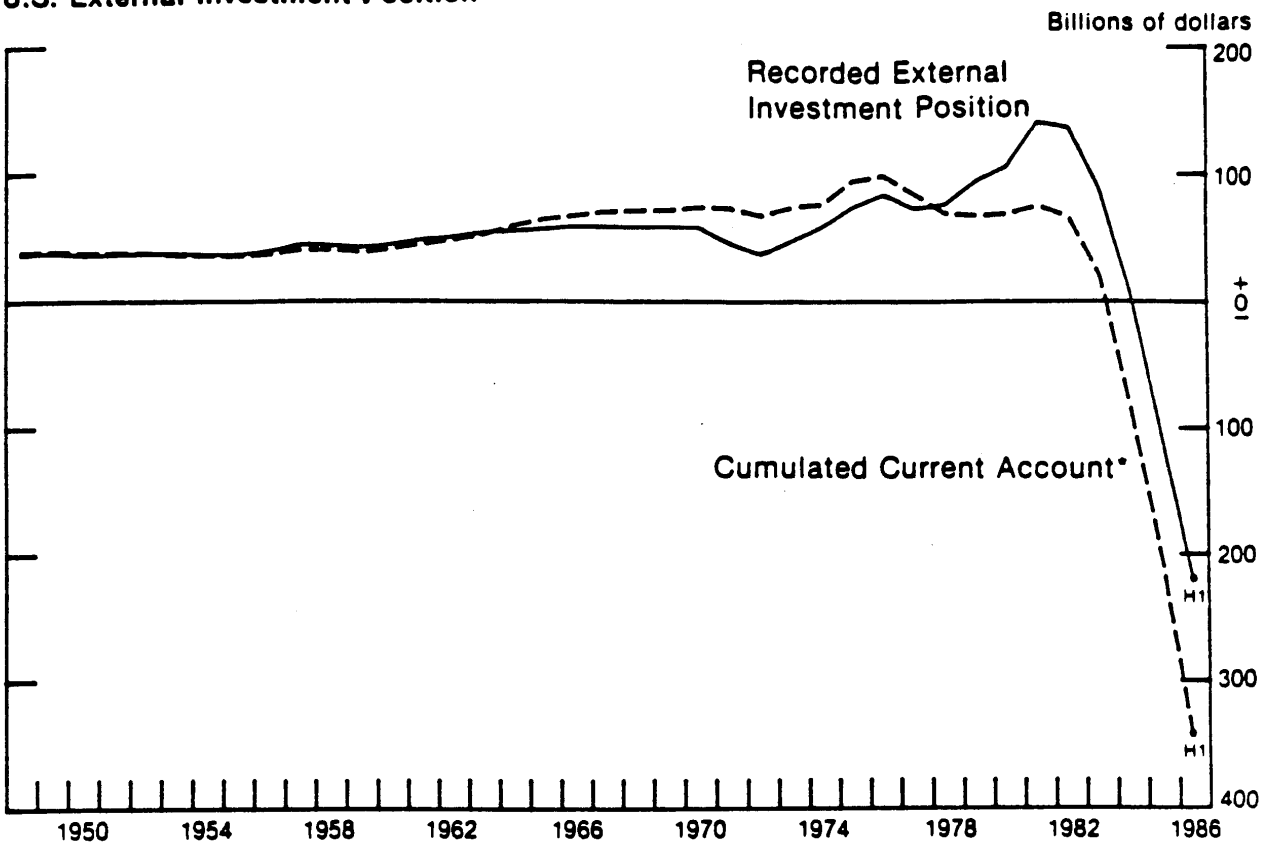
The implications of the deficit for U.S. net external indebtedness are shown in Chart 2. The solid line shows the officially recorded external investment position (the level of U.S. assets held abroad minus foreign assets held in the United States), and the dashed line, which begins at the recorded position in 1948, shows movements in the cumulated current account.1/ By either measure the U.S external investment position was substantially positive during most of the past 38 years, contributing to a comfortable surplus on U.S. net investment income receipts, but has turned sharply negative in recent years.

A breakdown of the current account balance into its major components is given in Chart 3. Most of the fall in the current account between 1980 and the first half of 1986 reflects the decline in the trade balance. Despite the sharp fall in the U.S. net foreign asset position, net investment income continues to show a healthy surplus. This is because the average rate of return on U.S. assets abroad (of which direct investment is a substantial proportion) is considerably higher than the average rate of return on foreign assets in the United States (largely claims on banks, treasury bills and other portfolio investments). Net portfolio investment income did begin to show a deficit in 1985, but was offset by the positive effects of the dollar depreciation on the valuation of U.S. direct investment income receipts from abroad. Other net services declined in 1984-85, and significantly so relative to their earlier history. However, the decline was small relative to the overall movement in the current account.

Some details on movements in the major price and volume components of the merchandise trade balance over the period 1980-1986H1 are presented in Table 1. As indicated in lines 3 and 9, prices of U.S.

Chart 2

U.S. External Investment Position



*From base of 1948 recorded external investment position.

NOTE: 1986 data are H1 estimates.

Source: BEA

Chart 3

Major Components of U.S. Current Account

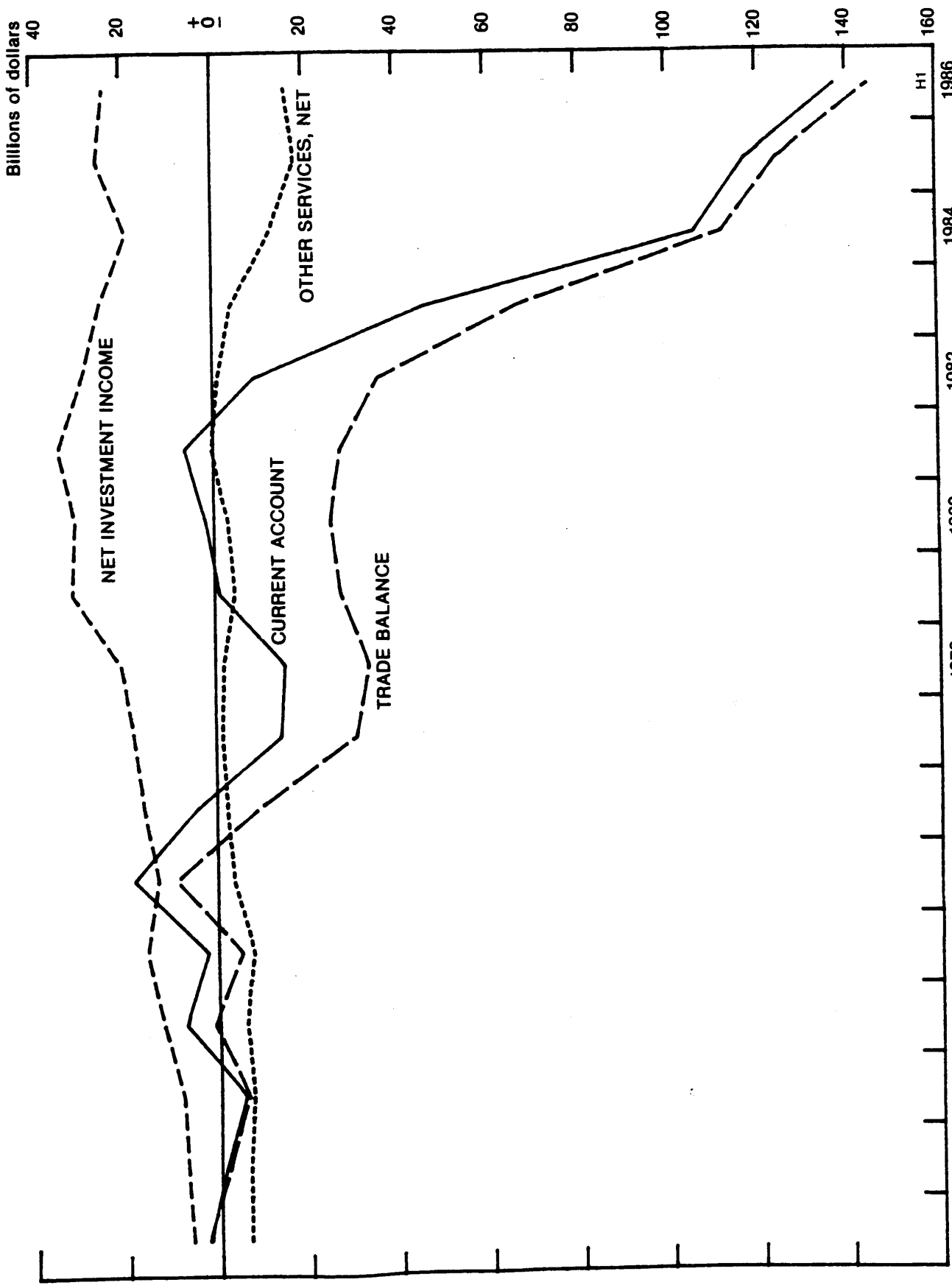


Table 1

U.S. Trade Prices and Quantities by Major Component
(Seasonally adjusted annual rates)

			1980	1986H1	Change 1980-1986H1 Billions of $	Change 1980-1986H1 Percent
Imports						
1.	Nonoil	Value (bil $)	170	326	+156	+92
2.		Quantity (bil 1982 $)	173	340		+97
3.		Price (1982=100)	98	96		-2
4.	Oil	Value (bil $)	79	36	-43	-54
5.		Quantity (bil 1982 $)	82	66		-20
6.		Price (1982=100)	96	56		-41
Exports						
7.	Nonagricultural	Value (bil $)	182	190	+8	+4
8.		Quantity (bil 1982 $)	202	203		+0
9.		Price (1982=100)	90	94		+4
10.	Agricultural	Value (bil $)	42	27	-15	-36
11.		Quantity (bil 1982 $)	39	28		-28
12.		Price (1982=100)	108	94		-13

Note: Prices are deflators from the National Income and Product Accounts.
Source: BEA.

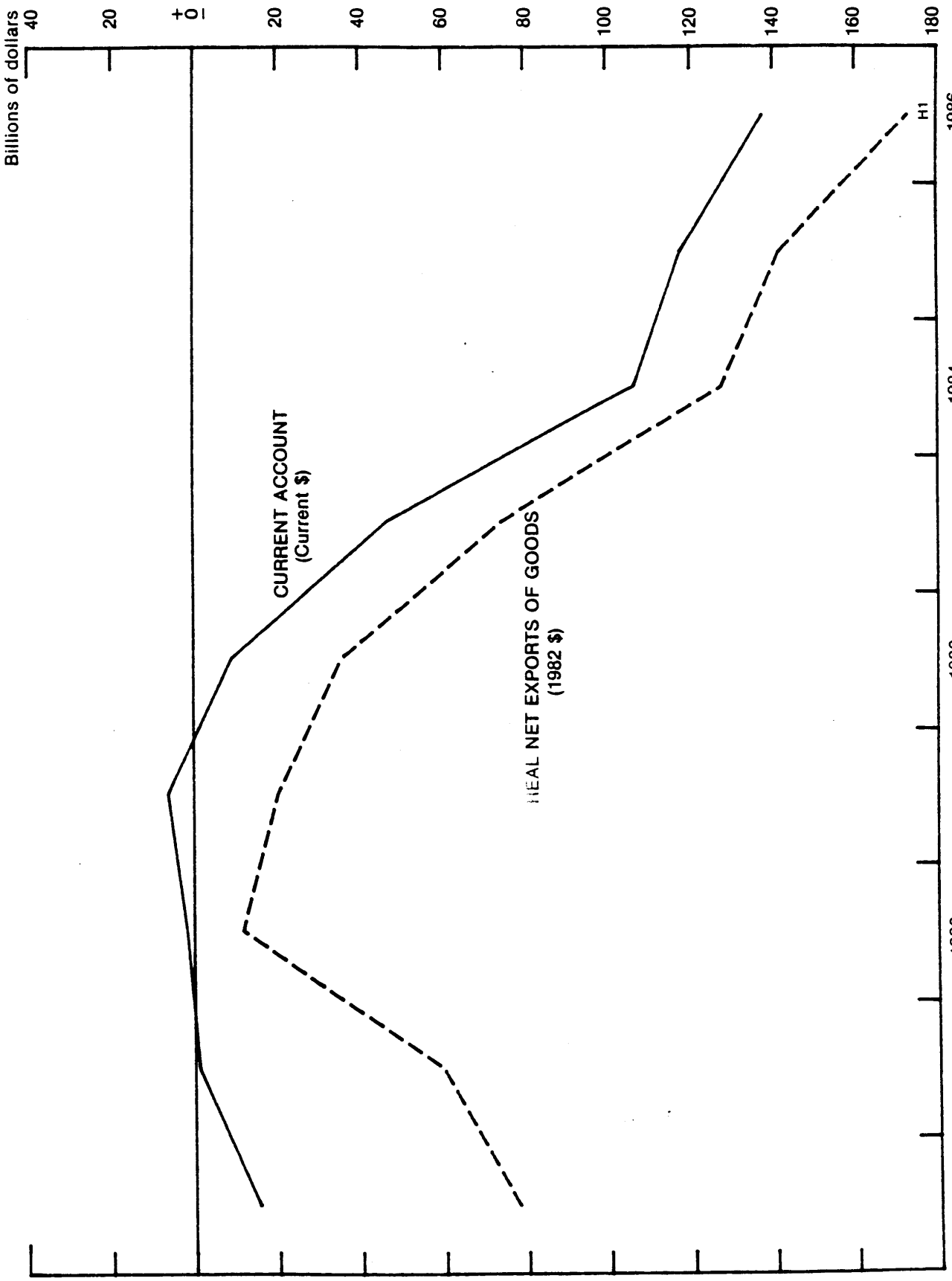
nonoil imports and nonagricultural exports showed relatively little net change over this period. A significant rise in the foreign-currency prices of U.S. nonoil imports was more than offset by the effects of the net appreciation of the dollar over this period. Meanwhile, U.S. nonagricultural export prices rose by only about 4 percent. Almost all of the increase in the trade deficit was accounted for by a doubling of the quantity of nonoil imports between 1980 and 1986H1 (line 2), while nonagricultural export volume was unchanged and agricultural exports fell significantly. These movements were partly offset by significant declines in both the price and volume of oil imports (lines 5 and 6). It would be misleading to conclude that the U.S. trade deficit was solely an "import problem", however. Under normal conditions some growth in both imports and exports could be expected. During the early 1980's, nonoil import growth rose substantially above earlier trends and nonagricultural exports fell substantially below earlier trends.

It is clear from the data in Table 1 that the decline in the trade balance between 1980 and the first half of 1986 was due to a decline in <u>real</u> net exports. The close association between movements in the current account and real net exports of goods over this period is further illustrated in Chart 4. This close association has two implications. First, it implies that an analysis of the decline in the current account balance must focus on the behavior of import and export volumes. Second, it raises a question as to why the U.S. terms of trade (excluding oil imports and agricultural exports) changed so little over this period despite the large movement in the dollar's exchange rate. Both of these issues are addressed in Section IV below.

A breakdown in changes in U.S. exports and nonoil imports by

Chart 4

U.S. External Balances



geographical region is given in Table 2. Nonoil imports from Japan, other Asian countries and Western Europe showed the largest increases between 1980 and 1986H1, especially in percentage terms. Exports to Canada, Japan and other Asian countries rose somewhat, but shipments to Western Europe and other developing countries fell.

III. Current Account Model

This section presents the partial equilibrium current account model that is used in the next section to calculate the contribution of the major "proximate determinants" of the U.S. current account to the widening of the U.S. deficit between 1980 and 1986H1. We begin with brief descriptions of the trade and service account equations. The equations are presented in implicit functional form in Table 3; definitions of variables are listed on Table 4, and parameter estimates are in Tables 5-10. We then discuss some of the key dynamics of the model and conclude the section with an assessment of the model's in-sample and recent post-sample predictive performance.

The model presented here represents an extension of earlier work by Helkie (1985), Helkie and Stekler (1984) and Hooper (1976, 1979), and is essentially the U.S. current account sector of the FRB Multicountry Model.2/ It is a two-country model including the United States and an aggregated rest of world, although considerable effort is made to take into account the importance of differences across various foreign regions and "third-country" effects in the empirical specification of the equations.

Merchandise Trade Volumes

In the merchandise trade sector, trade volumes other than

Table 2

U.S. Trade by Area
(Billions of dollars, SAAR)

		1980	1986H1	Change 1980-1986H1 Billions of $	Change 1980-1986H1 Percent
1.	Nonoil Imports Total	170	326	+156	+92
2.	Industrial Countries	119	234	+115	+97
3.	Canada	39	67	+28	+72
4.	Japan	31	78	+47	+152
5.	W. Europe	43	84	+41	+95
6.	Other	7	5	-2	-30
7.	Developing Countries	49	87	+38	+78
8.	Latin America	19	31	+12	+63
9.	Asia	18	41	+23	+127
10.	Other	12	15	+3	+25
11.	Exports Total	224	217	-7	-3
12.	Industrial Countries	137	145	+8	+6
13.	Canada	42	52	+10	+24
14.	Japan	21	26	+5	+24
15.	W. Europe	68	59	-9	-13
16.	Other	7	7	0	0
17.	Developing Countries	79	66	-13	-16
18.	Latin America	39	30	-9	-23
19.	Asia	14	17	+3	+21
20.	Other	26	19	-7	-27

Source: BEA

Table 3

Current Account Model[1/]

Merchandise Trade

Nonagricultural Export Volume

1. $X_{na}/P_{xna} = f\ (Y^{*}, (P_{xna}/E \cdot P^{*})_{L9}, K^{*}/K, DS)$

Agricultural Export Volume

2. $X_{a}/P_{xa} = f\ (Y^{*}, (P_{xa}/E \cdot P^{*})_{L8}, (P/P_{xa})_{L9}, DS)$

Nonoil Import Volume

3. $M_{no}/P_{mno} = f\ (Y, (TR \cdot P_{mno}/P)_{L8}, K/K^{*}, CU^{*}/CU, DS)$

Oil Import Volume

4. $M_{o}/P_{mo} = C_{o} + I_{o} + X_{o} - Q_{o}$

5. $C_{o} = f(Y, (P_{mo}/P)_{L60})$

Nonagricultural Export Price

6. $P_{xna} = f(PD, (P^{*}/E)_{L4})$

Agricultural Export Price

7. $P_{xa} = f(Y^{*}, E)_{L8}$

Nonoil Import Price

8. $P_{mno} = f(P^{*}, (E)_{L8}, (PC)_{L4})$

Services

Direct Investment Income Receipts

9. $X_{yd} = f(Y^{*}, CU^{*}, A_{d})$

(Table 3 continued)

Direct Investment Income Payments

10. $M_{yd} = f(\overset{+}{Y}, \overset{+}{CU}, \overset{+}{A^*_d})$

Other Investment Income Receipts

11. $X_{yo} = R_{yo} \cdot A_o$

12. $R_{yo} = f(\overset{+}{R}, \overset{\pm}{(R_{yo})_{L1}})$

Other Investment Income Payments

13. $M_{yo} = R^*_{yo} \cdot A^*_o$

14. $R^*_{yo} = f(\overset{+}{R}, (R^*_{yo})_{L1})$

Other Service Receipts

15. $X_{os}/P_{xos} = f(\overset{+}{Y^*}, (P_{xos}/E \cdot P^*)_{L8})$

Other Service Payments

16. $M_{os}/P_{mos} = f(\overset{+}{Y}, (P_{mos}/P)_{L8})$

Balances

Merchandise Trade Balance

17. $TB = X_{na} + X_a - M_{no} - M_o$

Current Account

18. $CA = TB + X_{yd} + X_{yo} + X_{os} - M_{yd} - M_{yo} - M_{os} - NT$

Asset Stocks

19. $CA = (A_d + A_o - A^*_d - A^*_o)$

1/ See Table 4 for definitions of variables; expected signs of coefficients are listed above variables.

Table 4

Definitions of Variables

A_d Stock of U.S. foreign direct investment assets

A_o Stock of U.S. other assets (portfolio) abroad.

CA Current Account.

C_o U.S. oil consumption.

CU Manufacturing capacity utilization.

E Exchange rate (foreign currency/dollar), weighted average.1/

ΔI_o Change in U.S. private and government oil stocks.

K Domestic private fixed capital stock.

L9 Subscript denoting, eg., 9-quarter distributed lag on the term in parentheses.

M_{no} Nonoil Import value.

M_o Oil import value.

M_{os} Other service payments (non investment income).

M_{yd} Direct investment income payments.

M_{yo} Other (portfolio) investment income payments.

NT U.S. net unilateral transfers to foreigners.

P U.S. GNP deflator.

P* Foreign CPI, weighted average. 1/

PC World commodity price.

PD Average of U.S. sectoral price indexes weighted by nonagricultural export shares.

P_{mno} Nonoil import deflator

P_{mo} Oil import deflator

P_{xa} Agricultural export deflator

P_{xna} Nonagricultural export deflator.

Q_o U.S. domestic oil production

(Table 4 continued)

R U.S. treasury bill rate.

R_{yo} Rate of return on U.S. portfolio assets abroad.

TB Trade balance.

TR Index of tariff rates.

X_a Agricultural export value.

X_{na} Nonagricultural export value.

X_o U.S. oil exports.

X_{os} Other service receipts.

X_{yd} Direct investment income receipts.

X_{yo} Other investment income receipts.

Y Real GNP.

* Denotes foreign variable (eg A* = stock of foreign assets in the U.S., R^*_{yo} = rate of return on foreign portfolio assets in the U.S., Y* = foreign GNP).

1/ E and P* are weighted differently in different equations, as described in the text.

agricultural exports and oil imports are determined in import demand equations (U.S. exports are treated as foreign imports), with goods produced in the two regions treated as imperfect substitutes. The standard specification, which includes home income and the price of the imported good (measured in home currency) relative to an index of home prices is augmented in several respects (see equations 1 and 3 in Table 3). First, we include a cyclical nonprice rationing variable, the ratio of foreign to home capacity utilization (as developed by Gregory (1971)). (This variable proved to be significant only in the import equation.)

Second, we augment the relative price term by adding a relative secular supply variable to the equation. Our defense for this unabashedly ad-hoc adjustment is that the existing price indexes do not adequately capture the price effects of the introduction of significant new product lines by foreign suppliers. Japan's entry into the world market as a major producer of passenger cars and other consumer durables beginning in the 1960s and early 1970s, for example, was a major factor underlying a substantial acceleration in the growth of U.S. imports during that period. The growth in U.S. imports from NICs provides a more recent example. The standard import demand equation tends to capture such developments spuriously as increases in the U.S. income elasticity of demand for imports. Since we view such developments as fundamentally supply determined, we have chosen to add a proxy for secular shifts in relative output supply. A number of variables were tested and the one selected (largely on empirical grounds) was the ratio of home to foreign productive capital stocks, as proxied by cumulated net fixed investment.

Finally, we added a dock-strike variable developed by Isard (1975) and an index of tariff rates (to the relative price terms).3/

The coefficient estimates for the U.S. nonoil import and nonagricultural export volume equations are given in Table 5. These equations were estimated using quarterly data over the period 1969Q1-1984Q4, in a double-log functional form. In the export equation, foreign GNP's were averaged using each country/regions's share in U.S. nonagricultural exports, while foreign prices and exchange rates were weighted by each country's share in world trade.4/ Multilateral trade weights were used in the latter case to capture the fact that U.S. exports compete significantly with many countries in third markets. The estimated income elasticities in the import and export equations are nearly identical, at 2.1 and 2.2 respectively (see columns 1 and 3 of Table 5). The long-run price elasticities are both roughly in the neighborhood of -1.0 (-.8 for exports and -1.05 for imports), suggesting that the Marshall-Lerner condition is met comfortably. The selection of 8-9 quarter distributed lags in the relative price terms was made on empirical grounds, after having tested a variety of different lag lengths. The actual and cumulated lag coefficient estimates are listed in the first four columns of Table 6.

These income and price elasticity estimates are crucial to an analysis of the factors contributing to the U.S. current account deficit. The income elasticities are noteworthy in two respects. First, they contradict the commonly held view that the income elasticity of U.S. imports is significantly greater than that of U.S. exports. We find that the addition of the relative supply proxy has the effect of lowering the import elasticity and raising the export elasticity. In addition, the

Table 5

Parameter Estimates for Trade Volume Equations 1/
(t-ratios in parentheses)

	Nonag Exports	Agric. Exports	Nonoil Imports	Oil Consumption
Intercept	-7.27 (-1.53)	.65 (.83)	-2.45 (-0.52)	-2.07 (-0.77)
Income	2.19 (5.46)	1.15 (12.31)	2.11 (5.30)	1.07 (5.52)
Relative price	-0.83 (-6.11)	-0.93 (-5.87)	-1.15 (-10.03)	-0.96 (-2.87)
Relative supply	-1.37 (2.27)	.54 (5.07)	-0.83 (-2.18)	
Dock-strike	0.78 (8.42)	1.07 (3.67)	0.81 (5.71)	
Relative capacity utilization			-0.28 (-1.33)	
Rho	0.69 (7.44)	0.19 (1.83)	0.47 (4.20)	0.40 (3.97)
R^2	0.89	0.94	0.96	0.93
SER	0.027	0.057	0.031	0.027
DW	2.11	1.87	1.92	1.86

1/ Equations are expressed in logarithmic form. Trade in gold and silver is excluded from the dependent variable. Numbers in parentheses are t-statistics.

Table 6

Relative Price and Exchange Rate Lags in Estimated Equations*

Lag Period	Nonag Export Volume		Nonoil Import Volume		Nonoil Import Defl.		Nonag Export Defl.	
	Lag Coef.	Cumulative	Lag Coef.	Cumulative	Lag Coef.	Cumulative	Lag Coef.	Cumulative
Current 0	0	0	-.42	-.42	-.28	-.28	-.12	-.11
-1	.06	.06	-.30	-.72	-.21	-.49	-.06	-.17
-2	.10	.16	-.21	-.93	-.16	-.65	-.03	-.20
-3	.12	.28	-.13	-1.06	-.11	-.76	-.01	-.21
-4	.14	.42	-.07	-1.13	-.08	-.84		
-5	.14	.56	-.03	-1.16	-.04	-.88		
-6	.12	.68	0	-1.16	-.02	-.90		
-7	.10	.78	+.01	-1.15	-.01	-.91		
-8	.06	.83						

* Exchange rate appears directly in nonag export volume equation and nonoil import deflator equation. Lags are quarterly.

relative capacity utilization terms in the import equation also tends to lower the income elasticity in that equation. In effect the total cyclical income elasticity is greater in the import equation (when the relative capacity utilization elasticity of .3 is combined with the income elasticity of 2.1) than in the export equation (which does not have a capacity utilization term).

Second, the income elasticities are estimated using real GNPs as the activity variables. This variable was selected over total domestic expenditures, which are also used commonly in trade equations. This selection has important implications for the partial equilibrium analysis presented in Section IV. We chose GNP as the activity variable partly because much of U.S. trade is in intermediate products and there is no reason to believe that inputs into the production of U.S. exports and final goods that compete directly with imports are any less import-intensive than inputs into the rest of U.S. output. To the extent that the import equation represents demand for intermediate goods, real GNP is clearly preferable to a total expenditure variable. In addition, the use of GNP in determining imports of final goods can be readily derived from underlying demand theory (see Leamer and Stern (1970), Chapter 2). Finally, when both real GNP and an aggregate domestic expenditure variable were tested empirically in our nonoil import volume equation, the GNP variable yielded a better overall equation fit.5/

Agricultural exports (equation 2 in Table 3) are modeled as a function of foreign income, the ratio of agricultural export prices to foreign domestic prices and the ratio of agricultural export prices to domestic output prices. The third variable is designed to capture in a very crude fashion the supply response of the U.S. agricultural sector to

changes in prices relative to U.S. output costs. Oil imports (equations 4 and 5) are determined as the excess of domestic consumption plus exogenous exports and stock changes over exogenous domestic production. Oil consumption is modeled as a function of domestic income with an elasticity near 1.0 and a 15-year distributed lag on the relative price of oil that sums to a long-run price elasticity near -1.0.

Trade Prices

Nonagricultural export and nonoil import prices (equations 6 and 8 in Table 3) are determined in markup equations. The markup over domestic production costs (proxied by domestic output prices) is a lagged function of competing goods prices in the foreign market. The import price equation also includes a world commodity price variable, as nearly 20 percent of these imports can be classified as basic commodities rather than manufactured goods. This variable was not found to be significant in the nonagricultural export price equation.

Preliminary estimation results suggested that changes in domestic costs in the exporting country are passed through quickly into U.S. import and export prices. Costs are proxied by a weighted average of domestic output prices by sector (weighted by each sector's share in U.S. nonagricultural exports) in the export price equation and by foreign consumer prices (weighted by bilateral nonoil import shares) in the import price equation. Markups or profit margins are assumed to vary, particularly in the short run, in response to changes in prices in the foreign market. On the import side, nonoil import prices respond with a lag to changes in the dollar's exchange rate. And on the export side nonagricultural export prices respond with a lag to changes in the exchange rate times foreign prices. The coefficient estimates are shown

in Table 7. The lag coefficients are given in the last four columns of Table 6; they are also illustrated graphically in Chart 5. As we shall see, the estimated lag coefficients imply quite different pricing behavior on the part of U.S. exporters and foreign exporters.

Chart 5 shows the responses of nonoil import prices (left-side panels) and nonagricultural export prices (right-side panels) to a hypothetical 10 percent appreciation of the dollar (shown in panels 1a and 1b). As indicated in panel 2a, foreign exporters raise their home-currency prices initially, absorbing most of the exchange rate change into higher profit margins in the near term. Over time, this effect is dissipated as the appreciation is gradually passed through into lower U.S. dollar import prices (panel 3a). Thus, in the short run foreign exporters in the aggregate appear to price to the U.S. market in response to exchange rate changes, but in the longer run, their prices are determined primarily by their domestic costs. In contrast, the home currency (dollar) prices of U.S. exporters change very little initially in response to a change in the exchange rate (panel 2b). Almost all of the dollar appreciation is passed through into higher foreign-currency import prices in the foreign market initially (panel 3b). U.S. exporters do exhibit some gradual responsiveness to foreign price competition over time, but it is much more subdued than the initial responsiveness of foreign exporters to the same shock. Anecdotal evidence relating to U.S. exporters' response to the dollar's decline since early 1985 suggests the possibility of a greater response more recently and indicates the need for further investigation of this result.

Table 7

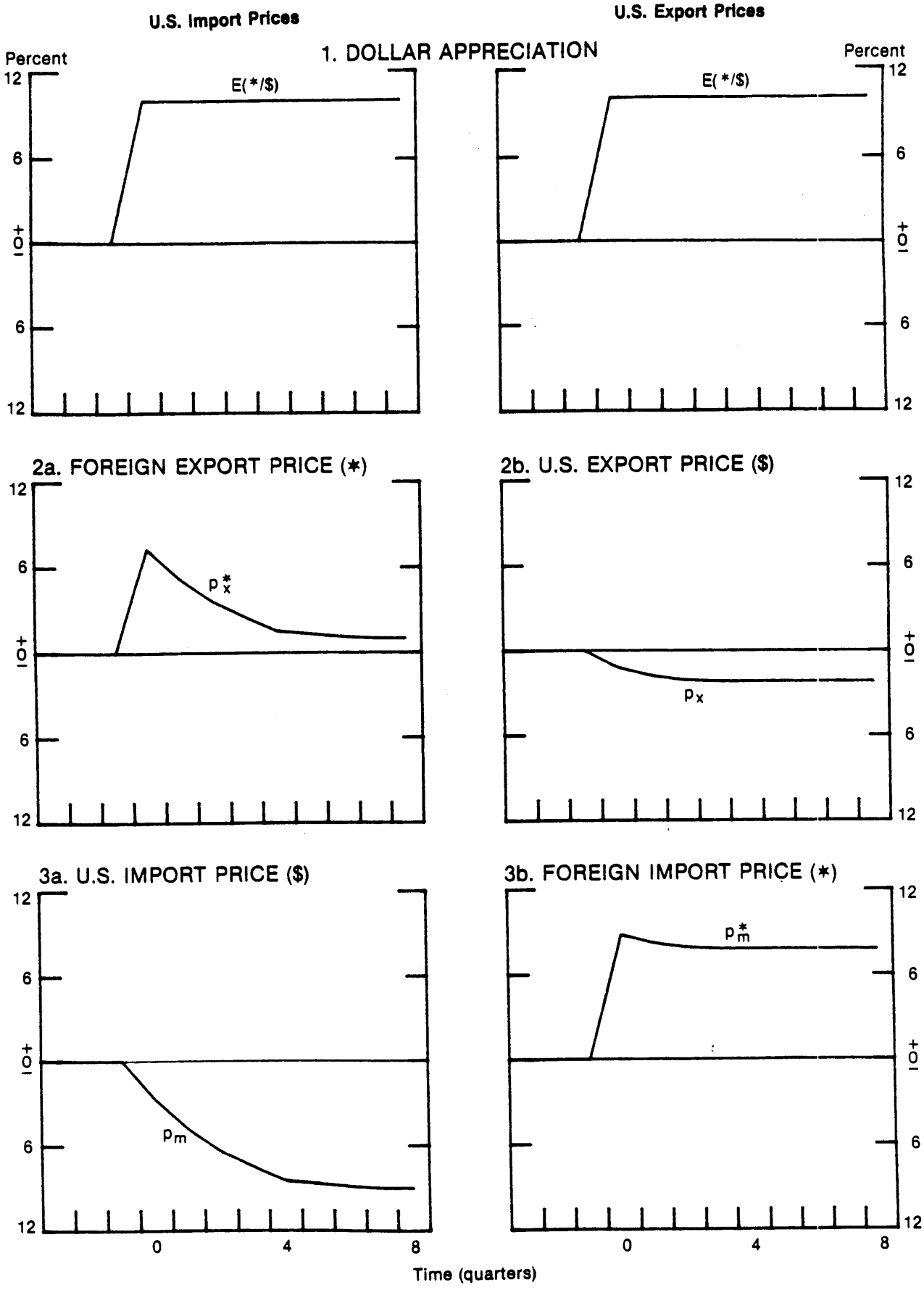
Parameter Estimates for Trade Price Equations 1/
(t-ratios in parentheses)

	Nonagricultural Exports	Agricultural Exports	Nonoil Imports
Intercept	-0.15 (-0.34)	0.23 (0.56)	4.30 (11.33)
Domestic prices	1.05 (10.43)	--	--
Foreign prices 2/	0.21 (3.05)	--	0.86 (19.81)
Exchange Rate 2/	-0.21 (-3.05)	-0.369 (-1.91)	-0.91 (11.34)
Commodity Prices 3/	--		0.16 (3.88)
World GNP	--	1.19 (2.32)	--
Rho	0.83 (12.33)	--	0.63 (6.26)
R2	0.97	0.98	0.99
SER	0.011	0.057	0.015
DW	1.65	--	1.35

1/ Equations are expressed in logarithmic form.
2/ Four quarter distributed lag on both price and exchange rate in nonag exports; eight quarter distributed lag on exchange rate in nonoil import equation.
3/ IFS nonoil commodity price index.

Chart 5

Effects of Dollar Appreciation on U.S. Nonoil Import Prices and Nonagricultural Export Prices



Services: Investment Income

The investment income equations (9-14 in Table 3) consist of returns on direct investment holdings and interest receipts and payments on financial (portfolio) liabilities.

To determine direct investment receipts and payments we assume that earnings depend on the stock of real direct investment, the price level and on fluctuations in nominal dollar profit rates. We use capacity utilization, the rate of change of GNP, and the price level to represent movements in the rate of profits. The exchange rate is included to translate foreign currency profits into dollars. Due to technical problems regarding definitional consistency in the series, the equation parameters vary substantially as one alters the sample period. In estimation, direct investment receipts were disaggregated among manufacturing, petroleum and other receipts. (See Table 8 for the parameter estimates.)

Portfolio interest receipts and payments are determined by an identity that multiplies the implicit interest rate times the value of outstanding assets. We explain the implicit interest rate as a geometric lag of the 90-day U.S.-Treasury bill rate. (The Treasury bill rate is used on the receipts side as well as the payments side because U.S. portfolio claims on foreigners are predominantly dollar-denominated.) In general, given the lagged dependent variables in the equations, changes in the 90-day Treasury bill rate are almost fully passed through in the long run to changes in implicit interest rates. Parameter estimates are given in Table 9.

Table 8

Parameter Estimates for Direct Investment Equations 1/

	Direct Investment Income Receipts			Direct Investment Income Payments
	Manufacturing	Petroleum	Other	
Intercept	2.44 (1.28)	-1.44 (-0.61)	-0.86 (-2.80)	-2.76 (-2.81)
Capacity utilization	6.42 (1.98)	9.51 (2.45)	3.64 (4.49)	6.60 (3.35)
Price * real asset	0.48 (2.78)	0.88 (3.89)	0.78 (27.62)	0.95 (9.25)
Price/Price (-1)	2.99 (3.04)	--	0.96 (1.63)	--
Rho	0.70 (6.76)	0.75 (7.98)	0.18 (1.29)	0.75 (10.07)
R^2	0.63	0.27	0.95	0.55
SER	0.159	0.176	0.082	0.187
DW	2.29	1.85	1.87	2.28

1/ The numbers in paratheses are t-statistics.

Table 9

Parameter Estimates for the Implicit Interest Rate on Portfolio Investment Income 1/

	Private Receipts	Government Receipts	Private Payments	Government Payments
Intercept	0.18	0.07	-0.06	0.03
	(2.83)	(0.72)	(-1.21)	(0.83)
90 day T-bill rate	0.50	0.08	0.51	0.19
	(12.53)	(1.30)	(11.83)	(7.93)
Implicit Interest rate (t-1)	0.45	0.82	0.47	0.80
	(12.38)	(9.35)	(9.81)	(25.61)
R^2	0.98	0.85	0.98	0.99
SER	0.028	0.097	0.049	0.033
DW	2.40	2.75	2.05	2.11

1/ The numbers in parentheses are t-statistics.

Other Services

Other services, including travel, passenger fares, other transportation, fees and royalties, other private services, and U.S. government miscellaneous services are aggregated into single equations for both receipts and payments. Other service transactions are related in general to the same variables that determine merchandise transactions: income and relative prices. We also include real merchandise trade volumes to explain the movements specific to transportation services. Parameter estimates are given in Table 10.

Balances and Asset Stocks

The deviations of trade and current account balances from the various components of the model are given in equations 17 and 18 in Table 3. In full current account model simulations, asset stocks are endogenized fairly mechanically. An increase in the U.S. current account deficit, for example, is assumed to be financed roughly half by an increase in foreign portfolio claims on the United States and half by a reduction in U.S. portfolio claims on foreigners. This allows us to take into account feedbacks from shifts in the current account to changes in the net investment income account. The large statistical discrepancy between the current and capital account is treated exogenously.

Predictive Performance

The in-sample (1969-84) and post-sample (1985Q1-86Q2) predictive performance of the single equations and overall model presented above are shown in Charts 6 - 11. Each chart shows an actual value (solid line), a model prediction (dashed line) and a summary of the in-sample and post-sample percent root-mean-squared prediction errors. These RMSEs are expressed as percentages of the in-sample or post-sample

Table 10

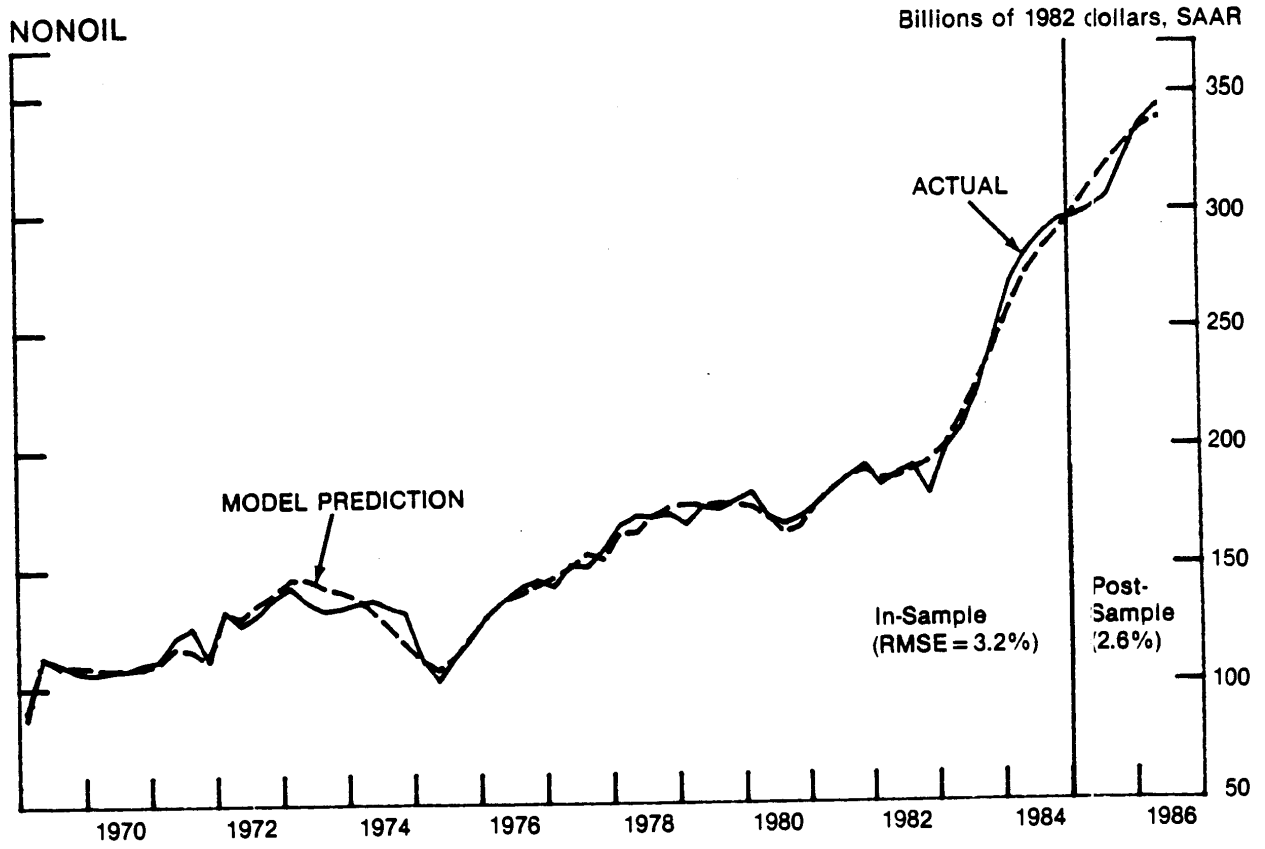
Parameter Estimates for Other Services 1/

	Receipts	Payments
Intercept	-3.08	-8.40
	(-9.26)	(-9.27)
Relative Price	-0.48	-0.62
	(-9.60)	(-7.88)
GNP 2/	0.75	0.73
	(14.73)	(5.11)
Real U.S. Exports (Imports) 3/	0.22	0.27
	(5.36)	(5.25)
Rho	0.42	0.58
	(4.07)	(6.14)
R^2	0.99	0.88
SER	0.017	0.024
DW	2.14	1.84

1/ The numbers in parentheses are t-statistics.
2/ Foreign GNP for receipts; U.S. GNP for payments.
3/ Exports for receipts; imports for payments.

Chart 6

Import Volume



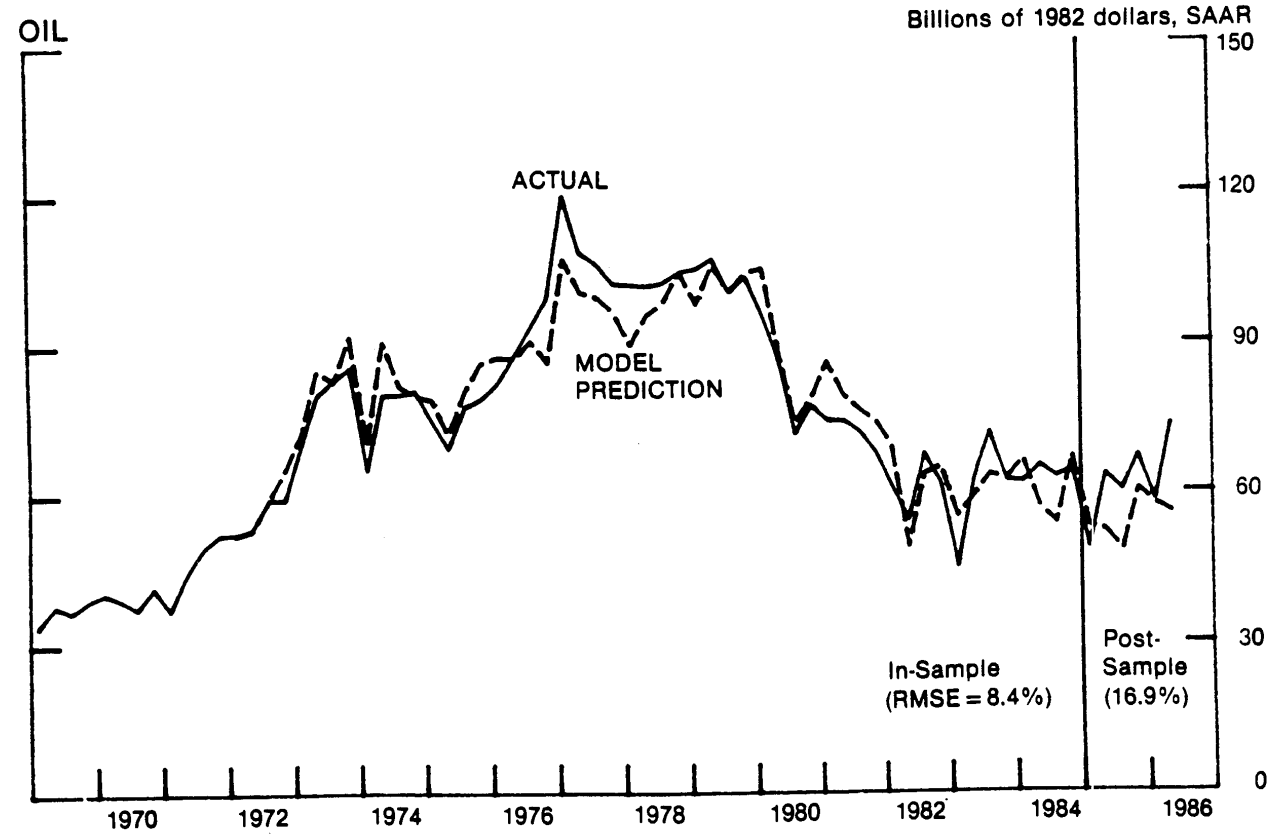
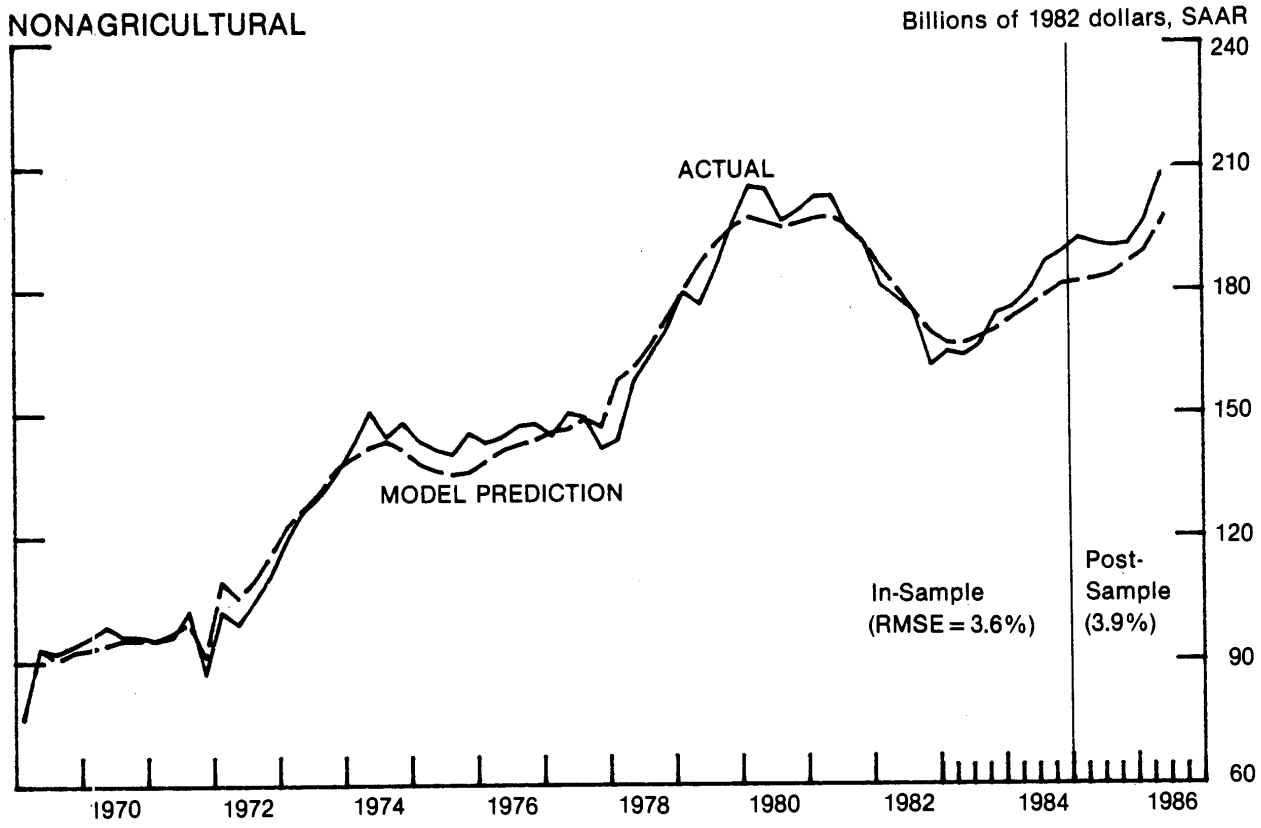


Chart 7

Export Volume



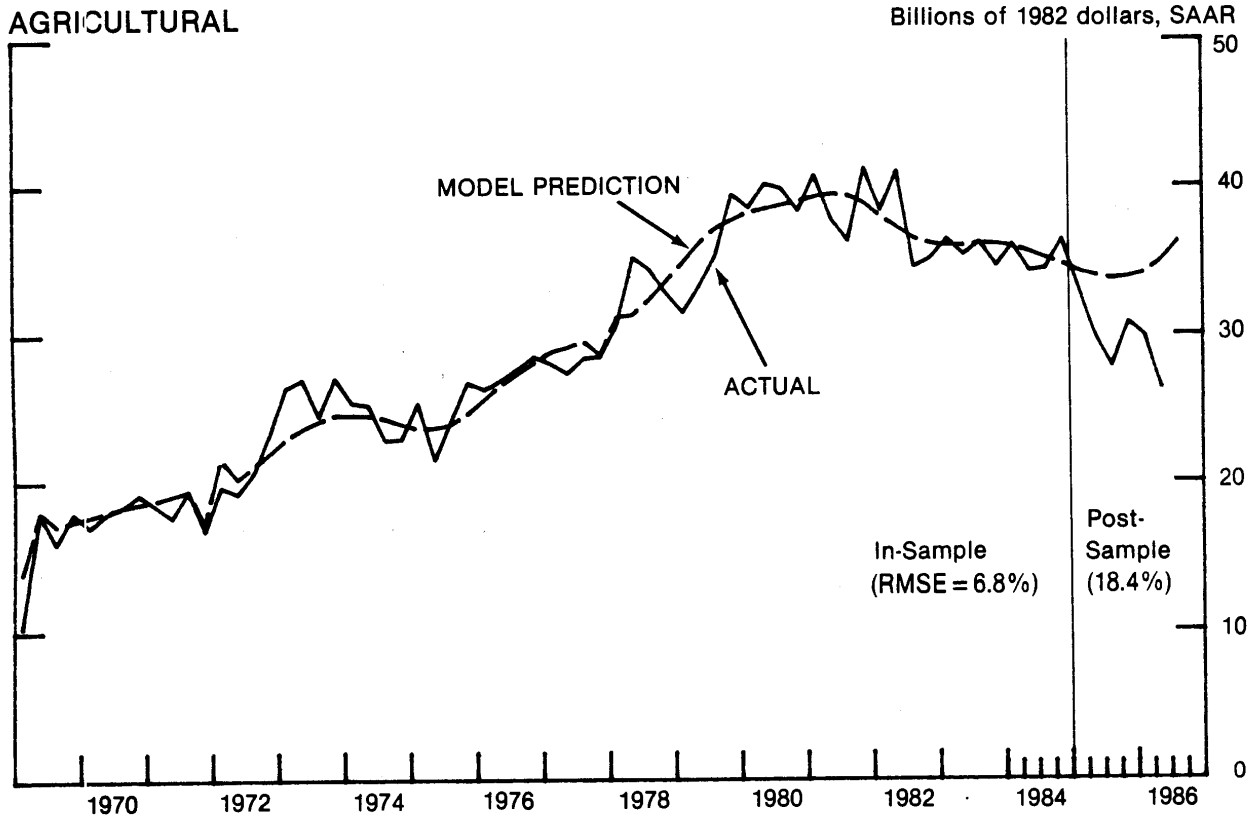
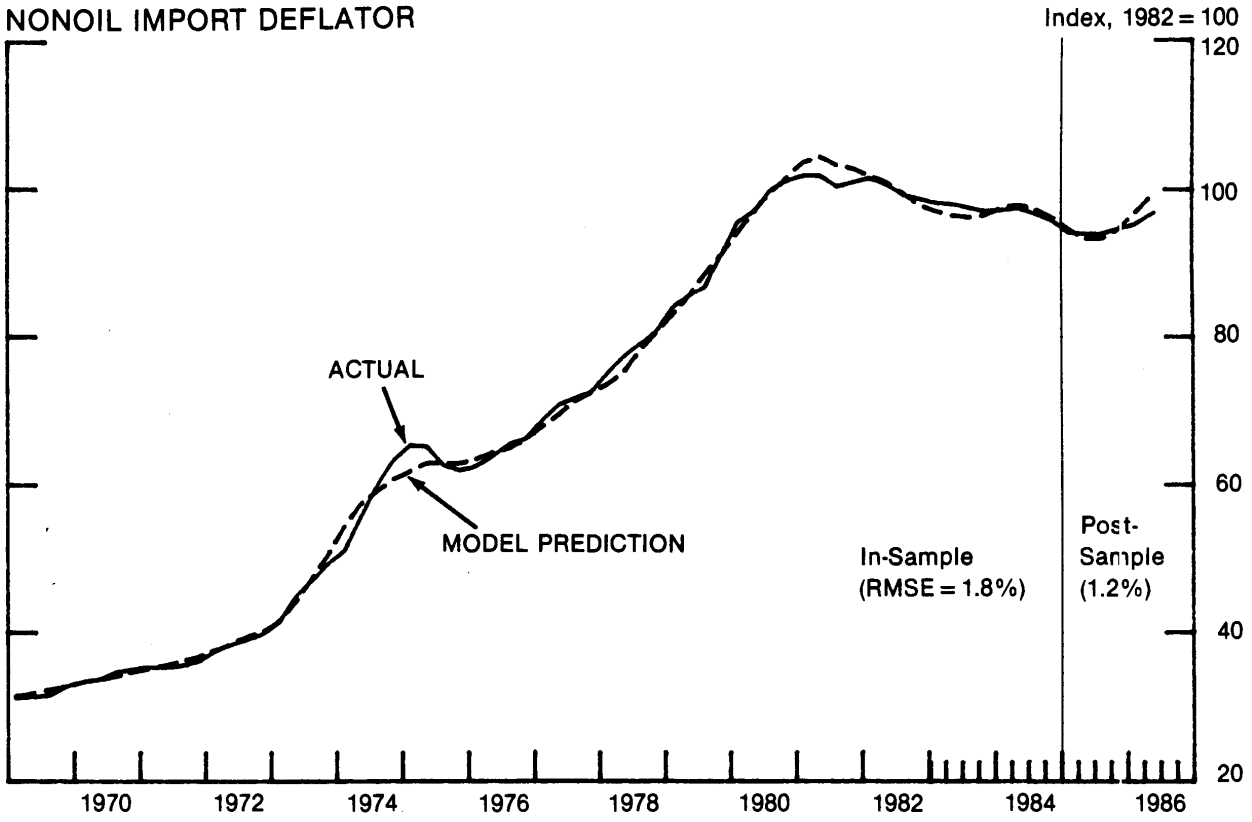


Chart 8

Trade Prices



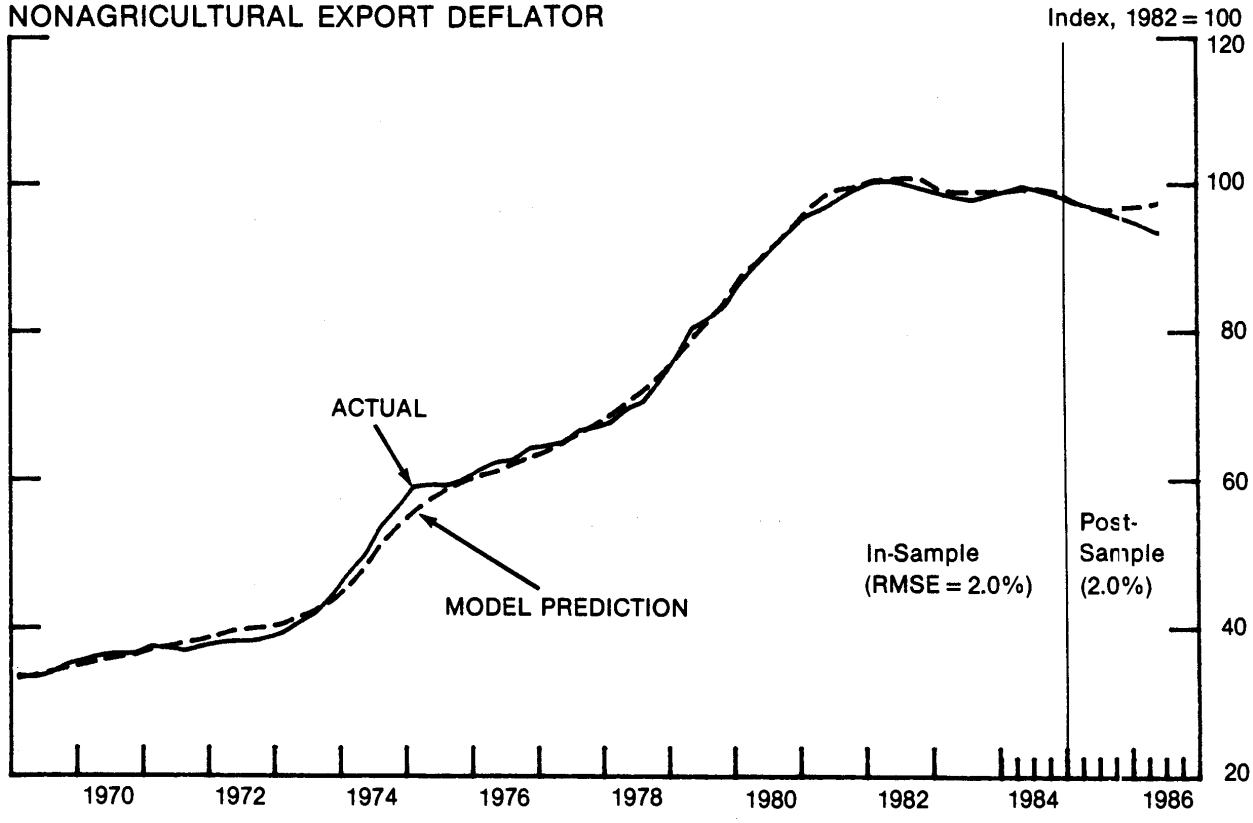
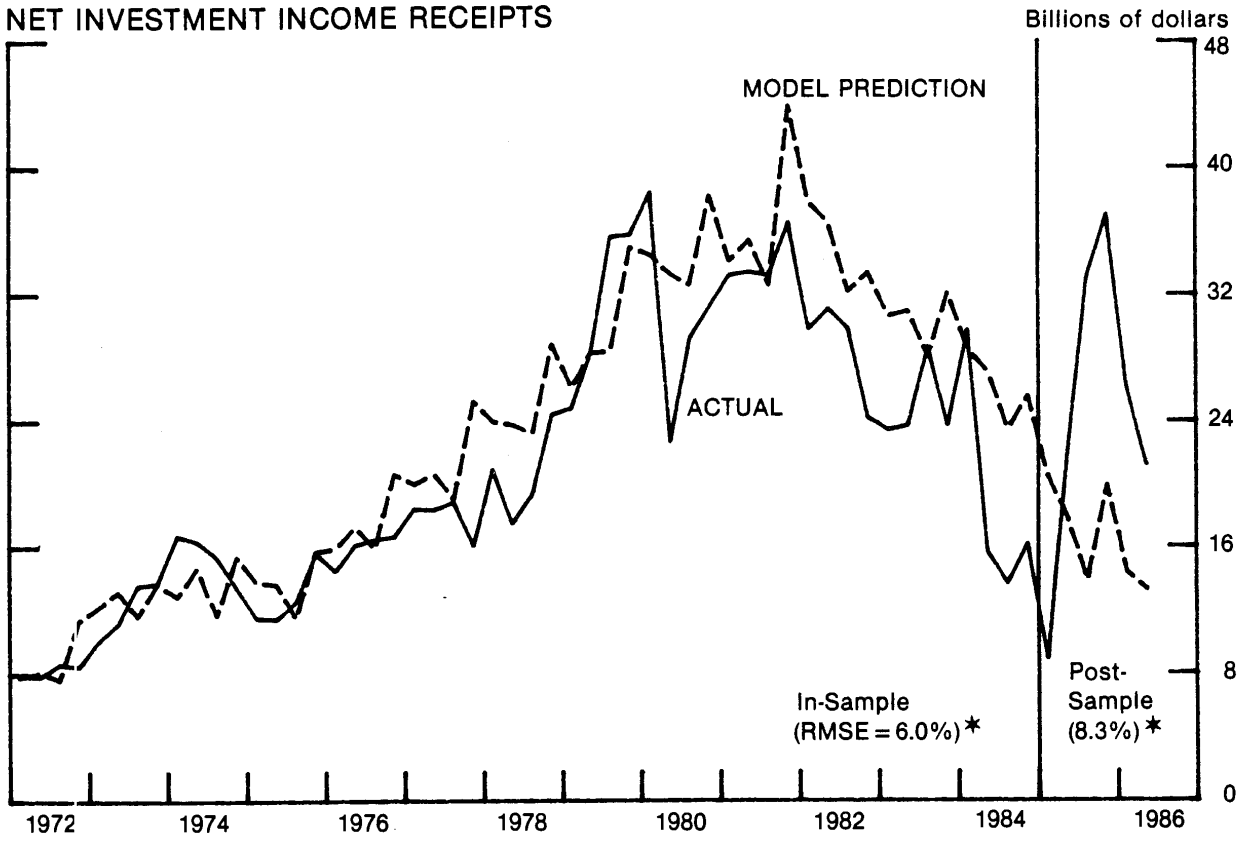
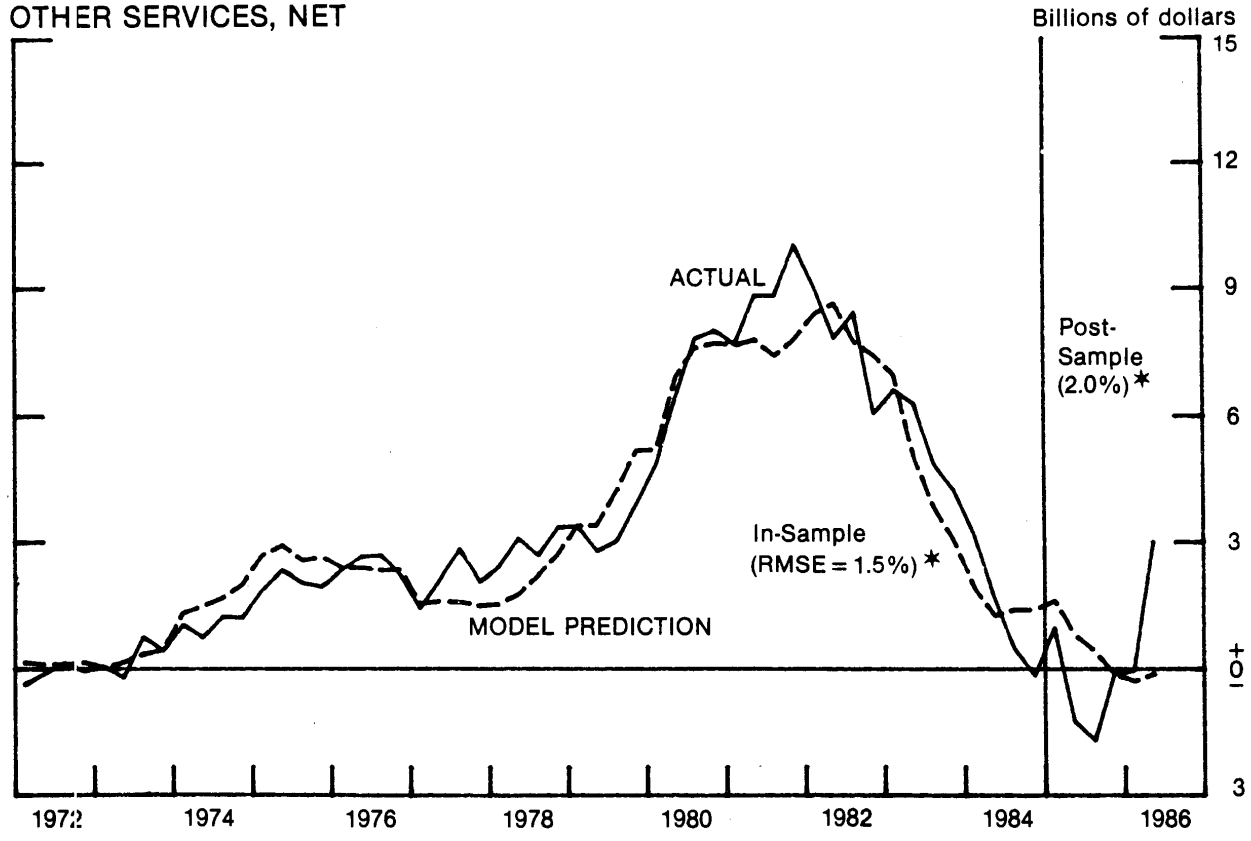


Chart 9

Service Account



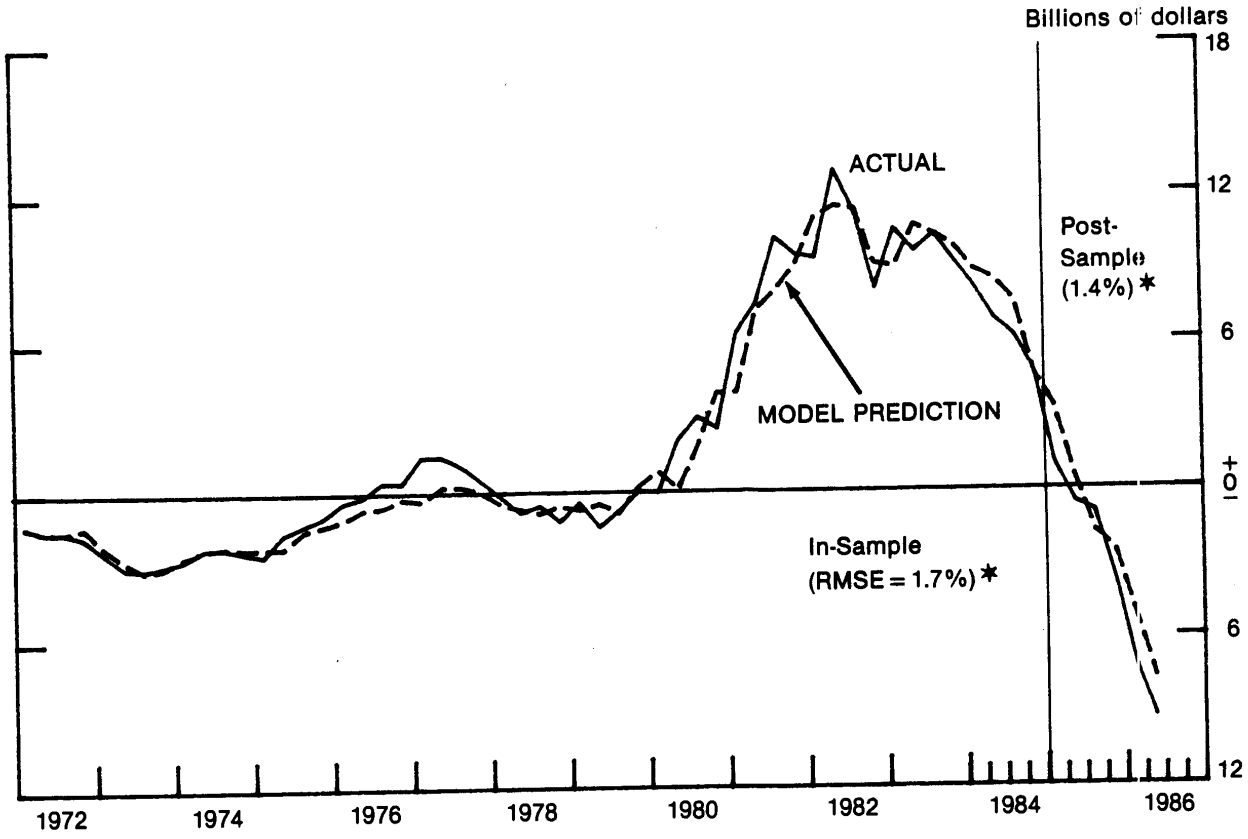


* RMSE as percentage of sample mean total receipts plus payments.

Chart 9A

Service Account

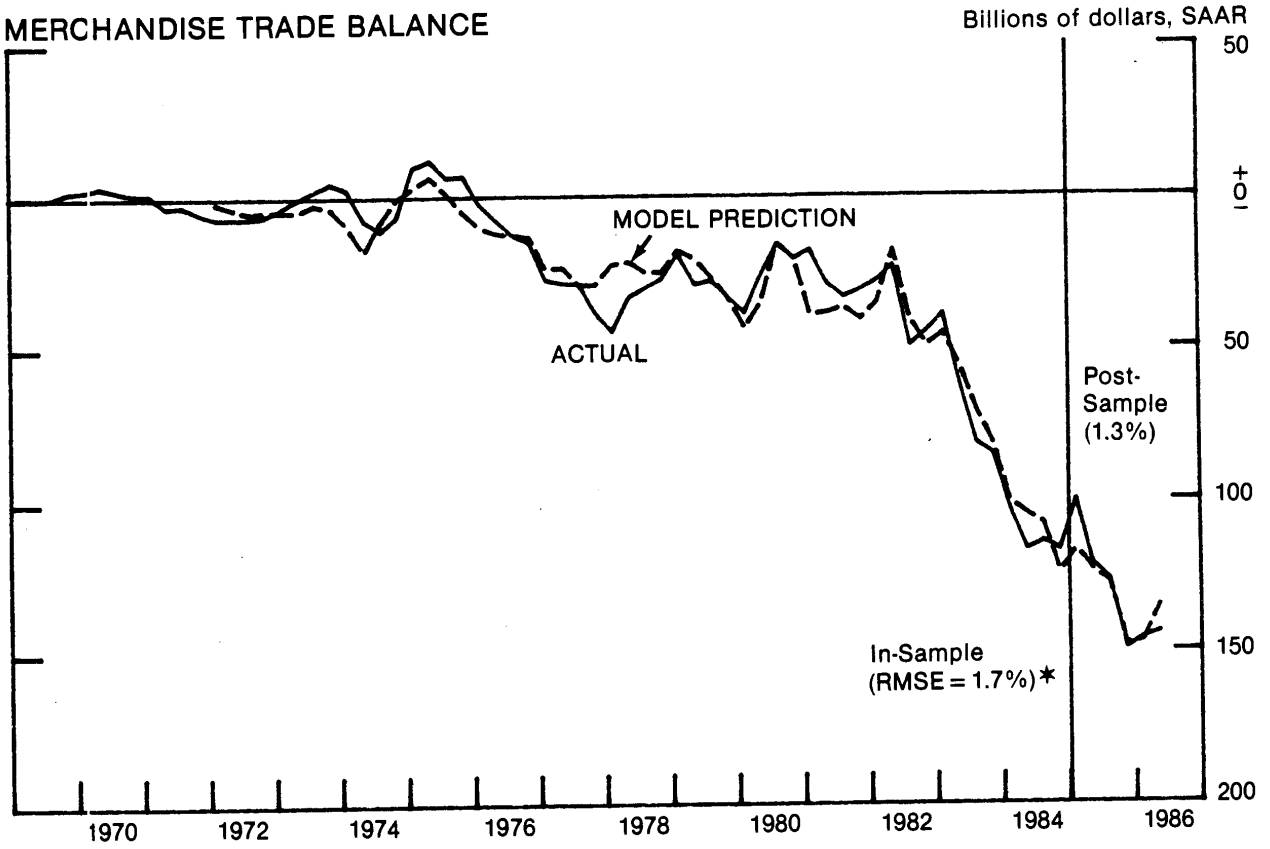
Net Investment Income Receipts (Excluding Direct Investment)

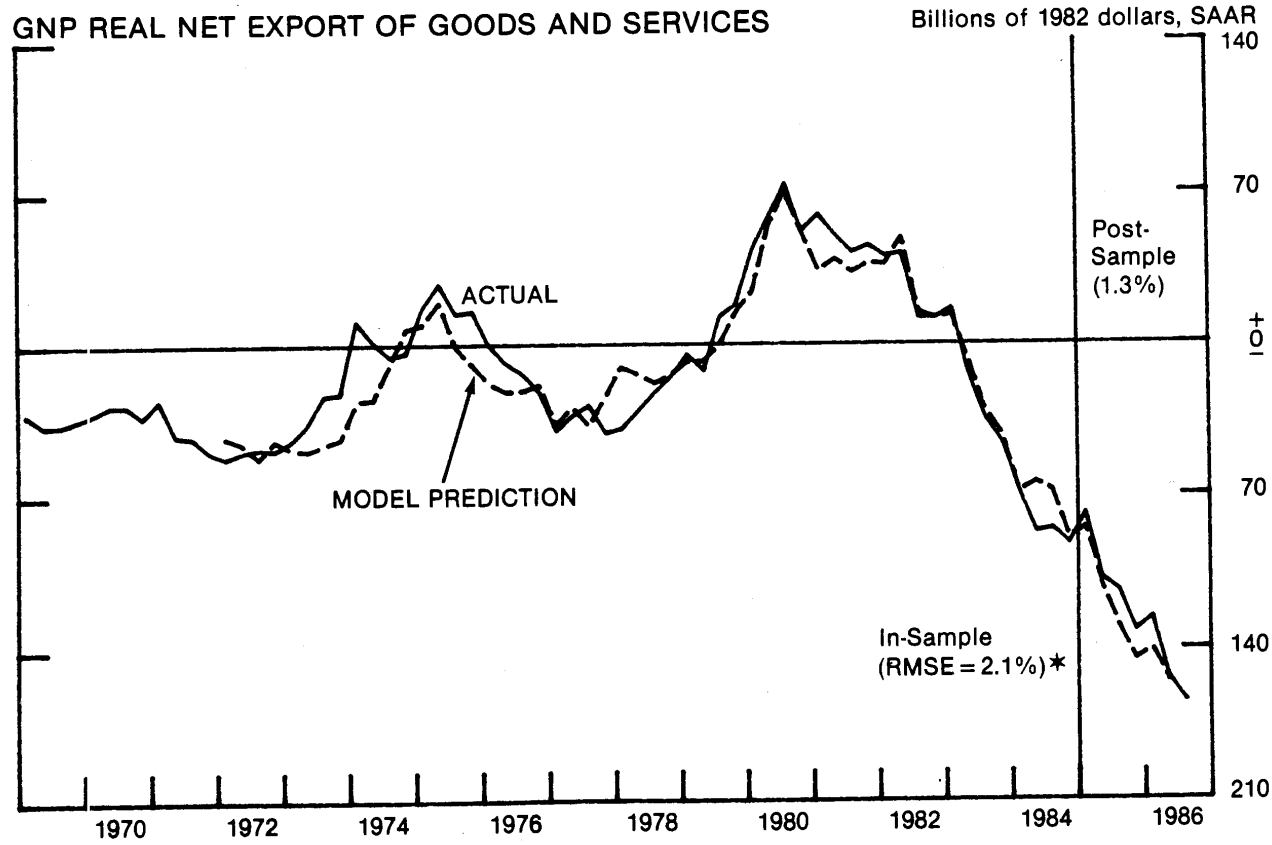


* Root mean squared error expressed as a percentage of sample mean of gross income receipts plus payments.

Chart 10

External Balance

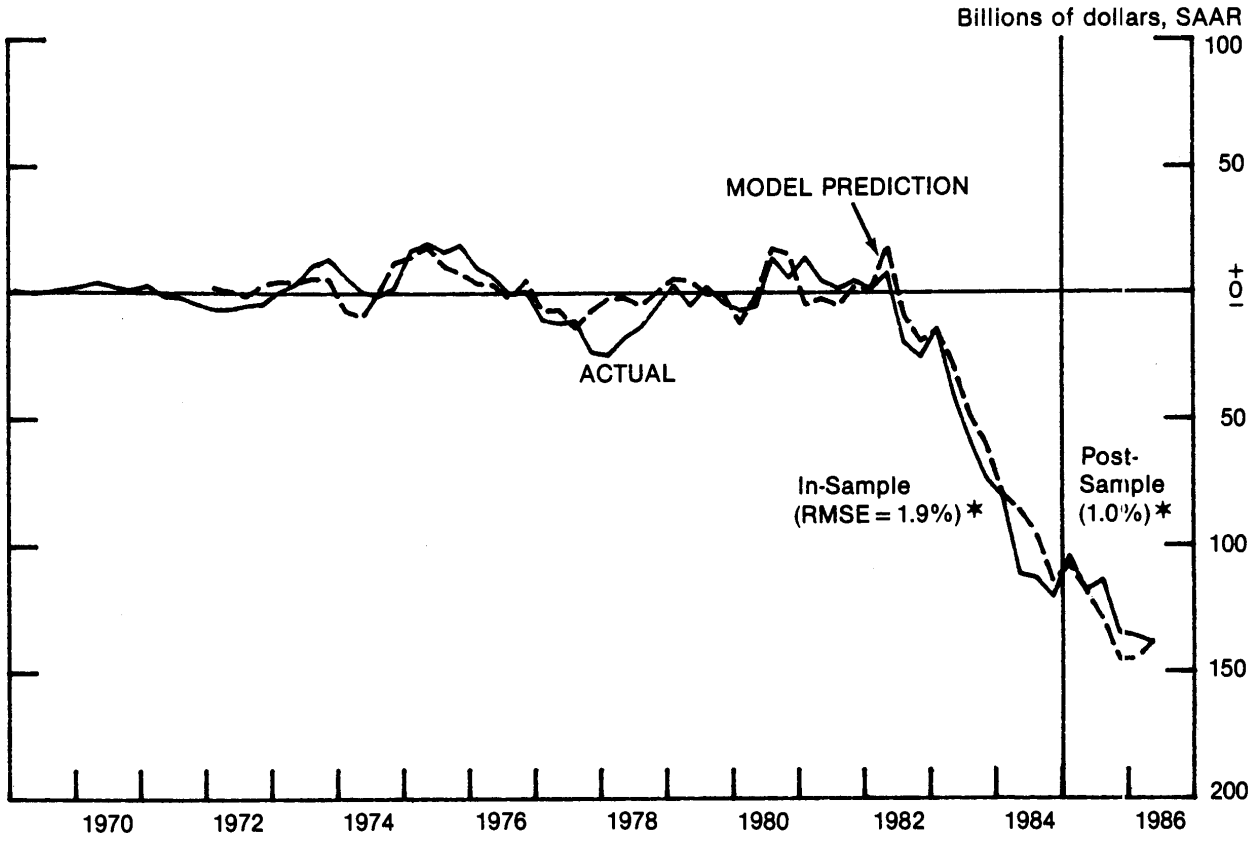




* RMSE as percentage of total imports plus exports.

Chart 11

Current Account Balance



* Expressed as a percentage of sample total imports plus exports of goods, services and transfers.

means, and in the case of balances or net flows as a percentage of the mean sum of the underlying gross flows (e.g., total exports plus imports for the trade balance). Autoregressive residuals are not included in the model predictions.

With the exception of agricultural exports, there is no indication of a significant increase in the model's prediction error during the post-sample period. The model did predict a slightly faster increase in non-oil import prices in the first half of 1986 than was realized (see Chart 8), but the error is well within the model's historical experience. (We note that 1986 data are subject to substantial revision.) As indicated in Charts 10 and 11, the model has been quite accurate in its post-sample prediction of continued declines in U.S. external balances in both nominal terms and real terms.

IV. Partial-Equilibrium Analysis of Factors Contributing to U.S. the External Deficit

This section uses the model described in the preceding section to quantify the contribution of the "proximate determinants" of the U.S. current account (income, relative prices, etc.) to the widening of the deficit during the early 1980s.

The changes in the major proximate determinants are given in Table 11. Changes over the period 1980-86H1 are shown for all of the variables. In addition, for exchange rates and other components of relative prices which influence trade volumes with a mean lag of about one year, we also show changes for the period 1980-1985Q1.

U.S. income and capacity utilization rose somewhat more than their foreign counterparts between 1980 and 1986H1. GNP growth in other

Table 11

Changes in Major Determinants of U.S. Current Account

	Logarithmic Percentage Changes*/ 1980-1986H1	1979-1985Q1 (for lagged variables
1. U.S. Real GNP	13.8	
2. Foreign Real GNP[1/]	11.6	
3. 10 Major Industrial Countries	10.1	
4. Other OECD Countries	13.1	
5. Developing Countries (excluding OPEC)	18.2	
6. OPEC	-5.7	
7. U.S. Capacity Utilization	0.7	
8. Foreign Capacity Utilization[2/]	-2.3	
9. U.S. Capital Stock	16.1	
10. Foreign Capital Stock[3/]	21.4	
11. Relative Price of Nominal Imports	-30.8	-29.6
12. Nonoil Import Price	-2.5	-4.4
13. U.S. GNP Deflator	28.3	25.2
14. Relative Price of Nonagricultural Exports	0.3	29.3
15. Nonagricultural Export Price	4.1	7.7
16. Foreign CPI[4/]	56.0	47.5
17. 10 Industrial Countries	33.2	30.0
18. 8 Developing Countries	137.8	110.1
19. Exchange Rate[4/]	52.2	69.1
20. 10 Industrial Countries	28.4	58.1
21. 8 Developing Countries	137.8	108.4
22. US PPI Export Weights	7.0	
23. Nonoil Import Price	-2.5	
24. Foreign CPI[5/]	63.1	
25. 10 Industrial Countries	31.3	
26. 8 Developing Countries	141.0	
27. Exchange Rate[5/]	51.9	57.7
28. 10 Industrial Countries	14.7	36.0
29. 8 Developing Countries	143.1	110.9
30. World Commodity Price	-27.8	-23.6

(Table 11 continued)

	Level Changes 1980-1986H1
31. Treasury Bill Rate (Percentage Points)	-4.92
32. U.S. Net Foreign Asset Position	-250.3
33. Stock of U.S. Direct Claims on Foreigners (billion $)	38.1
34. Stock of U.S. Portfolio Claims on Foreigners (billion $)	368.2
35. Stock of Foreign Direct Claims on U.S. (billion $)	113.7
36. Stock of Foreign Portfolio Claims on U.S. (billion $)	542.9
37. Statistical Discrepancy (billion $)	159.6

*/ The logarithmic percentage change (e.g., in variable X) is calculated as $100 \cdot \Delta \log X$. This measure of change has the advantage of showing quantitatively symmetrical changes for both increases and decreases.

1/ Index of real GNP in all OECD countries plus all developing countries (excluding communist countries), weighted by bilateral U.S. nonagricultural export shares.

2/ Includes 10 major industrial countries, weighted by GNP levels.

3/ Includes all OECD countries plus 10 developing countries weighted by multilateral trade shares.

4/ Includes 10 industrial countries and 8 major developing countries weighted by multilateral trade shares.

5/ Includes 10 industrial countries and 8 major developing countries weighted by bilateral U.S. nonoil import shares.

major industrial countries averaged nearly 1 percentage point (annual rate) less than U.S. growth over most of this period, and growth in OPEC countries was significantly negative. However, growth in other developing countries was well above the U.S. rate, paced by a total increase of well over 30 percent in the GNP of Asian developing countries over this period.

Next to the relatively small difference between U.S. and total foreign GNP growth, movements in relative prices were quite pronounced. The table includes several measures of foreign prices and exchange rates, some weighted by multilateral trade shares (for export volume equations). The overall price and exchange rate indexes are also divided into their industrial country and developing country components. The latter group includes two high-inflation countries (Brazil and Mexico) along with six Asian NICs. The distinction between the two periods shown in the table is most important for the relative price of nonagricultural exports, as the depreciation of the dollar between 1985Q1 and 1986H1 reversed almost all of the earlier rise in that relative price.

An analysis of factors contributing to changes in U.S. non-oil import prices and non-agricultural export prices is given in Table 12. These estimates were computed by comparing the prediction of each equation using actual values of right-hand-side variables with its prediction using right-hand-side variables held unchanged at their 1980 average values. The results indicate that a large reduction in import prices due to the rise in the dollar was almost exactly offset by a large increase in prices due to the rise in domestic prices abroad over the same period. On balance, non-oil import prices fell slightly as world commodity prices had a small negative contribution.

Table 12

Analysis of Factors Contributing to Changes in Export and Import Prices

Nonoil Import Prices	Logarithmic Percentage Change in contributing factor, 1980-1986H1	Contribution of Change price index (1982=100) 1980-1986H1
Total:		-4.3
Commodity Prices	(-27.8%)	-4.4
Foreign CPI	(+63.1%)	+51.7
Dollar	(+51.9%)	-45.3
Residual	--	-6.3
Nonagricultural Export Prices:		
Total:		3.8
U.S. Wholesale Prices	(7.0%)	+7.2
Foreign CPI	(56.0%)	+12.3
Dollar	(52.2)	-11.4
Residual	--	-4.3

U.S. export prices rose slightly, as the influence of moderate increases in export-weighted U.S. producer prices was partly offset by the net depressing effects of a higher dollar.

It is noteworthy that the increase in the export-share-weighted basket of U.S. producer prices (+7 percent) was substantially below the increase in the U.S. GNP deflator over this period (+28 percent). To a significant degree this difference reflects the relative importance in U.S. non-agricultural exports of computers and other office machinery, whose domestic prices have been falling at roughly a 10 percent annual rate in recent years.

Table 13 presents a partial-equilibrium analysis of factors that contributed to the decline in real net exports of goods between 1980 and 1986H1. Lines 1-15 show estimated contributions to each of the major components of the trade balance, based on the estimated trade volume equations in the model presented earlier. A summary of the total contribution by type of variable is given in lines 16-19. Relative GNP (and capacity utilization) was a significant factor, contributing to about one-fourth of the total widening of the deficit. Despite both the similarity of income elasticities and the relatively small margin by which GNP growth in the United States exceeded GNP growth abroad during this period, growth was still a significant factor because the average scale of U.S. real imports of goods over this period exceeded the scale of exports by a substantial margin.

This estimate of the growth contribution may be understated to some extent, inasmuch as the real purchasing power of OPEC and some other developing countries (whose export prices plunged) may have fallen more than would be suggested by the recorded declines in real GNP (which

Table 13

Analysis of Factors Contributing to Decline in U.S. Real Net Exports of Goods 1980-1986H1

	(Billions of 1982 $ SAAR)	
Change in Nonoil Import Volume		
1. Total	166	
2. Due to U.S. GNP (+13.8%)*	69	
3. " " U.S. CU/Foreign CU (+3.0%)	1	
4. " " M/US Relative Prices (-30.8%)	84	
5. " " US/Foreign Supply Proxy (-5.3%)	12	
Change in Oil Import Volume		
6. Total	-17	
7. Due to U.S. GNP (+13.8%)	23	
8. Due to conservation and lagged production responses to higher oil prices	-40	
Change in Nonag Export Volume		
9. Total	1	
10. Due to World GNP (+11.6%)	55	
11. Due to Relative Price of US Exports (0.3%)	-39	
12. Due to US/Foreign Supply Proxy (-5.3%)	-15	
Change in Ag Exports		
13. Total	-11	
14. Due to World GNP (+11.6%)	4	
15. Due to other factors, net	-15	
Memo:		
16. Total Change in Real Net Exports of Goods	-161	
17. Due to Relative GNP growth	-34	a/
18. Due to changes in competitiveness	-160	b/
19. Due to other factors (mainly oil conservation)	+33	c/

a/ Includes lines 2, 3, 7, 10, 14.
b/ Includes lines 4, 5, 11, 12 and $10 billion from line 15.
c/ Equal to line 16 minus lines 17 and 18.
*/ The numbers in parentheses are logarithmic percentage changes.

measures actual physical output). Also, estimates based on relative U.S. and foreign growth in domestic demand would probably show a substantially greater contribution due to growth factors, since the gap between U.S. and foreign domestic demand growth over this period was considerably greater than the gap between U.S. and foreign GNP growth.6/ We believe that the domestic demand approach would significantly overstate the growth contribution partly for reasons addressed in Section III pertaining to the importance of intermediate goods in U.S. trade, and partly because the gap between U.S. and foreign domestic demand growth is likely to have been widened by the direct effects of the dollar's appreciation (and the factors underlying that appreciation). However, we also recognize that the gap between U.S. and foreign domestic demand growth was significantly influenced by other factors, and that the gap between U.S. and foreign GNP growth was narrowed by the effects of the dollar's appreciation. In this light, our estimates of the partial-equilibrium contribution of "growth factors" are probably understated to some degree, particularly with respect to the impact on trade in finished goods. This discussion points out the inherent difficulties of trying to allocate "causal" contributions among jointly-determined endogenous variables in this type of exercise. The issue clearly warrants further investigation, however, in view of the potentially important policy implications attached to estimates of the relative effectiveness of "growth measures" versus "relative price measures" as a means of correcting current account imbalances.

In any event, while the growth factor was significant, our estimates suggest it was clearly dominated by the contribution of the change in competitiveness. The contributions of the changes in relative

prices of nonoil imports and nonagricultural exports alone (lines 4 and 11) accounted for over three-fourths of the total decline in real net exports. The shift in relative supply proxies (with foreign capital stock growth exceeding U.S. capital stock growth) contributed another $20 billion to the decline. Other factors, including largely the lagged response of U.S. oil consumption and production to the 1979-80 oil price hike (depressing oil imports) worked in the opposite direction to reduce the deficit.

In section II we noted that the U.S. terms of trade had changed relatively little on balance over the period 1980-1986H1. In particular, the ratio of nonagricultural export prices to nonoil import prices rose by only 6 percentage points. Nevertheless, we find that changes in relative prices associated with the rise in the dollar were the dominant factor underlying the shift in U.S. real net exports of goods. This apparent inconsistency can be explained as follows.

First, the relative price of exports is expressed in terms of foreign currency. As was illustrated in Chart 5, while the dollar price of U.S. export falls somewhat following an appreciation (as does the dollar price of U.S. imports -- see panels 2b and 3a), the foreign-currency price of U.S. exports rises by substantially more (panel 3b). Second, the relative price of exports affects export volumes with a mean lag of about one year. Export volumes in 1986H1 had been influenced most heavily by relative prices that existed in 1985H1, before the dollar had fallen significantly (see Table 11). Finally, the relative price terms include domestic price indexes in their denominators. Although nonoil import prices remained about flat in nominal terms during 1980-86H1, they

fell substantially in real terms, as U.S. domestic prices rose nearly 30 percent during that period.

Table 14 presents an analysis of factors contributing to the change in net service receipts during 1980-86H1. The right-hand column of the table shows changes in total net services, its components, and the contributions of various factors to those changes over the 5-1/2 year period, measured in billions of current dollars at annual rates. The numbers in parentheses in lines 5-17 show the levels of asset stocks and rates of return pertaining to various investment income categories in 1980 and 1986H1. The asset stocks are measured in billions of dollars, and the interest rates (in dollars) are shown in percentage points. The numbers in parentheses in lines 21-48 show <u>percent</u> changes in the various factors contributing to direct investment income and other net services.

The $13.4 billion decline in net services (line 1) was split about evenly between a decline in net investment income (line 2) and a decline in other net service receipts (line 33). In the investment income sector, a $10 billion fall in net portfolio receipts (line 3) was partly offset by a small increase in net direct investment income receipts (line 18).

The contributions of changes in assets stocks were computed at the average rate of return over the 1980-86H1 period, and the contributions of changes in rates of return at the average asset stocks. The asset stocks underlying all of the various receipts and payment categories rose over the period in question, with U.S. liabilities to foreigners (particularly private portfolio liabilities -- line 16) rising substantially more than U.S. claims on foreigners. The overall decline in the U.S. net foreign asset position had a relatively small negative

Table 14

Analysis of Factors Contributing to Changes in Services

		1980 Level	1986H1 Level	Contribution to 1980 - 1986H1 Changes (Billion $ AR)
1.	Change in Net Service Receipts			-13.4
2.	Change in Net Investment Income:			-6.8
3.	Change in Net Portfolio Income			-10.1
4.	Receipts:			17.3
5.	Government			3.4
	Due to changes:			
6.	Asset Stock	(71.9)	(119.9)	2.0
7.	Interest Rate	(3.5)	(4.9)	1.4
8.	Private			14.0
	Due to Change in:			
9.	Asset Stock	(262.2)	(594.2)	32.9
10.	Interest Rate	(12.2)	(7.9)	-18.9
11.	Payments:			27.4
12.	Government			9.9
	Due to change in:			
13.	Asset Stock	(137.1)	(255.0)	10.6
14.	Interest Rate	(9.2)	(8.9)	-.7
15.	Private			17.5
	Due to Change in:			
16.	Asset Stock:	(246.4)	(659.0)	29.6
17.	Interest Rate	(8.5)	(5.8)	-12.1
18.	Change in Net Direct Investment Income Receipts			3.3
19.	Receipts			3.0
			% Change 1980-86H1	
	Due to change in:			
20.	Asset Stock		(19.2)	5.1
21.	Foreign Capacity Utilization		(-4.5)	-11.1
22.	Foreign CPI		(82.2)	21.3
23.	Exchange Rate		(78.5)	-19.9
24.	Other			7.6
25.	Payments			-0.3
	Due to change in:			
26.	Asset Stock		(94.3)	11.2
27.	U.S. Capacity Utilization		(0.0)	-1.7
28.	U.S. GNP Deflator		(28.3)	4.6
29.	Other			-14.4

(Table 14 continued)

	Total Change in Net Investment Income Due to:		
30.	Change in asset stocks		-11.4
31.	Change in rates of return		-10.6
32.	Other		22.0
33.	Change in net other service receipts		-6.6
34.	Change in net military receipts		-1.3
35.	Change in net other receipts (excl. military)		-5.3
36.	Change in other service receipts (excl. military)		9.6
		(1980-86H1 % Changes)	
37.	Foreign GNP	(13.1)	4.4
38.	Foreign CPI	(103.8)	21.6
39.	Exchange rates	(101.0)	-20.5
40.	U.S. real exports	(-4.4)	-0.4
41.	Other service receipts deflator	(26.0)	4.8
42.	Other		0.6
43.	Change in other service payments (excl. military)		14.9
44.	U.S. GNP	(13.8)	4.2
45.	U.S. GNP deflator	(28.3)	7.2
46.	U.S. real imports	(46.1)	4.9
47.	Other service payments deflator	(4.2)	1.0
48.	Other		2.4

1/ The numbers in parentheses are logarithmic percentage changes.

impact on net income receipts, however (see line 30). This is largely because the average rate of return on U.S. private portfolio investments abroad was significantly higher than that on foreign investments in the United States. (Compare the interest rate levels shown in lines 10 and 17). A significant part of U.S. private portfolio liabilities to foreigners is in corporate stocks, whose returns other than capital gains (which are not included in the investment income accounts) are typically fairly low. Also, a large share of U.S. portfolio claims and liabilities represents intermediation by U.S. banks, who typically earn more on their loans and related activities abroad than they pay on their liabilities to foreigners.

The decline in interest rates on net portfolio receipts (lines 7, 10, 14 and 17) and the depressing effects of the rise in the dollar on direct investment income receipts both contributed to the overall reduction in U.S. net investment income receipts (line 31). Our estimates of factors contributing to direct investment income flows should be taken with caution, however, in view of the large residuals in these equations (reflected in lines 24 and 29).

The moderate decline in other net services excluding net military receipts (line 34) can be attributed largely to the effects of the dollar's real appreciation (as indicated by the combined effects shown in lines 37, 38 and 45). The net effects of U.S. and foreign growth (lines 36 and 44) were close to zero.

V. Analysis of Fundamental Determinants.

This section draws on the results of various multicountry model simulations to assess the contribution of changes in fiscal policies in

the United States and abroad to the widening of the U.S. external deficit.

Table 15 presents several different quantitative estimates of exogenous changes in government budget deficits in the seven major industrial countries between 1980 and 1985. The first two columns present IMF estimates of structural or cyclically-adjusted federal and general (including federal state and local) government budget balances. The third column presents the OECD's estimate for general balances. In principle, these estimates are designed to indicate the overall thrust of exogenous shifts in fiscal policy, with positive numbers denoting contractionary shifts. The IMF and OECD appear to agree that for the six non-U.S. countries shown, structural general budget balances increased by something on the order of 2-1/2 percent of GNP between 1980 and 1985. At the same time, the U.S. federal budget balance fell by roughly 3-1/2 percent of GNP. (In the U.S. case, unlike most other industrial countries, the federal balance as opposed to the general balance is probably the more appropriate exogenous policy measure.) The widening of the U.S. structural deficit took place fairly steadily over the five-year period.

Table 16, presents a summary of simulations reported by the Federal Reserve Board Staff's Multicountry Model (MCM) and an average of 9 out of 12 models that participated in a March 1986 Brookings conference.7/ The results of three simulations are given: a sustained U.S. fiscal contraction equal to 1 percent of baseline GNP, a fiscal expansion in other OECD countries equal to 1 percent of baseline GNP, and a 25 percent nominal depreciation of the dollar against other OECD currencies, on average. The table shows the impacts of each of these

Table 15

Fiscal Policy: Cumulative Exogenous Changes in Budget Balances 1980-85 */
(as percent of GNP/GDP)

	IMF Fiscal Impulse (Central/Federal Government	IMF Fiscal Impulse (General Government)	OECD Change in Structural Budget Balance (General Government)
Germany	2.9	4.4	3.1
Japan	1.5	3.5	4.0
United Kingdom	3.0	3.8	4.1
France	0	3.2	1.3
Italy	-.5	.8	-1.3
Canada	-2.4	-2.9	-2.6
Average of 6 above	1.2	2.8	2.3
United States	-3.7	-2.3	-2.3

*/ A positive number indicates a fiscal contraction, an increase in the structural budget surplus, or a reduction in the structural deficit.

Source: IMF estimates: World Economic Outlook, April 1986.
OECD estimates: Economic Outlook, various issues.

Table 16
Current Account and Exchange Rate Effects of Fiscal Shocks:
Multicountry Model Simulation Results */

No. Years after onset of Shock	Impact on: U.S. Current Account (billions of dollars) MCM	Nine Models Average	Nine Models Range	Dollar's Real Exchange Rate (Percent) Nine Models MCM	Nine Models Average
A. U.S. Fiscal Contraction 1/					
1	10	8	(2-19)	-1.6	-1.5
3	23	14	(6-28)	-3.5	-2.0
5	41	20	(5-47)	-4.6	-2.5
B. Fiscal Expansion in Rest of OECD 2/					
1	6	8	(2-23)	-.7	-1.1
3	8	8	(3-17)	0	-1.1
5	6	8	(1-28)	.2	-1.4
C. "Exogenous" Nominal Depreciation of the Dollar 3/					
1	0	4	(-15-41)	5	6
3	12	20	(-3-59)	19	18
5	25	30	(7-77)	20	15

1/ Sustained cut in government spending equal to 1 percent of GNP.
2/ Sustained increase in Government spending equal to 1 percent of GNP.
3/ 25 percent rise in the dollar against industrial country American over 3 years.
*/ Source: Bryant et. al. (forthcoming).

shocks (relative to baseline) after 1, 3 and 5 years on the U.S. current account and the dollar's real (CPI-adjusted) exchange rate against industrial-country currencies. For the current account we present both the nine-model average and the range.

The MCM's current account responses are considerably above the average for the U.S. fiscal shock, about equal to the average for the foreign fiscal shock, and somewhat below average for the exchange rate shocks. There is general agreement among the average, at least, that the U.S. fiscal contraction has a larger effect than the foreign fiscal expansion on both the current account and the dollar's exchange rate. (The dollar does depreciate in both cases.) The current account effect grows over time in the case of the U.S. shock, unlike the foreign shock. This can be attributed in part to the greater exchange rate change (which has lagged effects) in the U.S. case, and in part to differences in the impacts of the shocks on net investment income.

These results can be explained in turn, as follows. The fiscal shocks were run with monetary policy (i.e., money growth) held unchanged. Most models (including the MCM) showed a significantly larger decline in U.S. real interest rates for the U.S. fiscal contraction than they did increases in foreign real rates for the foreign fiscal expansion. (In the MCM, at least, this can be attributed in part to differences in money demand parameters across countries.) The greater interest rate change in the U.S. case produced both a greater real exchange rate change and a greater reduction in U.S. net investment income payments.

Using the simulation results in Table 16, we present in Table 17 a very rough calculation of the contribution of the 1980-85 fiscal

Table 17

Analysis of Contribution of Fiscal Policies and Additional Dollar Depreciation

1. Impact of U.S. Fiscal Expansion 1980-85 on:		
a. Level of U.S. current account deficit in 1986 3.5% x -$20 bil =	-$70 bil.	
b. CPI-adjusted $ exchange rate 3.5% x +3% =		+10.5%
2. Impact of Foreign Fiscal Contraction 1980-85 on:		
a. Level of U.S. current account deficit in 1986 -2.5% x $10 bil. =	-$25 bil.	
b. CPI-adjusted $ exchange rate -2.5% x 0 =		0
3. Total net effects of U.S. and foreign fiscal policy shifts	-$95 bil.	+10.5%
4. Total CPI-Adjusted Depreciation of the Dollar a. 1980-1985, Against: G-10 Currencies* b. G-10 + 8 LDC's*		+56% +48%
5. Impact of additional 40% $ appreciation on Current Account deficit	-$40 bil.	
Total Change in U.S. Current Account 1980-1986H1 -	-$147 bil.	

*/ Weighted using multilateral trade shares.

policy shifts. Based on the various simulation results, we have chosen to estimate the U.S. current account effects of U.S. and foreign fiscal shocks (equal to 1 percent of GNP) to be $20 billion and $10 billion respectively. We accept the asymmetry between current account effects of the U.S. and foreign fiscal shocks, partly because the U.S. fiscal shock directly affects all of U.S. imports, whereas the foreign fiscal shock directly affects only about two-thirds of a noticeably smaller volume of U.S. exports (with exports to developing countries not being directly affected). Also, the U.S. shock appears to have a greater impact through greater exchange rate changes than the foreign shock. We assume, based on the results in Table 16, that the U.S. shock results in a 3 percent real dollar depreciation, while the foreign shock results in no changes in exchange rates.

Since the Brookings model comparison exercise documented in Bryant et. al. showed the model simulation results to be linear and symmetrical to a reasonable approximation, we can apply these estimates to the actual fiscal policy changes presented in Table 15. The calculations in Table 17 are straightforward. A U.S. fiscal expansion equal to 3-1/2 percent of GNP results in a $70 billion reduction in the current account (line 1a). Part of this reduction can be attributed to a 10 percent real appreciation of the dollar associated with the fiscal shocks (line 1b). The foreign fiscal contraction contributed another $25 billion to the deficit, none of which was associated with dollar appreciation. On this basis, fiscal policy shifts accounted for nearly two-thirds of the decline in the U.S. current account, but only about one-fifth of the dollar's real appreciation.

As indicated in Chart 12, much of the longer-term movement in the CPI-adjusted dollar against the currencies of other major industrial countries over the past decade has been fairly closely associated with swings in the difference between U.S. and other industrial country long-term real interest rates. Based on MCM simulations, less than half of the rise in the real interest differential between 1979 and 1982 can be attributed to fiscal policy shifts (See Hooper (1985)). In addition, the dollar appreciated substantially in 1984 and early 1985 even as the interest differential was falling. In brief, much of the rise in the dollar must be attributable to other factors.

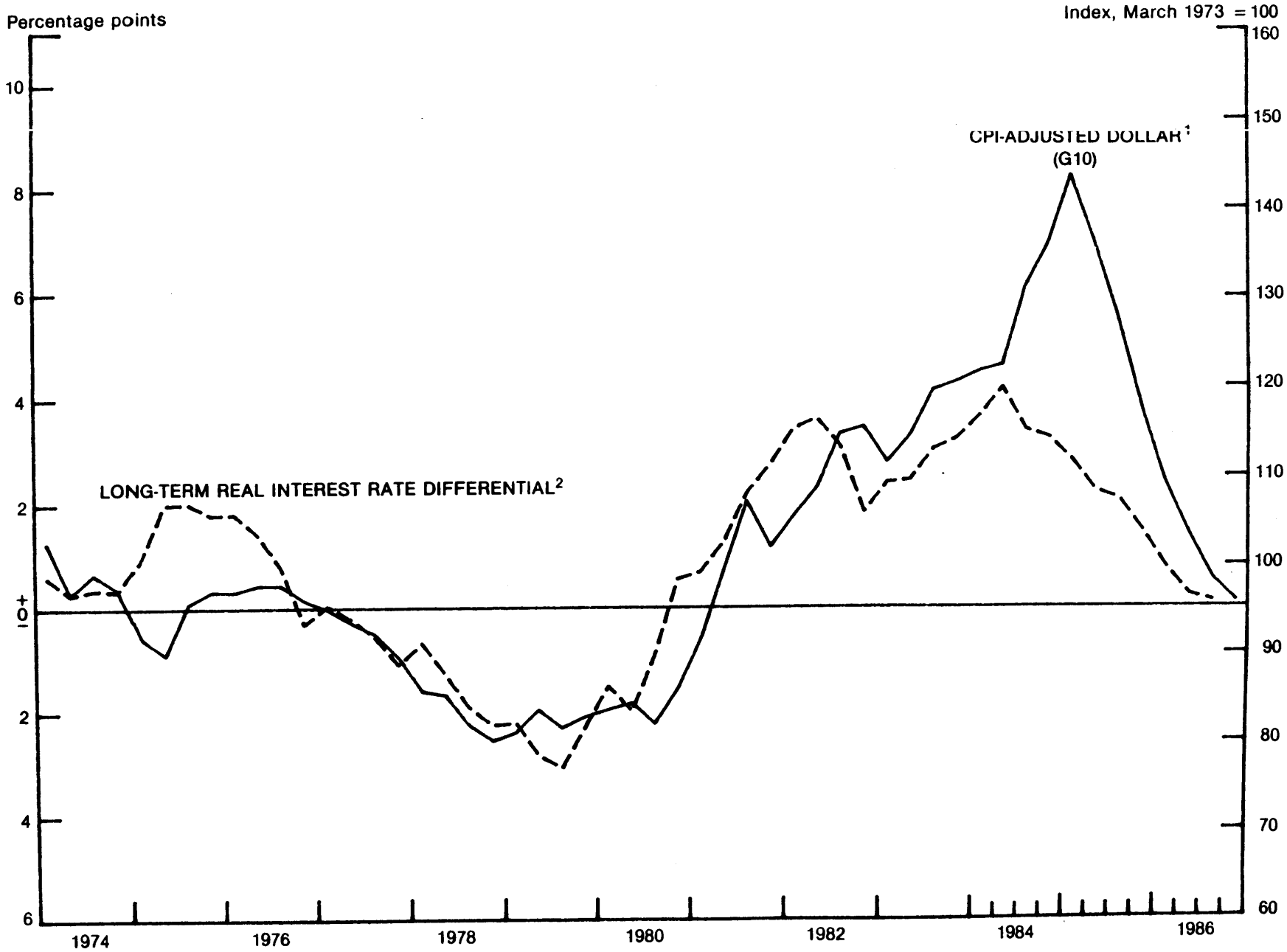
Line 5 in Table 17 presents an estimate of the contribution of this additional appreciation to the current account, based on the full model simulations results shown at the bottom of Table 16. We have assumed that a 25 percent appreciation would reduce the current account by $25 billion. This estimate is considerably smaller than our partial-equilibrium current account model would suggest, partly because the full model simulations treat income and prices endogenously. An "exogenous" exchange rate shock induces shifts in income that feed back to reduce the exchange rate's direct effect on the current account. Simulations with the MCM suggest that such feedbacks can reduce the partial-equilibrium current account effects of an exchange rate shock by at least 50 percent.

VI. Recent Changes in U.S. Price Competitiveness

Given the importance of the decline in U.S. price competitiveness during the early 1980s to the widening of the U.S. deficit, any significant reversal of the deficit will require a significant recovery of U.S. price competitiveness. By some measures,

Chart 12

Dollar's Real Exchange Rate and Real Interest Rate Differential



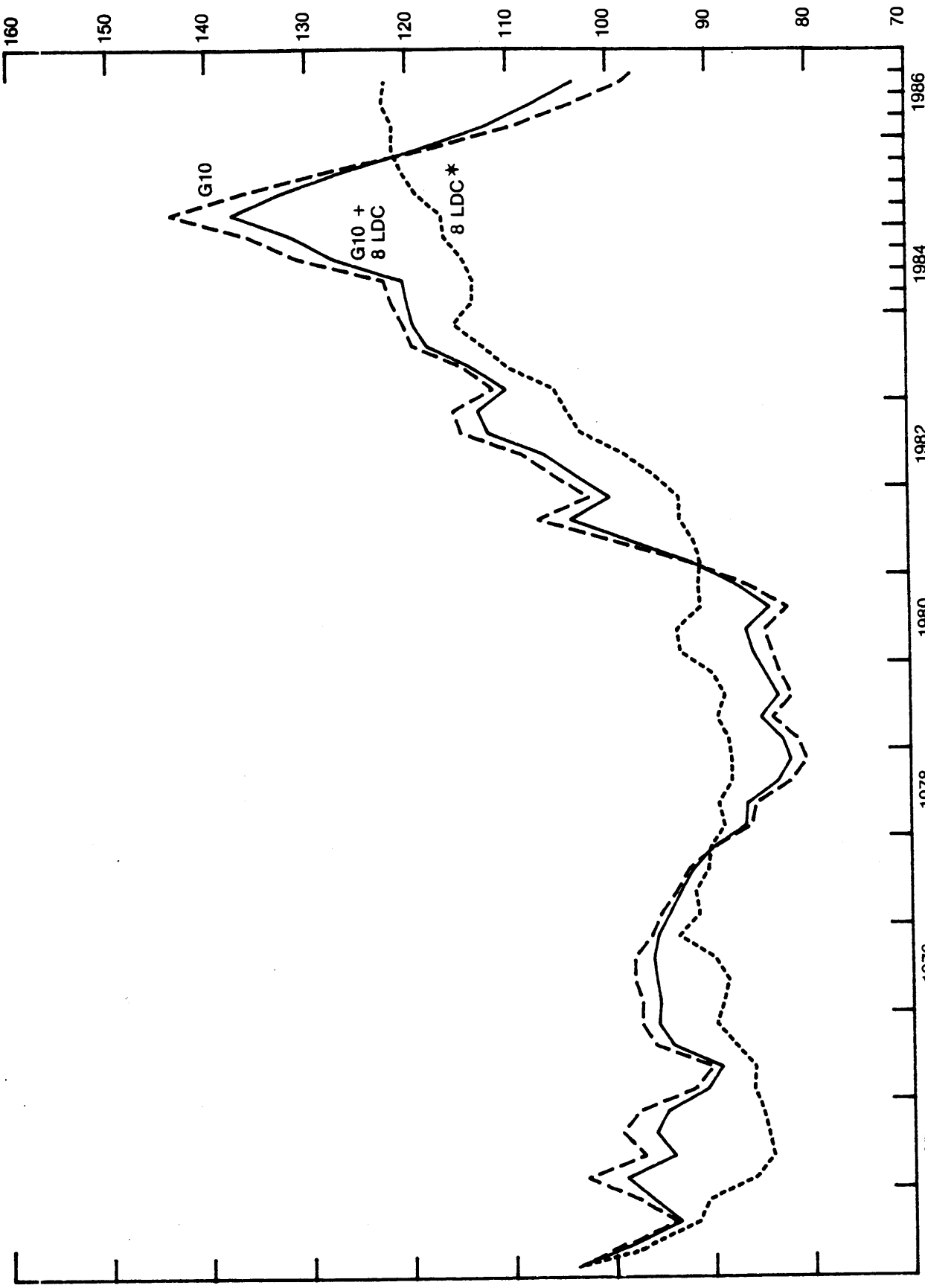
1. All data are quarterly averages. The price adjusted dollar is the Federal Reserve Board's weighted average index of the exchange value of the dollar against the currencies of the foreign Group-of-Ten countries plus Switzerland, where nominal exchange rates are multiplied by relative levels of consumer 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.

the dollar has declined substantially in the past year and a half, but it has not yet had a visible impact on the U.S. trade balance either in nominal terms or in real terms.

Several explanations involving factors that may have diminished the apparent gain in U.S. price competitiveness have been offered to explain this result. One is that the Federal Reserve Board staff's exchange rate index, which includes only the currencies of G-10 countries, gives a misleading picture of movements in the dollar. Other indexes, such as one recently constructed by the Federal Reserve Bank of Dallas that includes a number of developing country currencies shows very little decline in the dollar. However, the Dallas index is significantly biased by the inclusion of exchange rates for a number of high inflation Latin-American countries in nominal terms. Chart 13 shows several indexes in real terms (all adjusted for relative consumer prices), including: 1) the FRB G-10 index, 2) an index for 8 major developing countries (including Mexico, Brazil, Korea, Taiwan, Hong Kong, Singapore, Malaysia and the Philippines), and 3) an index combining the other two using 1978-83 world trade weights. Although the dollar has continued to appreciate in real terms against the 8 developing country currencies, it has still reversed about two-thirds of its earlier rise against the total basket of 18 currencies. When the index is constructed using bilateral U.S. nonoil import shares as weights (Chart 14), the dollar has fallen less, but it has still reversed over half of its earlier rise. Given the importance of German and Japanese competition with the United States in third markets, the multilateral index is probably a better indicator for

Chart 13

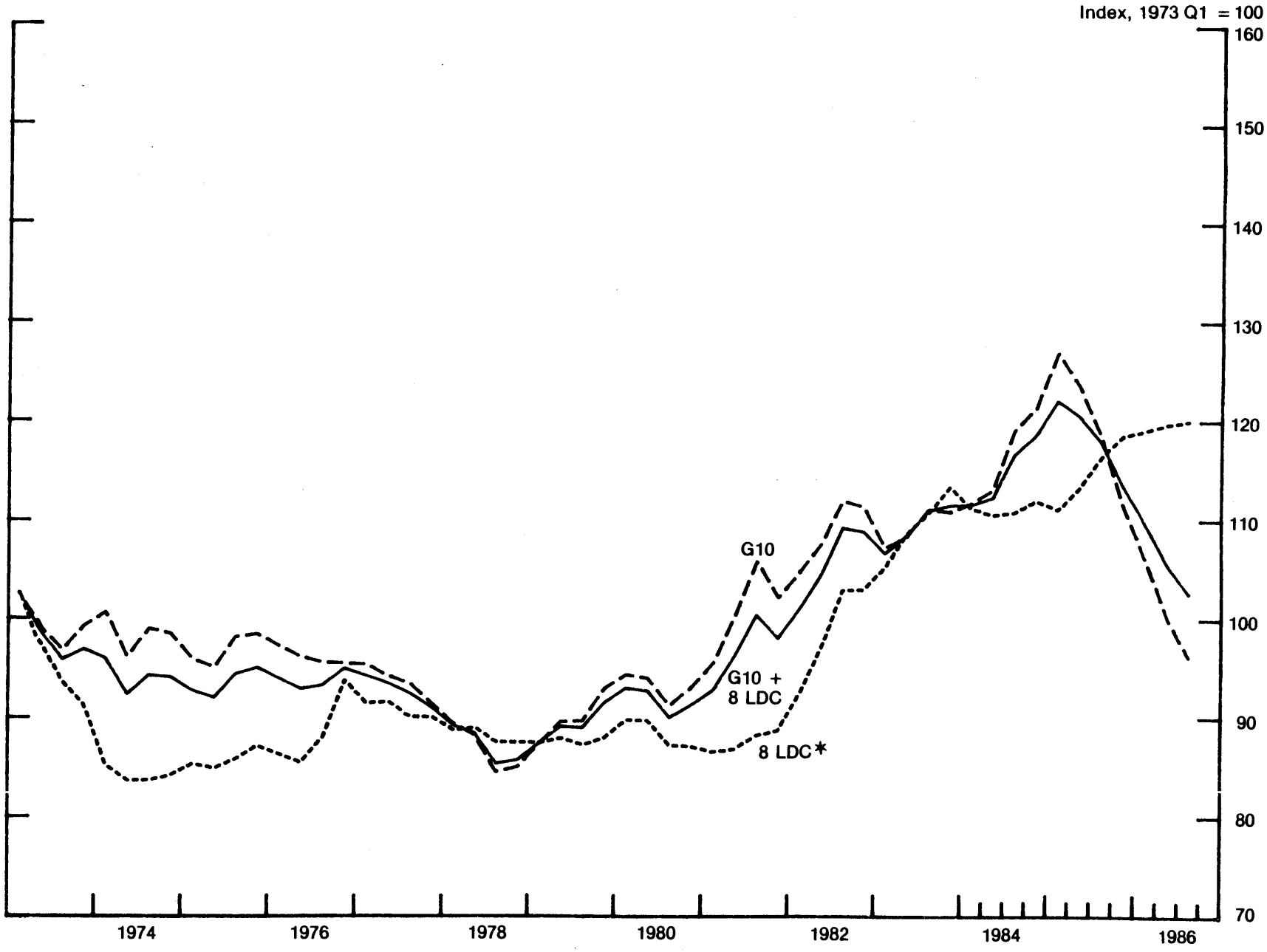
Alternative Indexes of the Dollar's CPI-Adjusted Exchange Rate, Weighted by Multilateral (World) Trade Shares



* Mexico, Brazil, Hong Kong, Malaysia, Philippines, Singapore, South Korea, and Taiwan.

Chart 14

Alternative Indexes of the Dollar's CPI-Adjusted Exchange Rate, Weighted by Bilateral U.S. Nonoil Import Shares



* Mexico, Brazil, Hong Kong, Malaysia, Philippines, Singapore, South Korea, and Taiwan.

the price competitiveness of U.S. exports, whereas the bilateral (import-weighted) index is probably more important to understanding the behavior of nonoil import prices.

A second reason that might be considered, drawing on Marston's (1986) work, is that the strong trend growth in Japanese labor productivity in manufacturing may be significantly offsetting the effects of the dollar's fall against the yen in nominal terms. Data on comparative manufacturing unit labor costs in dollars, shown in Table 18, suggest this is not the case. Indeed, even expressed in terms of local currencies, Japanese unit labor costs have risen relative to U.S. unit labor costs since early 1985, so that the fall in the dollar is more than fully reflected in a gain in U.S. competitiveness in terms of relative unit labor costs in dollars.

Finally, it has been suggested that foreign exporters, after having increased their profit margins significantly during the dollar's rise, have had ample room to cut their margins during the dollar's fall. Mann (1986) provides empirical evidence to support this point using U.S. import price data and proxies for foreign cost data. Transitory behavior of this type is also evident in the estimated aggregate nonoil import price equation discussed in Section II above. Different theoretical bases for such behavior can be found in Mann (1986) and Baldwin and Krugman (1986). The latter study suggests that significant fixed costs to market entry may lead export firms to stay in the market longer (i.e. cut their profit margins more) in the face of a home currency appreciation than they would if entry costs were not significant.

Data on comparative U.S., German and Japanese export prices published by the Bureau of Labor Statistics provide a mixed picture,

Table 18

U.S. German and Japanese Unit Labor Costs

		Logarithmic Percentage Changes	
		1980Q2 - 1985Q1	1985Q1 - 1986Q2
1.	U.S.	11.0	-0.2
2.	Germany (local currency)	7.8	3.7
3.	(in $)	-50.9	40.9
4.	Japan (local currency)	8.6	3.6*
5.	(in $)	-2.1	35.4*
6.	Ratio U.S./Germany (in $)	62.0	-41.0
7.	U.S./Japan (in $)	13.2	-35.6*

*/ Through 1986Q1 for Japan.
Source: Germany and Japan: OECD Main Economic Indicators; U.S.: BLS.

however. U.S. price competitiveness vis-a-vis these two countries is of particular importance, partly because these two countries represent the United States' major export competitors in world markets for manufactured goods, partly because the two were running a combined current account surplus of roughly $105 billion at an annual rate during the first half of 1986 (compared with the U.S. deficit of $145 billion), and partly because it is against the currencies of these two countries that the dollar has fallen most noticeably since early 1985. Any significant decline in the U.S. deficit is likely to be reflected in a decline in Japanese and German surpluses.

Table 19 presents changes in the ratios of U.S. export prices to German and Japanese export prices for various aggregate commodity categories over the periods before and after the dollar's peak in March 1985.

The price data underlying the ratio changes shown in the table were obtained from national sources, based on surveys of actual transactions prices adjusted for shifts in quality. The overall U.S.-German and U.S.-Japanese ratios were aggregated from ratios for narrowly defined commodity categories using 1980 German and Japanese export shares, respectively.

The data suggest that movements in U.S.-German export prices in dollars have followed very closely both the change in the DM/$ exchange rate and movements in U.S.-German unit labor costs in dollars. In brief, there is little evidence to suggest significant shifts in profit margins by German exporters. In the Japanese case, however, evidence of a shift in profit margins is apparent. The ratio of U.S. to Japanese export prices has fallen noticeably less than either the yen-dollar exchange

Table 19

Changes in U.S. Export Price Competitiveness of vis a vis Japan and Germany*

		Logarithmic Percentage Changes**/	
		June 1980-March 1985	March 1985-June 1986
Yen/$ Nominal Rate		+17	-43
CPI-Adjusted Yen/$		+29	-42
WPI-Adjusted Yen/$		+34	-36
Ratio of U.S. Export Prices to Japanese Export Prices.			
All Products	(1.0)	+26	-20
Chemicals	(.07)	+6	-3
Metal Products	(.18)	+24	-6
General Machinery	(.21)	+27	-29
Elec. Machinery	(.19)	+25	-16
Transport Equip.	(.24)	+26	-27
Misc. Manuf. Goods	(.08)	+25	-19
Household Elec. Equip.	(.10)	+15	-15
Intergrated Circuits	(.01)	+72	-16
DM/$ Nominal Rate		+62	-39
CPI-Adjusted DM/$		+69	-36
WPI-Adjusted DM/$		+60	-37
Ratio of U.S. Export Prices to German Export Prices			
All Products	(1.0)	+60	-36
Chemicals	(.13)	+44	-36
Machinery Transport	(.44)	+69	-39
Other Manuf. Goods	(.32)	+59	-35

*/ + = increase in U.S. relative prices or decline in U.S. price competitiveness. Numbers in parenthesis are weights in total indexes (based on 1980 Japanese and German export shares).

**/ The logarithmic percentage change (e.g., in variable X) is calculated as $100 \cdot \Delta \log X$. This measure of change has the advantage of showing quantitatively symmetrical changes for both increases and decreases.

Source: Exchange Rates: FRB, Export prices: BLS.

rate or the ratio of U.S. to Japanese unit labor costs in dollars. In both the German and Japanese cases, however, substantial gains in U.S. export price competitiveness have taken place over the past year. To the extent that price competitiveness is an important factor in determining trade flows, U.S. exports should begin to regain some of their recent losses in world market shares over the year ahead.

These shifts in relative export prices may not have been fully reflected in the relative price of U.S. imports. Between the first quarter of 1985 and the fourth quarter of 1986, U.S. nonoil import prices (based on BLS data) rose by about 12 percent. The prices of imports from Canada and developing countries, against whose currencies the dollar has not changed appreciably, would have tended to hold down the total import price increase. It is also conceivable that German and Japanese exporters have been less inclined to raise their dollar export prices in the U.S. market than they have in other markets.

FOOTNOTES

1/ The difference between the two series reflects movements in the statistical discrepancy, or unreported transactions, in the U.S. international accounts, as well as valuation effects (due principally to exchange rate changes) that are included in the solid line but not the dashed line. The solid line in Chart 2 implicitly treats the discrepancy as unreported current account transactions, while the dashed line implicitly treats it as unreported capital flows. To the extent that the statistical discrepancy reflects unrecorded capital flows the recorded series (or the solid line in the chart) gives an optimistic picture of the present U.S. external investment position.

2/ See Edison et. al. (1986) for a description of the full MCM.

3/ Tariff rate equals tariff receipts obtained from the monthly Treasury Bulletin divided by the nonoil import value.

4/ Countries include each major industrial country (OECD and South Africa), plus Mexico and two regions -- OPEC and NonOPEC LDCs (excluding Mexico) -- in the foreign income variables. In the relative price term, the foreign G-10 represent the industrial countries and eight LDCs, represent the developing countries (Mexico, Brazil, Taiwan, Singapore, Hong Kong, South Korea, Philippines, Malaysia).

5/ When the nonoil import volume equation was estimated with total domestic expenditure rather than GNP, the capacity utilization coefficient dropped to zero, and the price elasticity fell somewhat.

6/ The decline in U.S. real net exports between 1980 and 1986H1 amounted to over 5 percent of real GNP. The same increase in foreign real net exports amounted to something on the order of 2-3 percent of foreign GNP,

which means that the gap between U.S. and foreign domestic demand increases would have been 7-8 percentage points greater than the gap between U.S. and foreign GNP increases. (Domestic demand is defined as GNP less net exports.)

7/ The results will be presented in Bryant et. al. (forthcoming). The nine models included in the averages presented in Table 16 are: DRI, EC COMPACT, LINK, Minford-Liverpool, IMF-MINIMOD, MCM, McKibben-Sachs model, OECD Interlink, Taylor model. Several other models were excluded from the average either because they were unable to run the simulations correctly or because they were obvious outliers.

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