

INTERNATIONAL MONETARY FUND



Staff Country Reports

September 1995

IMF Staff Country Report No. 95/94

United States—Background Papers

These background papers on the United States were prepared by a staff team of the International Monetary Fund as background documentation for the periodic consultation with this member country. In releasing this document for public use, confidential material may have been removed at the request of the member.

Copies of this report are available to the public from

International Monetary Fund • Publication Services
700 19th Street, N.W. • Washington, D.C. 20431

Telephone: (202) 623-7430 • Telefax: (202) 623-7201

Telex (RCA): 248331 IMF UR

Internet: publications@imf.org

Price: \$15.00 a copy

International Monetary Fund
Washington, D.C.

This page intentionally left blank

INTERNATIONAL MONETARY FUND

UNITED STATES OF AMERICA

Background Papers

Prepared by E. Buckberg (PDR), C. Kramer (WHD), D. Laxton (RES),
M. Leidy (PDR), W. Lee (WHD), S.E. Oppers (WHD), C. Reinhart (WHD),
S. Symansky (RES), A. Thomas (WHD), and C. Towe (WHD)

Approved by the Western Hemisphere Department

July 24, 1995

Contents

Page

Basic Data	vii-viii
I. Introduction	1
II. U.S. Fiscal Deficit Reduction and the U.S. Dollar	4
1. The short-run effects of fiscal policy in standard models	4
2. The effect of a risk premium	7
3. The response of monetary policy to a fiscal contraction	8
4. The medium- and long-term implications of government debt	10
III. The Real Effective Value of the U.S. Dollar, the Fiscal Deficit, and Long-Run Balance of Payments Equilibrium	17
1. Introduction	17
2. Long-Run Balance of Payments Equilibrium and the Real Exchange Rate	17
a. A model of balance of payments equilibrium	17
b. Long-run balance of payments equilibrium and the fiscal deficit	19
3. Data	20
4. Results	22
5. Conclusion	26
Appendix Data	29

<u>Contents</u>	<u>Page</u>
IV. Trends in the International Use of the U.S. Dollar	30
1. Introduction	30
2. The international uses of a currency	31
3. Trends in the use of the dollar as an international unit of account	33
4. Trends in the use of the dollar as an international medium of exchange	36
5. Trends in the use of the dollar as an international store of value	38
6. Conclusion	45
V. Capital Flows and Exchange Rate Volatility: Evidence from the United States	49
1. Introduction	49
2. Capital account developments and characteristics	51
3. Exchange rate volatility, excess returns, and capital flows	54
4. Excess returns, interest rate volatility, and capital flows	59
5. Foreign official intervention	61
6. Concluding remarks	62
VI. Asymmetries in the U.S. Output-Inflation Process	67
1. Introduction	67
2. Models of the Phillips curve	68
3. Testing of asymmetries in the U.S. data	70
4. Policy implications of asymmetries	75
5. Conclusions	78
VII. Tax Overhaul Proposals: Replacing Income Tax with Consumption Taxation	81
1. The flat tax proposal	82
2. Saving-exempt income tax	84
3. The equivalence between the flat tax and the consumption tax	87
4. Distributional implications of the tax proposals	88
5. Administrative and compliance gains from tax simplification	91
6. Macroeconomic efficiency issues	92
7. The expected effect of tax reform on labor supply	94
8. Other macroeconomic issues	94
9. Transition issues	95

<u>Contents</u>	<u>Page</u>
VIII. Tax-Assisted Saving in the United States: A Review and Assessment	99
1. U.S. tax assistance for saving	99
2. Recent proposals for enhanced saving incentives	100
3. A simple analysis of saving incentives	101
4. The effect of tax incentives on saving	102
5. Further evidence from household survey data	104
a. An analysis of tax-assisted saving	105
b. An analysis of 1989 asset shares	112
6. Conclusion	112
Appendix. Data	117
IX. International Trade and Investment Policies	119
1. The Uruguay Round Agreement	119
a. Estimated effects of the Uruguay Round on the United States	120
b. MFN tariff cuts and bindings	121
c. Textiles and clothing	121
d. The agreement on agriculture	123
2. The North American Free Trade Agreement (NAFTA) and the Free Trade Area of the Americas (FTAA)	123
3. Asia-Pacific Economic Cooperation Forum (APEC)	126
4. Other international agreements and the resolution of trade disputes	127
a. Agreements reached under the U.S.-Japan Framework talks	127
b. Dispute settlement activity under GATT/WTO	129
5. Import policies and measures	130
6. Developments under Section 301 and special 301	132
a. China	133
b. U.S.-Japan auto dispute	133
c. The banana dispute	135
d. Korea	136
e. Canada	136
f. U.S.-Japan film dispute	137
7. Trade preferences for developing countries	137
8. Foreign investment	137
9. Other measures and issues	137
X. Official Development Assistance	140

	<u>Contents</u>	<u>Page</u>
Tables		
I-1.	Additional Background Material	3
II-1.	The Effects of a Cut in the U.S. Fiscal Deficit	6
II-2.	The Effects of a Reduction in the Risk Premium on U.S. Securities	9
II-3.	The Effects of a Cut in the U.S. Fiscal Deficit with Unchanged Nominal Interest Rates	11
IV-1.	The International Use of the Dollar	32
IV-2.	Currency Denomination of Trade Invoicing in France, Germany, Italy, Japan, the United Kingdom, the United States, and OPEC	34
IV-3.	Exchange Rate Arrangements	35
IV-4.	Currency Distribution of Foreign Exchange Intervention in the European Monetary System	37
IV-5.	Currency Composition of Eurocurrency Deposits	39
IV-6.	Currency Composition of International Syndicated Bank Credits	40
IV-7.	Currency Composition of New Gross Issues of External Bonds	41
IV-8.	Currency Composition of Long-Term Developing Country Debt	42
IV-9.	Currency Composition of Official Holdings of Foreign Exchange, End-of-Year	44
V-1.	Capital Account	50
V-2.	Net Purchases of Long-Term Foreign Securities by U.S. Investors in Selected Emerging Markets	53
V-3.	The Interaction of Private and Official Capital Flows--Contemporaneous Pairwise Correlations	55
V-4.	Exchange Rate Volatility and Capital Flows--Contemporaneous Pairwise Correlations	57
V-5.	Exchange Rate Volatility and Capital Flows--Causality Tests	58
V-6.	Capital Flows, Excess Returns, and Interest Rate Volatility--Contemporaneous Pairwise Correlations	60
V-7.	Foreign Official Intervention, Exchange Rate Volatility, and Changes in the Dollar	63
VI-1.	Biased Tests of Asymmetry	72
VI-2.	Asymmetric Model of the U.S. Output-Inflation Tradeoff	74
VI-3.	A Small Simulation Model of the U.S. Output-Inflation Process	76
VII-1.	Average Tax Rates by Taxable Income Under Proposed Flat Taxes	83
VII-2.	Replace Current Individual and Corporate Income Taxes (including the EITC) with a Flat Rate Tax	90
VIII-1.	Saving Equations	108
VIII-2.	Saving Rate Equations	110
VIII-3.	1989 Asset Share Equations	113
X-1.	Overseas Development Assistance on a Budget Basis	141
X-2.	Net Disbursements of Overseas Development Assistance	142

Contents

Page

Statistical Appendix Tables

1.	Historical Economic Indicators	143
2.	Prices, Productivity, and Costs	144
3.	Bank Reserves, Monetary Aggregates, and Interest Rates	145
4.	General Government Receipts and Expenditures, National Income Accounts Basis	146
5.	Federal Government Transactions, National Income Accounts Basis	147
6.	State and Local Government Transactions, National Income Accounts Basis	148
7.	Balance of Payments	149
8.	Merchandise Trade Balance	150
9.	Merchandise Export Developments	151
10.	Merchandise Import Developments	152
11.	Services Account	153
12.	Investment Income Account	154
13.	Regional Contributions to Growth of Imports and Exports	155
14.	Contribution to Growth of Service Flows by Type of Service	156
15.	Sources and Uses of Funds--Gross Basis	157
16.	Sources and Uses of Funds--Net Basis	158

Charts

III-1.	Fiscal and External Indicators	22a
III-2.	Fitted and Actual Values: Model for REER	26a
IV-1.	Currency Composition of Foreign Exchange Trading in London	36a
IV-2.	Currency Composition of Foreign Exchange Trading in New York	36b
IV-3.	Currency Distribution of Eurocurrency Deposits	38a
IV-4.	Currency Distribution of External Bank Loans	38b
IV-5.	Currency Distribution of Net Gross Issues of External Bonds	38c
IV-6.	Currency Distribution of Developing Country Debt	38d
IV-7.	Net Flow of U.S. Currency Abroad	44a
IV-8.	Official Holdings of Foreign Exchange	44b
IV-9.	Change in Official Holdings of U.S. Dollars	44c
IV-10.	Share of Currencies in Official Holdings of Foreign Exchange	44d
V-1.	External Account Indicators	50a
V-2.	Components of Private Capital Flows	52a
V-3.	Volatility of Capital Flows	52b
V-4.	Exchange Rate Volatility	54a
V-5.	Indicators of Interest Rate Volatility	62a
V-6.	Foreign Official Assets and the Dollar	62b
VI-1.	Interpreting U.S. Inflation with a Linear Model	74a
VI-2.	Interpreting U.S. Inflation with an Asymmetric Model	74b

Contents

Page

Charts (Continued)

VI-3.	Linear Model Responses to a Temporary 1 Percent Positive Demand Shock	78a
VI-4.	Linear Model Responses to a Temporary 1 Percent Positive Demand Shock: Delayed Monetary Policy Response	78b
VI-5.	Asymmetric Model Responses to a Temporary 1 Percent Positive Demand Shock	78c
VI-6.	Asymmetric Model Responses to a Temporary 1 Percent Positive Demand Shock: Delayed Monetary Policy Response	78d
VIII-1.	Private Saving	100a
VIII-2.	Contribution to Tax-Assisted Saving Plans	100b

United States--Basic Data

Area and population

Area	3,732,396 sq. miles
Total population (1994)	260.3 millions
Annual rate of population increase (1994)	1.0 percent
Life expectancy at birth (1991)	75.4 years
Population per physician (1992)	390.5 persons
<u>GDP per capita (1994)</u>	US\$25,882.9

1991 1992 1993 1994
(In billions of dollars)

GDP

At constant 1987 prices	4,867.6	4,979.3	5,134.5	5,344.0
At current prices	5,724.8	6,020.2	6,343.3	6,738.4

Ratios to GDP

External current account	-0.1	-1.1	-1.6	-2.2
Overall federal government surplus/deficit (-)	-3.5	-4.7	-3.8	-2.4
Private saving	16.4	16.3	15.8	15.6
Private investment	13.0	13.1	13.9	15.3

Annual changes in selected indicators

(In percent)

Real GDP	-0.6	2.3	3.1	4.1
Domestic demand	-1.3	2.5	3.9	4.7
Private consumption	-0.4	2.8	3.3	3.5
Business fixed investment	-5.7	2.0	12.5	13.7
Residential investment	-12.9	16.2	8.2	8.6
Stockbuilding 1/	1.2	-0.7	-0.8	-0.8
Government expenditure	-0.1	0.1	0.3	0.6
Net exports 1/	0.7	-0.3	-0.8	-0.7
Exports	6.3	6.7	4.1	9.0
Imports	-0.5	8.7	10.7	13.4
Nominal GDP	3.2	5.2	5.4	6.2
Personal disposable income	4.6	6.4	4.1	5.8
Personal saving rate 2/	5.0	5.5	4.1	4.1

Prices, incomes, and employment

GDP deflator	3.8	2.8	2.2	2.1
Consumer prices	4.2	3.0	3.0	2.6
Compensation per hour 3/	1.5	2.7	1.3	1.9
Productivity 3/	3.5	2.3	1.7	0.7
Employment	-0.9	0.6	1.5	3.1
Unemployment rate (level)	6.7	7.4	6.8	6.1

Financial aggregates and interest rates

M1 4/	8.6	14.2	10.2	1.7
M2 4/	3.0	1.7	1.9	0.9
Debt of nonfinancial sector 4/	4.4	4.8	5.5	4.8
3-month treasury bill rate (level)	5.4	3.5	3.0	4.3
10-year treasury note rate (level)	7.9	7.0	5.9	7.1

	<u>1991</u>	<u>1992</u>	<u>1993</u>	<u>1994</u>
	<u>(In billions of dollars)</u>			
<u>Fiscal aggregates 5/</u>				
General government revenues	1,759.0	1,849.1	1,970.6	2,124.6
General government expenditures	1,944.9	2,106.9	2,185.6	2,257.5
Overall surplus or deficit (-)	-185.9	-257.8	-215.0	-132.9
Federal government revenues	1,128.7	1,178.3	1,265.7	1,379.0
Federal government expenditures	1,331.6	1,460.9	1,507.0	1,538.1
Overall surplus or deficit (-)	-202.9	-282.7	-241.4	-159.1
<u>Balance of payments</u>				
Merchandise exports (f.a.s.)	416.9	440.4	456.8	502.5
Merchandise imports (f.a.s.)	-491.0	-536.5	-589.4	-668.6
Trade balance	-74.1	-96.1	-132.6	-166.1
Balance on investment income	14.8	4.5	9.0	-9.3
Balance on services and transfers	52.3	23.7	23.7	24.1
Balance on current account	-6.9	-67.9	-99.9	-151.2
Direct investment (net)	-5.2	-31.1	-31.5	0.1
U.S. official assets (net)	23.0	44.8	70.8	44.8
Other capital (net)	28.9	71.3	24.7	120.7
Errors and omissions	-39.7	-17.1	36.0	-14.3
	<u>(In percent change)</u>			
Exchange rates (period average)				
Nominal effective exchange rate (1990 = 100)	-1.6	-2.0	3.0	-1.8
Real effective exchange rate (based on unit labor costs indices; 1990 = 100)	-1.6	-1.9	4.0	0.8
	<u>(In billions of SDRs)</u>			
<u>International reserve position (end of year)</u>				
Gross official international reserve assets 6/	54.3	51.9	53.4	50.9
<u>IMF data (as of June 30, 1995, unless indicated otherwise)</u>				
Article VIII status				
Exchange rate (July 20, 1995)			US\$1.5591 per SDR	
Quota			SDR 26,526.8 million	
Total Fund holdings of U.S. dollars			SDR 17,421.6 million	
Special Drawing Rights Department				
Allocation of SDRs			SDR 4,899.5 million	
Holdings of SDRs			SDR 7,565.6 million	

-
- 1/ Contribution to real GDP growth.
2/ As a percentage of personal disposable income.
3/ Nonfarm business sector.
4/ December over previous December.
5/ On a national income accounts basis, calendar years.
6/ Gold is valued at SDR 35 per ounce.

I. Introduction 1/

Since the beginning of the year, economic growth has slowed from the unsustainable pace set during 1994, partly in response to the tightening of monetary policy that began in February of last year. The impetus for a reduction in the fiscal deficit also seems to have grown; since the beginning of the year both the Congress and the Administration have presented budget proposals that envisage achievement of a balanced budget over a seven to ten-year horizon.

Other developments, however, give rise to continued concern that the policy environment may not be adequate to achieve a satisfactory macroeconomic outcome. The U.S. current account deficit is expected to remain large; inflation increased in the first half of the year; and the dollar continued to weaken against the currencies of the major industrial countries. Building on the previous work by the staff (Table I-1), this report addresses a number of these issues, with an emphasis on the relationship between fiscal policy and the exchange rate, monetary policy and the inflation-output tradeoff, and the effects of tax policy on private saving.

Chapter II examines the effect of fiscal deficit reduction in the context of the Fund's multicountry simulation model, with a particular focus on the effect of deficit reduction on the current account and the real exchange rate. The simulations suggest that, other things being equal, fiscal consolidation will tend to cause the real exchange rate to depreciate in the short term, which would help to reduce the current account deficit. However, a tight monetary policy or a significant shift in portfolio preferences toward dollar-denominated assets could alter this result. In the longer run, deficit reduction and the improvement in national saving would imply a lower level of net foreign indebtedness and a lower current account deficit than otherwise. The dollar would rise above its baseline level in the longer term.

Chapter III examines this prediction by estimating a long-run relationship between the real effective exchange rate for the U.S. dollar and a number of variables including the U.S. fiscal deficit relative to that of its major trading partners. The results suggest that the relative fiscal stance has affected the equilibrium level of the real effective exchange rate, but that the principal avenue through which fiscal policy affects the real exchange rate is through its impact on the level of net foreign liabilities.

Exchange market pressures on the U.S. dollar is often attributed to the persistence of a large U.S. current account deficit. However, two other

1/ I. Aquino (staff assistant), Y. Li (research assistant), S. Solares (staff assistant), and A. Stevens (administrative assistant) participated in the preparation of this document. The report was edited by C. Towe.

factors are often mentioned as contributing to the dollar's weakness: the erosion of the U.S. dollar's role as a key reserve currency and the movement of cross-border capital flows. Chapter IV discusses the principal factors that help promote a currency's role as a reserve currency and examines a number of indicators of the dollar's role in the international monetary system. The data suggest that while the dollar's status appears to have diminished somewhat in the foreign exchange and eurodollar deposit markets, the share of dollar-denominated international syndicated bank loans and official reserves has rebounded in recent years.

Chapter V examines developments in the U.S. capital account and the extent to which these developments may have affected exchange rate volatility. The analysis suggests that a growing volatility of net capital flows has been correlated with the increased volatility of the dollar's exchange rate during the past decade.

A notable feature of monetary policy developments during the past year has been the fact that monetary conditions were tightened in advance of clear signs that inflation pressures were mounting. Chapter VI examines the hypothesis that the short-run tradeoff between inflation and output--the Phillips curve--is asymmetric. In particular, it presents evidence that the upward response of inflation to excess demand is greater than the decline in inflation that occurs in periods of excess supply. Simulations are used to show that, when the Phillips curve is asymmetric, delaying the monetary policy response to an excess demand shock will require a more severe economic downturn than would otherwise be needed to keep inflation from rising.

An important factor underlying the weakness in U.S. saving performance and the large current account deficit during the 1990s has been the low level of private saving. This has contributed to recent proposals for tax policies to promote saving, through either an expansion of federal tax assistance for retirement saving or a comprehensive reform of the income tax system. Chapter VII reviews some of the major proposals for simplifying the personal and corporate income tax systems and converting them to a consumption tax. In particular, the "flat tax" proposal would set a fixed marginal tax rate that would be applied to the business sector's value-added tax and the household sector's labor income. The chapter notes that estimates of the gain in economic efficiency that could result from these types of tax reform proposals are as high as 5-6 percent of GDP. However, such a reform would raise important distributional and transition issues.

Chapter VIII describes recent proposals for an expansion of existing tax preferences for retirement saving and examines whether these preferences have had a significant effect on household saving in the past. The results of the econometric investigation do not suggest that these tax preferences boosted overall saving, but instead have encouraged a shift in households' asset allocation toward tax sheltered saving vehicles.

Chapter IX reviews recent U.S. trade policy developments, and Chapter X discusses U.S. overseas development assistance.

Table I-1. United States: Additional Background Material

United States - Background Papers (SM/94/223)

Chapter III.	Indicators of Economic Slack
Chapter IV.	Changes in the Relationship Between the Long-Term Interest Rate and its Determinants
Chapter VI.	A U.S. Value Added Tax--Issues for Consideration
Chapter VII.	An Examination of U.S. Saving Performance
Chapter VIII.	Postwar Investment and Productivity Trends
Chapter IX.	Welfare Reform in the United States
Chapter X.	Health Care Cost Containments
Chapter XI.	Wage Dispersion and Job Growth

United States - Recent Economic Developments (SM/93/183)

Chapter III.	Inflation and the Business Cycle
Chapter V.	Fiscal Deficit Reduction and Interest Rate Spreads
Chapter VI.	Investment Incentives in the United States
Chapter VII.	U.S. Health Care Reform
Chapter VIII.	An Overview of Income Distribution in the United States

United States - Recent Economic Developments (SM/92/168)

Appendix I.	The Output Gap: A Brief Exploration
Appendix II.	The Recent Instability of M2
Appendix IV.	State and Local Government Finances in the Current Cycle

The United States Economy: Performance and Issues
(International Monetary Fund, Washington, D.C., 1992)

Chapter 2.	National and Personal Saving: Measurement and Analysis of Recent Trends
Chapter 3.	Tax Policy and National Saving
Chapter 4.	National Saving Targets for the Federal Budget Balance
Chapter 9.	Tax policy and Business Investment: Evidence from the 1980s
Chapter 10.	A Systems Approach to Estimating the Natural Rate of Unemployment and Potential Output for the United States.
Chapter 16.	Structural Models of the Dollar
Chapter 17.	The U.S. Health Care Industry: Performance and Issues

II. U.S. Fiscal Deficit Reduction and the U.S. Dollar 1/

There has been considerable discussion recently about the potential effects of U.S. fiscal policy on the value of the U.S. dollar. This chapter reviews the assumptions and predictions of traditional models and draws the conclusion that, all other things equal, the effect of deficit reduction in the short run would be to cause the dollar to depreciate. However, this statement should be qualified for three reasons.

First, the effect of deficit reduction will depend on whether market participants demand a risk premium on U.S. securities. In such circumstances, a major fiscal contraction could result in a significant portfolio shift toward U.S. assets. This would put upward pressure on the U.S. dollar and downward pressure on U.S. interest rates. While the possibility of such a shift in preferences cannot be ruled out, there is very little evidence available to suggest that risk premiums on U.S. securities have responded significantly to changes in U.S. fiscal policy.

Second, the magnitude of the exchange rate response will depend on the reaction of the monetary authorities. For example, if the Federal Reserve did not allow nominal interest rates to fall immediately in response to a fiscal contraction but instead used the fiscal contraction as an opportunity to reduce inflation, the nominal exchange rate could appreciate in the short run. Third, the short-run and medium-term effects of fiscal consolidation on the exchange rate are likely to be in the opposite direction. The long-run effect of fiscal contraction would be to lower U.S. net foreign liabilities and net debt-service payments abroad, which would permit a larger net flow of goods from the rest of the world. Thus, in the long run the dollar would have to be more appreciated than in the absence of deficit reduction in order to reduce the trade surplus to its new steady-state equilibrium.

Section 1 provides a very brief review of the short-run predictions of traditional flow-equilibrium models such as the Mundell-Fleming model, as well as the implications of more fully articulated intertemporal models. Section 2 considers the case where a reduction in government debt results in a lower risk premium on U.S. securities. Section 3 shows that the short-run effects on the exchange rate will depend on the reaction of the monetary authorities. Finally, in Section 4 simulations from the Fund's multicountry simulation model (MULTIMOD) are used to focus the discussions on the medium-term and long-run implications of a reduction in government debt.

1. The short-run effects of fiscal policy in standard models

Traditional Keynesian models that focus on flow equilibrium considerations--such as the Mundell-Fleming model--predict a depreciation in the real value of the currency in response to a contractionary fiscal

1/ Prepared by Douglas Laxton and Steven Symansky.

policy. 1/ This prediction is also an important characteristic of more fully articulated dynamic intertemporal models where stocks play a critical role in the equilibration process. This is true because in both of these models the real exchange rate is a fundamental price that (with the real rate of interest) moves to equilibrate aggregate demand and supply in the goods market. As long as the shock provides a contractionary impulse to domestic demand, the real exchange rate must depreciate in the short run in order to crowd in net foreign demand.

In flexible price models, where aggregate demand has to be equal to aggregate supply at all points in time, the real exchange rate must depreciate sufficiently to offset the contractionary effects of the fiscal policy shock on aggregate demand. This is also true in sticky price versions of these models except it may take some time to re-equilibrate aggregate demand and aggregate supply.

Table II-1 provides the results of an illustrative simulation of MULTIMOD that assumes a permanent reduction in government debt equal to 10 percent of baseline GDP. 2/ This is accomplished by raising taxes by approximately 1 percent of baseline GDP for ten years and then allowing taxes to adjust to stabilize the debt-to-GDP ratio at a lower level. 3/ Since the objective of this section is to study the short-run effects of the shock, the discussion focusses on the first three years of the simulation. As can be seen in the first line of Table II-1, real GDP falls by 0.7 percent in the first year in response to the fiscal contraction. However, after the first year output rises back toward baseline and by the third year is 0.1 percent above baseline.

1/ The Mundell-Fleming model amends the familiar closed economy IS-LM model with a condition requiring a balance of payments equilibrium. See Dornbusch and Fischer (1978), pp. 627-629, or Mundell (1961) for a diagrammatical exposition of this simple model. While this model has insights for understanding the short-run effects of fiscal policy it does not provide a very adequate framework for understanding the medium-term and long-term implications of fiscal policy. Indeed, as discussed below, a contractionary fiscal policy that permanently reduces government debt will result in a real exchange rate depreciation in the short run and a real exchange rate appreciation in the long run.

2/ The version of MULTIMOD used in this chapter is based on recent work by Faruquee, Laxton, and Symansky (1995). The revised model relaxes the assumption that the real interest rate equals the real growth rate of GDP in the steady state. In addition, the revisions make private consumption more responsive to changes in current disposable income.

3/ The same story would hold if government expenditures were reduced for 10 years although the quantitative effects would be somewhat different. In general because government expenditures usually have stronger effects on aggregate demand, monetary conditions have to adjust more in the short run.

Table II-1. United States: The Effects of a Cut in the U.S. Fiscal Deficit

(Percentage deviation from baseline, unless otherwise noted)

	1996	1997	1998	1999	2000	2001	2002	Long Run ^{1/}
Effective exchange rate	-2.7	-2.8	-2.8	-2.6	-2.4	-2.2	-1.9	0.4
Real exchange rate	-2.2	-2.5	-2.6	-2.6	-2.4	-2.2	-2.1	0.3
Real GDP	-0.7	-0.2	0.1	0.3	0.3	0.3	0.2	0.2
Output gap	-0.7	-0.2	--	0.2	0.2	0.1	--	--
Inflation (GDP deflator) ^{2/}	-0.3	-0.4	-0.2	--	--	--	--	--
Potential GDP	--	--	0.1	0.1	0.2	0.2	0.2	0.2
Capital stock	0.1	0.2	0.3	0.4	0.6	0.7	0.7	0.8
Short-term interest rate ^{2/}	-0.1	-0.3	-0.4	-0.5	-0.5	-0.4	-0.4	-0.1
Long-term interest rate ^{2/}	-0.3	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4	-0.1
Real long-term interest rate ^{2/}	-0.2	-0.3	-0.4	-0.3	-0.3	-0.4	-0.4	-0.1
General government balance/GDP ^{2/}	0.9	1.1	1.2	1.2	1.2	1.3	1.3	0.5
Government debt/GDP ^{2/}	-0.5	-1.6	-2.8	-4.0	-5.0	-6.0	-7.0	-10.0
Current account balance/GDP ^{2/}	0.2	0.3	0.3	0.4	0.4	0.4	0.4	0.4
Net foreign liabilities/GDP ^{2/}	--	-0.3	-0.6	-1.0	-1.4	-1.8	-2.1	-7.0
<u>Contribution to real GDP</u>								
Real private consumption ^{2/}	-1.2	-1.0	-0.9	-0.7	-0.7	-0.7	-0.7	0.2
Real investment ^{2/}	0.1	0.2	0.3	0.3	0.3	0.3	0.3	0.1
Real net exports ^{2/}	0.5	0.6	0.7	0.7	0.7	0.6	0.6	-0.1

^{1/} The estimates for the long run measure the permanent effects of the shock.

^{2/} In percentage points.

Although the magnitude of the output responses reported in Table II-1 will depend on certain key policy and behavioral assumptions, the same qualitative result holds in most models where the monetary authorities are attempting to stabilize the inflation rate. In this particular example, the inflation rate is stabilized over a three-year horizon. Since the shock is a contractionary impulse to the system, monetary conditions--the combined effects of interest rates and exchange rates on aggregate demand--must ease in order to crowd in net exports and interest-rate sensitive components of aggregate demand. Indeed, if one examines the contribution to real GDP in the table it can seem that the fiscal shock results in higher real net exports and investment.

For this particular example, the value of the dollar declines by about 2.7 percent on an effective trade-weighted basis and long-term interest rates fall by about 30-40 basis points. This easing in monetary conditions is sufficient to close the output gap by the third year. It is important to note that these effects assume that the monetary authorities allow interest rates to fall and there are no major changes in the perceived risk of U.S. securities. 1/ These issues are considered in the following two sections.

2. The effect of a risk premium

The standard result reported above ignores possible links between deficit reduction and uncertainty about future taxation. For example, deficit reduction may reduce the risk of a default on government interest obligations (equivalent to imposing a 100 percent tax rate on interest income), or increase the perceived risk of an increase in tax rates or of a surprise inflation in the future. Rational market participants will attach positive probabilities to these outcomes if it is apparent that the fiscal policy process is potentially unstable. 2/ In traditional macro models this is sometimes modelled with an upward sloping supply of funds schedule. In other words, it is assumed that the rest of the world is unwilling to

1/ In addition, the simulation experiment assumes that the new fiscal plan is fully credible and tax rates adjust immediately. If the public was skeptical that the debt reduction was going to be permanent, the short-run contractionary impulse would be larger and this would necessitate a larger depreciation in the short run. On the other hand, there are cases when policies are announced but expenditure and tax parameters do not change until sometime in the future. When these changes are credible the exchange rate will tend to lead movements in actual fiscal instruments. Indeed, one interpretation of the recent weakness in the U.S. dollar and the decline in U.S. long-term interest rates is that market participants are now expecting large cuts in the U.S. fiscal deficit.

2/ For examples of recent work in this area, see Aizerman (1989), Alesina and Tabellini (1989), Bhandari, Haque, and Turnovsky (1989), Alesina, Prati, and Tabellini (1990), Alesina, De Broeck, Prati, and Tabellini (1993), and Bayoumi, Goldstein, and Woglom (1994).

absorb increasing amounts of U.S. securities at the prevailing real interest rate.

This possibility is usually introduced in macroeconomic models by assuming that, at some point, market participants demand a risk premium in order to be compensated for greater uncertainty about the after-tax rate of return. For example, the risk premium in the interest parity equation can be made a function of the net foreign liability position of the country. In this case, a fiscal contraction may actually result in an appreciation in the real value of the currency since the reduced demand for loanable funds by the government is more than offset by an increase in private sector supply. ^{1/}

While this argument may be applicable to other countries, it would be difficult to argue that this offsetting effect would be very large in the United States given the very low level of long-term interest rates relative to other countries. ^{2/} Indeed, the low levels of long-term interest rates in the United States may already embody an expectation of significant fiscal consolidation in the future.

Table II-2 reports the effects of reducing the risk premium in the interest parity equation by 50 basis points in MULTIMOD. ^{3/} In this case long-term interest rates in the United States fall by about 20 basis points and the nominal effective exchange rate appreciates by 2.2 percent. The increase in real GDP is sustained because the shock reduces the cost of capital in the United States and increases investment and potential output. The result of the appreciation is a worsening of the trade balance, an increase in the current account deficit, and a rise in net foreign liabilities.

Note, however, that if the results of the previous section were summed with these, the effect of fiscal contraction would still be a depreciation. This suggests that the decline in the risk premium would need to be relatively large to cause an appreciation in the face of deficit reduction.

3. The response of monetary policy to a fiscal contraction

It is important to recognize that the short-term effects of any shock--including fiscal shocks--will depend on how the Federal Reserve responds. If the Federal Reserve cuts interest rates in an attempt to minimize the effect on the inflation rate then the nominal exchange rate is likely to depreciate significantly in the short run. However, if the Federal Reserve delays an interest rate cut one would expect a different effect on the

^{1/} In the context of the Mundell-Fleming model, this would be equivalent to a large downward shift in the world interest rate.

^{2/} For a discussion of these issues for Canada, see Bayoumi and Laxton (1994) and Chapter 14 in SM/95/81.

^{3/} The shock is assumed to last for 20 years since in the long run the uncertainty regarding fiscal policy is assumed to be eliminated.

Table II-2. United States: The Effects of a Reduction in the Risk Premium on U.S. Securities

(Percentage deviation from baseline, unless otherwise noted)

	1996	1997	1998	1999	2000	2001	2002	Long Run ^{1/}
Effective exchange rate	2.2	2.1	2.1	2.2	2.3	2.3	2.4	--
Real exchange rate	1.5	1.3	1.3	1.3	1.3	1.4	1.4	--
Real GDP	0.1	--	0.1	0.1	0.1	0.1	0.1	--
Output gap	0.1	--	--	--	--	--	--	--
Inflation (GDP deflator) ^{2/}	-0.1	-0.1	-0.1	--	--	--	--	--
Potential GDP	--	--	0.1	0.1	0.1	0.1	0.1	--
Capital stock	--	0.1	0.2	0.3	0.3	0.4	0.5	--
Short-term interest rate ^{2/}	-0.1	-0.2	-0.3	-0.3	-0.3	-0.2	-0.2	--
Long-term interest rate ^{2/}	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	--
Real long-term interest rate ^{2/}	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	--
General government balance/GDP ^{2/}	--	--	0.1	0.1	0.1	--	--	--
Government debt/GDP ^{2/}	--	--	-0.1	-0.1	-0.2	-0.2	-0.1	--
Current account balance/GDP ^{2/}	--	-0.1	-0.1	-0.1	-0.1	-0.1	-0.2	--
Net foreign liabilities/GDP ^{2/}	0.1	0.2	0.3	0.4	0.5	0.7	0.8	--
<u>Contribution to real GDP</u>								
Real private consumption ^{2/}	0.2	0.2	0.3	0.3	0.3	0.3	0.3	--
Real investment ^{2/}	0.1	0.2	0.2	0.2	0.2	0.2	0.2	--
Real net exports ^{2/}	-0.2	-0.3	-0.4	-0.4	-0.4	-0.4	-0.4	--

^{1/} The estimates for the long run measure the permanent effects of the shock. In this case they are all zero because the shock only lasts for 20 years.

^{2/} In percentage points.

exchange rate, since this is equivalent to assuming that monetary policy tightens in response to the contractionary fiscal policy shock. In a world with sticky prices in the short run, this could result in an appreciation in both the nominal and real exchange rate.

Table II-3 reports some illustrative simulation results for the same fiscal shock described in Section 2, except that this time the Federal Reserve is assumed to hold the short-term interest rate fixed in the United States. In this case, the contractionary effects of the shock are large and the nominal exchange rate appreciates in the very short run. Indeed, in this case the contractionary effects of the shock are so large that inflation is about 2 percentage points lower over the first three years.

4. The medium- and long-term implications of government debt

As mentioned above, the prediction that a fiscal contraction results in a real depreciation in the short run carries over to a large class of models where the real exchange rate plays a fundamental role for re-equilibrating the economy; as long as the shock has a contractionary effect on aggregate demand the real exchange rate must depreciate in order to crowd in net foreign demand. However, since the Mundell-Fleming model only focusses on flow equilibrium considerations, it does not provide a very useful framework for examining the medium- and long-term implications of a reduction in the stock of government debt. In order to do this, one has to turn to models that look beyond the short-run effects of fiscal policy to models where stock-accumulation effects are fully accounted for. Indeed, as shown below, these models predict that the real exchange rate will appreciate in the long run in response to a permanent reduction in government debt.

MULTIMOD shares the qualitative predictions of standard, open-economy, general equilibrium growth models. In this class of models, countries with relatively impatient consumers are net debtors to the rest of the world, and countries with relatively patient consumers are their creditors. ^{1/} In a world with debtor and creditor countries, there will be a constant real resource transfer in the steady state from debtor countries to creditor countries. The interest payments of debtor countries to their creditors will have to be financed with a positive trade balance in the debtor countries. Conversely, creditor countries will be able to import more than they export and pay for this trade balance deficit with the interest that they receive on their loans to the rest of the world.

In order to discuss the effects of government debt in the long run, it is useful to provide some very basic analytics. In the steady state, the current account balance will be proportional to the net foreign asset

^{1/} The basic consumption theory behind MULTIMOD is based upon work by Blanchard (1985), Buiter (1987), Weil (1989), and Macklem (1993).

Table II-3. United States: The Effects of a Cut in the U.S. Fiscal Deficit
with Unchanged Nominal Interest Rates

(Percentage deviation from baseline, unless otherwise noted)

	1996	1997	1998
Effective exchange rate	2.7	2.8	2.7
Real exchange rate	0.6	-1.2	-2.8
Real GDP	-2.2	-1.9	-0.8
Output gap	-2.1	-1.8	0.7
Inflation (GDP deflator) 1/	-2.0	-2.7	-2.1
Potential GDP	--	-0.1	--
Capital stock	-0.1	-0.2	-0.1
Short-term interest rate 1/	--	---	--
Long-term interest rate 1/	--	---	--
Real long-term interest rate 1/	0.8	0.1	-0.4

1/ In percentage points.

position of the country. This can be represented by the following equation. ^{1/}

$$\frac{CA}{Y} = \left(\frac{g}{1+g} \right) \left(\frac{NFA}{Y} \right) \quad (1)$$

where: CA is the current account balance, Y is nominal GDP, NFA is the country's net foreign asset position, and g is the growth rate of all nominal variables. Note that if all nominal variables in the economy are growing at 5 percent in the steady state and net foreign assets are equal to 100 percent of GDP then the current account surplus must be equal to about 5 percent of GDP. Conversely, if the country were a debtor country instead of a creditor country then the country would be running a current account deficit in the steady state. Basically, because of growth a country can only remain a debtor country or a creditor in the steady state if its nominal current account deficit or surplus grows at the same rate as nominal income.

The current account can also be expressed as the sum of the interest payments received from foreigners and the nominal trade balance (TB). For simplicity assume that interest payments are paid on a one-period bond that rolls over each period so that interest payments received from foreigners will be $r NFA_{t-1}$. Then the current account equation becomes:

$$\frac{CA}{Y} = \frac{r}{1+g} \frac{NFA}{Y} + \frac{TB}{Y} \quad (2)$$

because NFA_{t-1} is equal to $NFA_t/(1+g)$. These two equations are useful for understanding the steady-state properties of any model even though they make no assumptions beyond the conditions of a balanced steady-state growth path. Note that if we substitute Equation 1 into Equation 3 we obtain:

$$\frac{TB}{Y} = \left(\frac{g-r}{1+g} \right) \frac{NFA}{Y} \quad (3)$$

As long as the real interest rate is greater than the real growth rate of the economy then the nominal interest rate will be greater than the growth rate of nominal income. Under these conditions the term in parenthesis in

^{1/} Equation 1 follows from the balance of payments condition that the current account balance (CA) has to be equal to the change in net foreign assets ($CA = \Delta NFA = NFA_t - NFA_{t-1}$). If we define g to be the steady-state growth rate of all nominal variables then $(NFA_t/NFA_{t-1}) - 1 = g$ or $NFA_{t-1} = NFA_t/(1+g)$. Substituting this last expression into the CA equation and dividing by nominal GDP produces Equation 1.

Equation 3 will be negative. 1/ Countries that have positive net claims on the rest of the world will be running a trade deficit in the steady state, while countries that are debtor countries will have trade surpluses. In other words, net creditor countries will receive a permanent flow of interest payments from the rest of the world and thus be able to maintain a level of imports that is higher than exports.

For example, a fiscal contraction reduces the economy's net consumption of foreign goods and services in the short to medium run. During this period, the economy's net foreign liability position is reduced since there is a lesser need for foreign saving. By borrowing and consuming less in the nearer term, a larger amount of consumption and a larger trade deficit can be sustained in the long run. In order to equilibrate the demand for domestically produced goods with domestic production, an appreciation of the real exchange rate is required.

This result depends on the assumption that consumers have finite planning horizons. To illustrate the importance of this assumption, consider the effect of fiscal policy in a model where consumers have an infinite planning horizon--i.e., they live forever. For example, the government acts to lower the level of government debt by means of a temporary tax hike. Although taxes rise in the short run, there will be lower taxes in the new steady state, because the government's interest rate obligations will decline with the reduction in government debt. If consumers live forever and there are perfect capital markets, the reduction in consumers' disposable income during the temporary tax hike would equal the rise in disposable income thereafter in present-value terms. In this case, households would not adjust their consumption decisions either now or in the future in response to the change in fiscal policy. Instead private saving would fall to offset the rise in public savings, and consumption, real interest rate, the real exchange rate, and the current account would all remain unchanged.

In models like MULTIMOD, consumers have a finite planning horizon. As a result, the present value of the fall in disposable income during the temporary period with higher taxes is greater than the present value of the rise in disposable income thereafter. 2/ Households therefore reduce their consumption in the short run rather than running down their savings initially and then building them back up later. Since the United States is a net debtor to the rest of the world, the rise in total national savings would result in a reduction in the U.S. net foreign liability-to-income ratio. As can be seen from Equation 3 above, this eventually would imply lower net interest payments to foreigners and a smaller trade surplus with the rest of the world. In order to induce a smaller trade surplus (lower

1/ Although it is true that the real interest rate sometimes falls below the real rate of growth, this is not likely to be sustainable in the steady state.

2/ The same steady-state results could also be achieved with a temporary cut in government expenditures.

imports and higher exports) with the rest of the world, the real exchange rate must appreciate in the steady state.

Table II-1 reports some MULTIMOD simulation results for this type of shock. Again, government debt is assumed to be reduced by 10 percent of baseline GDP by imposing a one percent tax rate hike for ten years. Thereafter, tax rates are allowed to be lower in order to stabilize the debt-to-GDP ratio. Note, in this simulation the real exchange rate depreciates in the short run and then starts to appreciate by the third year. Indeed, by the fourteenth year the real value of the exchange rate is higher relative to its baseline value. ^{1/} Again, this appreciation is necessary to sustain a higher level of net imports; since interest obligations to foreigners are now reduced there will be a larger sustainable net flow of goods to U.S. consumers. And under normal assumptions about demand and supply curves, this can only come about if the relative price of these goods falls.

^{1/} If the shock were induced by a change in government expenditures, instead of taxes, then the long-run appreciation in the real exchange rate would occur earlier. This will also be the case for tax shocks in models where consumption is tied more closely to changes in disposable income. See, for example, Laxton and Tetlow (1992).

References

- Aizerman, John, "Country Risk, Incomplete Information and Taxes on Foreign Borrowing," Economic Journal, Vol. 99 (March 1989), pp. 147-61.
- Alesina, Alberto, and Guido Tabellini, "External Debt, Capital Flight and Political Risk," Journal of International Economics, Vol. 27 (November 1989), pp. 199-220.
- , A. Prati, and G. Tabellini, "Public Confidence and Debt Management: A Model and a Case Study of Italy." In Public Debt Management: Theory and History, ed. by R. Dornbusch and M. Draghi (New York: Cambridge University Press, 1990).
- , M. De Broeck, A. Prati, and G. Tabellini, "Default Risk on Government Debt in OECD Countries." Economic Policy: A European Forum (October 1993), pp. 428-63.
- Bayoumi, T., M. Goldstein, and G. Woglom, "Do Credit Markets Discipline Sovereign Borrowers? Evidence from the United States." (Washington: International Monetary Fund, Research Department, 1994).
- Bayoumi, Tamim, and Douglas Laxton, "Government Deficits, Debt, and the Business Cycle," in Deficit Reduction: What Pain. What Gain? (Ottawa: C.D. Howe Institute) 1994.
- Bhandari Jagdeep S., Nadeem Ul Haque, and Stephen J. Turnovsky, "Growth, External Debt, and Sovereign Risk in a Small Open Economy," IMF Working Paper No. WP/89/54 (Washington: International Monetary Fund, June 1989).
- Blanchard, O. J., "Debt, Deficits, and Finite Lives," Journal of Political Economy, Vol. 93 (1985), pp. 223-47.
- Buiter, Willem H., "Fiscal Policy in Open, Interdependent Economies," Chapter 3 in Economic Policy in Theory and Practice, ed. by Assaf Razin and Efraim Sadka (New York: St. Martins Press, 1987), pp. 101-44.
- Dornbusch, Rudiger and Stanley Fischer, Macroeconomics (New York: McGraw Hill, 1978).
- Faruquee, Hamid, Douglas Laxton, and Steven Symansky, "Government Debt, Life-Cycle Income and Liquidity Constraints: Beyond Approximate Ricardian Equivalence" unpublished manuscript.
- Laxton, Douglas, and Robert Tetlow, "Government Debt in an Open Economy," (Ottawa: Bank of Canada Technical Report No. 58.) 1992.
- Macklem, R.T., "Terms-of-Trade Disturbances and Fiscal Policy in a Small Open Economy." Economic Journal, Vol. 103 (1993), pp. 916-36.

Mundell, Robert, "Flexible exchange rates and employment policy," Canadian Journal of Economics and Political Science, Vol. 27 No. 4 (November 1961), p. 509-517.

Weil, Phillip, "Overlapping Families of Infinitely-lived Agents," Journal of Public Economics, Vol. 38 (March 1989), pp. 183-98.

III. The Real Effective Value of the U.S. Dollar, the Fiscal Deficit, and Long-Run Balance of Payments Equilibrium ^{1/}

1. Introduction

The relationship between the fiscal deficit and the equilibrium U.S. dollar exchange rate has been the focus of much recent interest. The notion that concerns about persistent U.S. fiscal deficits may underlie the recent decline in the dollar against the yen and deutsche mark has led to a debate over whether lowering the U.S. fiscal deficit would strengthen or weaken the dollar. ^{2/} The debate stems mainly from the polar predictions made by different models. Models that focus on flows, such as the Mundell-Fleming model, predict that deficit reduction would cause the dollar to depreciate, while stock-flow models such as the Fund's MULTIMOD predict short-run depreciation but long-run appreciation. ^{3/}

This chapter examines this issue by extending Faruquee's (1994) empirical analysis of the long-run real effective exchange rate of the U.S. dollar. The model developed below describes short-run and long-run relationships among stocks, flows, and relative prices in the context of balance of payments equilibrium. Empirical tests confirm that in the long run, the real exchange value of the U.S. dollar is significantly influenced by the U.S. fiscal balance relative to the average fiscal balance of its trading partners. The model also accurately tracks (in sample) the real effective U.S. dollar over the last 40 years. ^{4/}

Section 2 briefly discusses the model, Section 3 discusses the data, and Section 4 presents empirical results. Section 5 concludes the chapter.

2. Long-run balance of payments equilibrium and the real exchange rate

a. A model of balance of payments equilibrium

Faruquee's (1994) analytical model is an integration of flow and stock equilibrium into a continuous-time model of the balance of payments. Asset flows, asset stocks, and variables that influence the current account balance (including the real exchange rate) are jointly determined in equilibrium. Equilibrium in this context is defined to mean a sustainable balance

^{1/} Prepared by Charles Kramer. The provision of data by Hamid Faruquee is gratefully acknowledged.

^{2/} See for example "Every Which Way," The Economist, June 3, 1995; Martin Feldstein, "Lower Deficits, Lower Dollar," Wall Street Journal, May 15, 1995; and Paul Krugman, "Why Higher Savings May Hit the Dollar," Financial Times, May 24, 1995.

^{3/} This issue is discussed further in Section 3. See also the accompanying background paper by Laxton and Symansky.

^{4/} Of course, a more rigorous test of the model's predictive ability would be to assess its out-of-sample forecasting performance.

of payments, in particular a sustainable stock of net foreign assets in the long run. The model has four main components: the trade balance (modeled in terms of the real exchange rate and other shift factors), short-run balance of payments equilibrium, interest rate parity, and a long-run constraint on the accumulation of net foreign assets. From these relationships, Faruquee derives a long-run equilibrium relationship among the steady-state real exchange rate, steady-state asset stocks, and shift factors for the trade balance.

Net exports, nx , are assumed to depend on the real exchange rate, q (the real price of the domestic good, as the foreign good serves as the numeraire), and shift factors, x , that affect the trade balance:

$$nx = -\gamma q + x\theta, \quad \gamma > 0. \quad 1/$$

Ignoring nonfactor services, or including them implicitly in nx , the current account is the sum of net exports and interest on the stock of net foreign assets, denoted by a (the real rate of return on foreign assets is denoted by r^*):

$$ca = -\gamma q + x\theta + r^*a.$$

Since the current account equals the capital account when the balance of payments is in equilibrium, 2/

$$\dot{a} = -\gamma q + x\theta + r^*a, \quad (1)$$

where the dot denotes the derivative with respect to time. 3/ In addition, domestic interest rates are given by foreign interest rates less the expected effect of depreciation, or

$$r = r^* - \alpha E_t[\dot{q}_t],$$

where α is the share of domestic goods in home consumption (recall that q is the price of domestic goods relative to foreign goods), $E_t[\cdot]$ is an expectations operator, and r is the domestic real interest rate.

1/ x is defined here as a $(1 \times k)$ vector, with a conformable coefficient vector θ .

2/ In this definition, the capital account includes movements in official reserves (e.g., official intervention in foreign exchange markets). The same is true for the data on net foreign assets used in the empirical work.

3/ This analysis rules out valuation effects by denominating all securities in terms of one numeraire (the foreign good); in fact, the securities of the two countries are assumed to be perfect substitutes for one another. In principle, in a more general model, short-run valuation effects due to changes in the exchange rate (with stocks held fixed) might enter the equation for the evolution of the stock in the non-numeraire quantity.

In the long run, asset accumulation must be consistent with its desired (or sustainable) path, \dot{a}^d . This path is assumed to be given by

$$\dot{a}^d = \delta(r - r^*) + \phi(a^d - a), \quad \delta, \phi > 0.$$

Desired foreign asset accumulation is thus a positive function of the spread between domestic and foreign real interest rates and the gap between desired and actual foreign assets.

A sustainable balance of payments means that $\dot{a} = \dot{a}^d$, or combining the previous two equations and the real interest-rate parity condition,

$$-\gamma q + x\theta + r^*a = -\delta(\alpha E_t[\dot{q}_t]) + \phi(a^d - a). \quad (2)$$

Solving Equations 1 and 2 for the steady-state values of a , x , and q (denoted by \bar{a} , \bar{x} , and \bar{q}) yields

$$\bar{q} = (r^*/\gamma) \bar{a} + (1/\gamma) \bar{x}\theta, \quad (3)$$

plus other conditions governing the steady-state level of foreign assets, the shift factors, and the evolution of q . Equation 3 implies that, for example, an increase in the steady-state level of net foreign assets is consistent with an appreciation of the real effective exchange rate, all else equal. The empirical analysis thus is based on the steady-state specification for the real exchange rate shown in Equation 3.

b. Long-run balance of payments equilibrium and the fiscal deficit

In the absence of Ricardian equivalence, the fiscal balance can influence the equilibrium exchange rate in the long run. ^{1/} In particular, an increase in net foreign indebtedness (resulting from a deterioration in the fiscal balance) decreases the net interest receipts from abroad. In the long run, the balance on goods and services must improve in order to restore the current account to a sustainable level. This improvement requires a real depreciation. This long-run effect stands in contrast to the short-run effects, mediated by interest rates, that obtain in models that focus solely on flow equilibrium, (e.g., the Mundell-Fleming model), in which a large fiscal deficit increases domestic real interest rates, attracting capital from abroad and causing the real exchange

^{1/} Loosely, Ricardian equivalence is the proposition that changes in the mix of taxes and debt used to finance spending are offset by changes in private behavior in a way that leaves real economic variables unchanged. For details in the context of exchange-rate determination see Macklem, Rose, and Tetlow (1994) and the accompanying background paper by Laxton and Symansky.

rate to appreciate. In more general settings with uncertainty, changes in the fiscal balance might also affect confidence or risk premiums. 1/

The fiscal balance is used in the empirical model rather than the corresponding stock of debt. This is of no consequence for the long run; when the target stock of government debt, B , is fixed as ratio to nominal GDP, which in the steady state is growing at the rate g , the steady-state deficit, D , and the steady-state stock of government debt are related by the identity $D = gB$. 2/ Also, in practice, fiscal plans focus on deficits as much as or more so than on the stock of debt, so it is relevant from a policy perspective to focus on the effects of deficit reduction on the exchange rate. With FBAL denoting the fiscal balance, the long-run model will then be

$$\bar{q} = (r^*/\gamma) \bar{a} + \zeta \overline{\text{FBAL}} + (1/\gamma) \bar{x}\theta, \quad (3')$$

where the coefficient ζ embodies both the proportionality factor, g , and any other effects (such as effects on confidence or risk premiums) that the fiscal deficit might have on the long-run real exchange rate. 3/ The empirical analysis that follows assesses the significance of this modification for the United States, with special focus on its implications for the long-run real exchange rate.

3. Data

The choice of variables follows directly from the theoretical framework of the previous section. 4/ The Appendix describes data sources and the details of how each series is computed.

The real exchange rate is measured by the multilateral real effective exchange rate based on consumer prices (REER). Two other relative price series serve to capture movements in trade that are unrelated to changes in REER. An index of the ratio of traded-goods prices to non-traded goods prices (TNT) for the United States relative to partner countries serves as a proxy for trends in sectoral productivity that may not be captured by the CPI-based REER. The terms of trade (TOT), the ratio of export unit value to

1/ For further discussion see Black, Laxton, Rose, and Tetlow (1994) and Macklem, Rose, and Tetlow (1995). The accompanying background paper by Laxton and Symansky also provides details on these effects and simulations using MULTIMOD.

2/ See Macklem, Rose, and Tetlow (1995).

3/ The accompanying background paper by Laxton and Symansky shows that changes in net foreign assets can affect both the size and the composition of the current account balance. These are not explicitly modeled in their effects on foreign assets and net exports in augmenting the model here, however.

4/ The productivity variable (PROD) mentioned in Faruquee is not included in the analysis. It did not show up significantly in his results, and his main findings omitted it.

import unit value, captures fluctuations in the prices of foreign traded goods that may not be fully reflected in either foreign CPIs (through REER) or in the domestic prices of traded goods (through TNT). While it may seem peculiar to use three relative price variables, no single measure of the real exchange rate fully explains international competitiveness. 1/ In addition, there is broad theoretical and empirical support for a specification linking TOT and TNT with the real exchange rate. 2/ Of course, in practice each of the series is at best a proxy for its theoretical counterpart.

In addition, the analysis below includes consideration of the effect of the fiscal balance in the United States relative to its G-7 trading partners (the G-7 accounts for about 70 percent of U.S. trade). The series is limited to the G-7 since expanding coverage to the most heavily-weighted non-G-7 partner country (Mexico) would have reduced the sample period by one third. This series is denoted FBAL. 3/

REER is treated as the real exchange rate in this discussion, in contrast to much theoretical work where other relative prices (such as the relative price of traded to nontraded goods) play the role of the real exchange rate. Williamson (1994) argues that a real effective rate based on relative price levels is preferable to a series based on narrower measures of relative prices. 4/ As the three relative prices, REER, TOT, and TNT, are jointly determined, in equilibrium the relationship of TNT and TOT to the real exchange rate is ambiguous, and will depend on the source of shocks and the structure of demand and supply. 5/

1/ See e.g. Marsh and Tokarick (1994), who recommend using a diverse set of competitiveness indicators.

2/ See Edwards (1989) and Ostry (1988).

3/ Since data on the fiscal balance for Japan is not available from the data source (IFS) before 1955, the index starts at that date. It is conceivable that two variables--one for United States and another for trading-partner balances--ought to be employed, rather than one comparative measure. After all, different interest rates prevail on the debt of different countries, and a reduction in the U.S. deficit may have a different effect on confidence than an increase the deficit of a partner country. However, empirical tests (not shown) do not reject the restriction that the cointegrating coefficients are the same size and opposite in sign for United States and aggregated partner-country deficits, so proceeding with the data as defined is reasonable.

4/ Williamson (1994) illustrates this with a simple model of the real exchange rate. If there are no nontraded goods, his real exchange rate expression collapses to the terms of trade; if the home country is small in the traded-goods market, it collapses to the price of nontraded goods relative to the price of domestic exportables. Clearly, neither of these circumstances describes the United States.

5/ See, e.g. Edwards and van Wijnbergen (1987) and Ostry (1988).

The likely effects of changes in NFA and FBAL on REER are considerably more straightforward. 1/ NFA should be positively related to the real exchange rate in the long run; an increase in net foreign assets leads to an increase in net interest receipts from abroad, which requires an appreciation to generate offsetting flows in the trade and nonfactor service components. 2/ Finally, the fiscal balance should be positively related to the real exchange rate, for essentially the same reasons as for the net foreign asset position. In the absence of Ricardian equivalence, a decrease in the fiscal deficit lowers net foreign debt and improves the income component of the current account, requiring an offsetting appreciation. 3/ Including both NFA and FBAL in the exchange rate equation permits inference on the effects of changes in FBAL holding NFA constant, including channels other than the current account, e.g. effects on confidence or risk premiums.

All series are annual and span 1955-90. Chart III-1 shows the data plotted over time. Several patterns are worth noting: for example, REER declines steadily after the end of Bretton Woods, with a spike in the mid-1980s. The next task is to analyze these patterns in the context of the empirical model.

4. Results

The empirical model employed is an error-correcting model (ECM). It incorporates a long-run relationship among the variables of interest in a model of their joint short-run dynamics. Specifically, if the variables are collected into a (5×1) vector $Y_t = [REER_t, TOT_t, TNT_t, NFA_t, FBAL_t]$ the model is

$$\Delta Y_t = \mu + \Gamma_1 \Delta Y_{t-1} + \dots + \Gamma_k \Delta Y_{t-k} + \pi Y_{t-k-1} + u_t. \quad (4)$$

Here, μ is a (5×1) vector of constants (intercepts for each of the five equations), $\Gamma_1, \dots, \Gamma_k$ are (5×5) matrices of short-run coefficients, π is the (5×5) matrix of long-run coefficients, and u_t is a (5×1) vector of random disturbances. The long-run relationships among the variables in Y are embedded in the $(n \times n)$ matrix π , where n is the number of variables (here, n is 5). These long-run relationships are estimated using the full information maximum likelihood method of Johansen. 4/ The details of estimation and inference in ECMs are readily available elsewhere, so they

1/ Again, the focus here is on long-run relationships. As noted above, short-run dynamics may differ considerably in nature from the steady-state relationship.

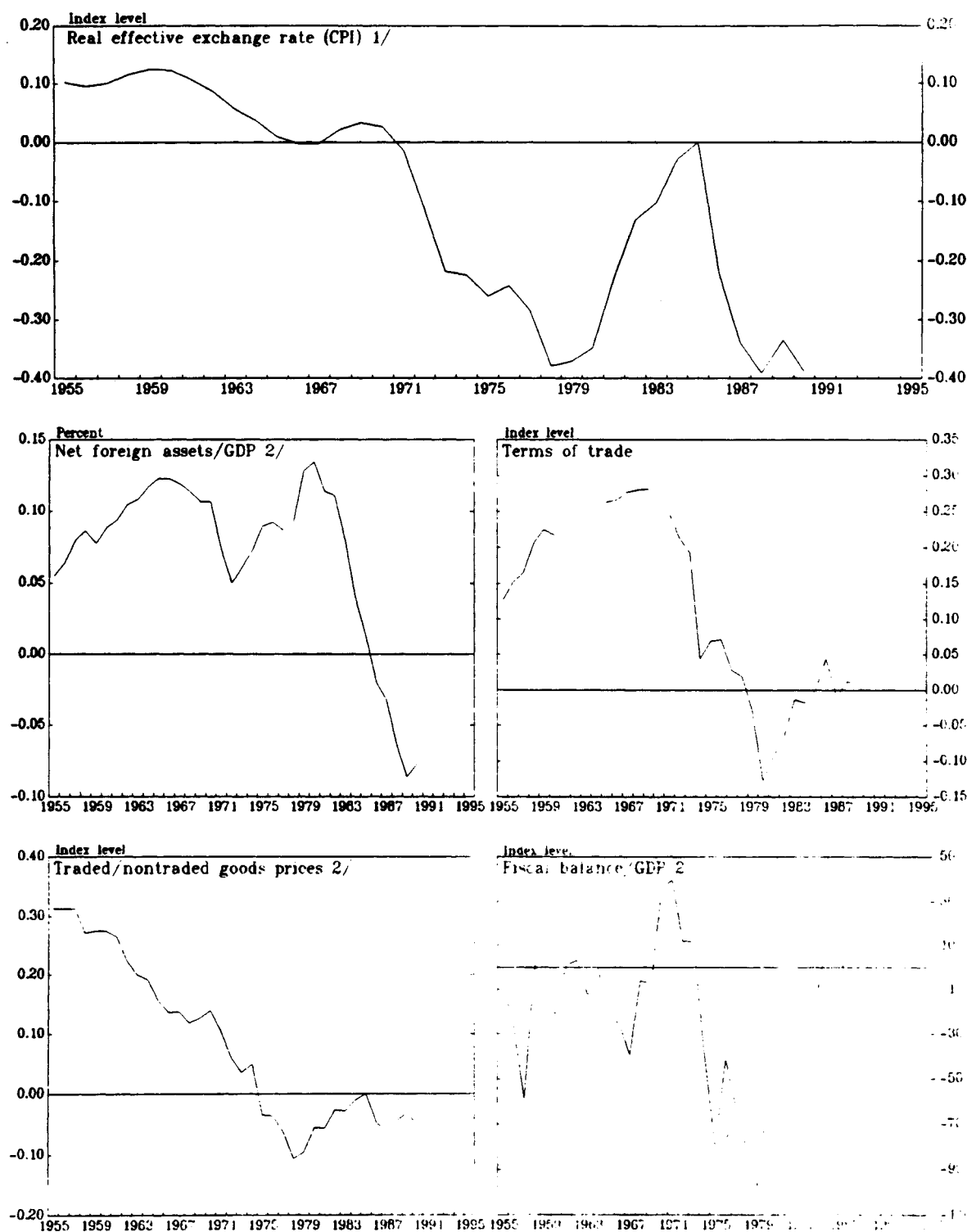
2/ Valuation effects might play a role in the short run, but here two long-run steady states are compared. Valuation effects are not present since the exchange rate is constant in the steady state.

3/ The absence of Ricardian equivalence is necessary so that an increase in public saving is not offset dollar for dollar by a decrease in private saving, leaving total saving unchanged.

4/ See Hamilton (1994), Chapter 20.

CHART III-1

UNITED STATES
FISCAL AND EXTERNAL INDICATORS



Source: International Financial Statistics

1. A decline in the index indicated a real depreciation.
2. Relative to partner countries.

are omitted here. 1/ As in Faruquee (1994), the constant μ is restricted to impose consistency between the condition that there is a constant in the ECM and the condition that the differenced series are driftless (i.e., that $E(\Delta Y_t) = 0$). 2/

The remainder of this section presents the main empirical results. The first task is to ascertain that the variables have long-run (unit-root) components, so that the asserted long-run relationship among them is statistically justifiable. The tabulation below presents augmented Dickey-Fuller tests for a unit root, including a constant and trend. 3/ The number of lags for each test was chosen to be the same as employed by Faruquee.

Tests for Unit Roots 4/

<u>Variable</u>	<u>ADF(k)</u>
REER	-2.92
Δ REER	-3.51
TOT	-1.66
Δ TOT	-5.24*
FBAL	-1.67
Δ FBAL	-7.11*
NFA	-1.91
Δ NFA	-3.31
TNT	-1.17
Δ TNT	-5.77*

The results are mixed; for REER and NFA, neither the level or difference of the series can reject the null of a unit root. However, small changes in the specification of the test lead it to reject the null of a

1/ See, e.g., Hamilton (1994), Chapters 19 and 20.

2/ See Hamilton (1994), p. 581.

3/ Strictly speaking, the restriction that the constant term in the ECM lies in the cointegrating space, which involves the assumption that $E(\Delta Y_t) = 0$, has implications for the correct specification of these tests. In particular, it implies that including a trend term in tests for the level, and a constant and trend term in tests for the difference, is inefficient. However, the tests were run with trend terms anyway, for comparability with the results in Faruquee (1994). At most one might expect some loss of test power from including these terms if they are irrelevant; in fact, the test results improve when these terms are omitted.

4/ The asterisk denotes significance at the 5 percent level. Note that $k = 0$ except in the case of REER and NFA, where $k = 1$.

unit root for both $\Delta REER$ and ΔNFA . 1/ There is thus evidence to suggest that all the variables are difference-stationary, and hence are good candidates for a cointegrating relationship.

Cointegration results are presented next. These are performed using an ECM with four lags, and with the constant constrained as described above. 2/ These tests give an idea of the number of long-run relationships among the series, and the qualitative features of those relationships. The maximum eigenvalue and trace tests are presented in the tabulation below. The maximum eigenvalue test pits the null of r cointegrating relationships against the alternative of $r+1$ cointegrating relationships, while the trace test pits the null of r cointegrating relationships against the alternative of n cointegrating relationships.

The trace and eigenvalue tests imply at least four cointegrating relationships among the variables. The tests strongly reject the null of no more than 3 cointegrating relationships, and so four cointegrating relationships are assumed to be present for the rest of the analysis. 3/

Tests for the Number of Cointegrating Relationships 4/

Null Hypothesis	Maximum Eigenvalue Test	Trace Test
rank = 0	44.4**	131.8**
rank \leq 1	32.4*	87.4**
rank \leq 2	22.8*	55.0**
rank \leq 3	20.5**	32.2**
rank \leq 4	11.8*	11.8*

Tests for the significance of each of the variables in the cointegrating relationship are presented in the tabulation below. These are

1/ For each of the differenced variables, the null of a unit root is rejected (using no lags) when the constant and trend terms are omitted. These results make sense if the trend and constant do not belong in the test regression--the failure to reject may indicate low power caused by the presence of irrelevant variables.

2/ The results of the cointegration tests using an unconstrained constant were qualitatively similar--the test still finds $r > 1$ cointegrating vectors, though fewer of them. Also, a test rejected the restriction that the fourth lag of all variables in all equations could be excluded at the one percent level.

3/ The statistics could be interpreted as rejecting the null of four cointegrating vectors in favor of the alternative that there are five such vectors, but this would make no sense; it would imply that the variables are all stationary, which is almost surely false given the results of the unit root tests.

4/ One asterisk indicates significance at the 5 percent level. Two asterisks denotes significance at the 1 percent level.

likelihood ratio tests for joint restrictions across the four cointegrating relationships. 1/ For each model, all of the variables are significant at the ten percent level; indeed, except for the fiscal balance, all are significant at the one percent level. The more modest significance of the fiscal balance might result from some mild redundancy in including both FBAL and NFA. In fact, when NFA is excluded from the model, the

Tests of Exclusion Restrictions 2/

<u>Variable</u>	<u>Test Statistic</u>
REER:	$\chi^2 = 20.3^{**}$
NFA:	$\chi^2 = 13.7^{**}$
TOT:	$\chi^2 = 17.4^{**}$
TNT:	$\chi^2 = 15.5^{**}$
FBAL:	$\chi^2 = 7.9^*$

restriction that FBAL does not enter any of the cointegrating relationships is easily rejected at the one percent level. This indicates that NFA, which includes foreign holdings of U.S. government debt, probably already captures some of the effects that fiscal policy has on exchange rates. 3/

Chart III-2 gives a view of the in-sample fit of the model. The model tracks the changes in the real effective exchange rate well, including the decline after Bretton Woods and the appreciation of the mid-1980s. The correlation between fitted and actual values is about 98 percent.

The final assessment of the model involves an examination of the signs of the relationships among the variables. The focus will be on estimates of the long-run matrix π . 4/ Note that these estimates provide information solely about the long-run relationships among the variables. There are

1/ The tests turn out to be sensitive to the number of cointegrating relationships assumed to be present. The previous results clearly imply the presence of four cointegrating relationships, though, so these results rest on safe ground.

2/ One asterisk denotes significance at the 10 percent level, two asterisks denotes significance at the 5 percent level. Note that $k = 0$ except in the case of REER and NFA, where $k = 1$.

3/ A more detailed study would break NFA into private and public components of assets and liabilities, and include domestically-held public debt as an auxiliary variable. This endeavor awaits future research efforts.

4/ The use of statistical, rather than economic, restrictions to identify the cointegrating vectors in the Johansen technique makes it impossible to ascribe a structural interpretation to their estimates. This point is discussed in more detail by Pesaran and Shin (1994).

several possible long-run relationships to be examined, in particular one for each row of π , but the natural choice is the one associated with $\Delta REER$, i.e., the first row of π . Estimates of this first row are presented in Equation 5 below, normalized so that the first element (corresponding to REER) is equal to -1, hence putting the coefficients in regression format. Since the variable FBAL is large in magnitude, its estimated coefficients are relatively small. Here the coefficients are multiplied by 100 to make the presentation cleaner. FBAL is an index number and hence unitless, so this transformation is of no real consequence.

$$REER = -0.23 + 1.58 NFA - 0.10 TOT + 0.88 TNT + 0.11 FBAL \quad (5)$$

The coefficients of NFA and TNT have positive signs. These are consistent with arguments about intersectoral resource allocation (for TNT) and the arguments made above about the long-run effects of NFA shifts on the composition of the current account. TOT, on the other hand, has a negative sign. It may be that supply effects dominate trade in manufactures, but demand effects dominate for trade in goods and services. FBAL also has the predicted sign in the equation, e.g. a positive sign.

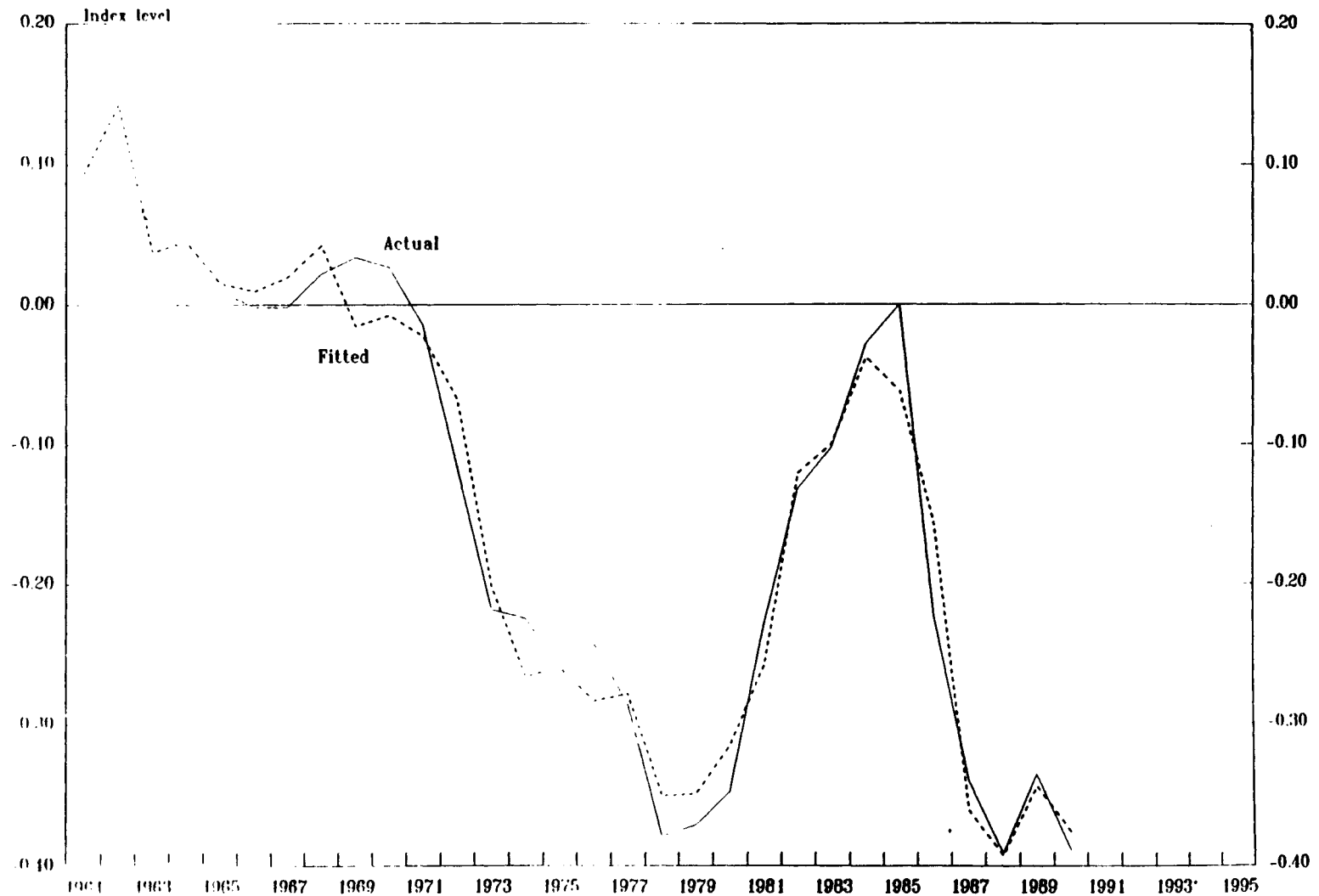
5. Conclusions

Discussions of the relationship of the fiscal balance to exchange-rate trends have increased in relevance since the most recent decline of the dollar against the yen and deutsche mark. These discussions have focused largely on the predictions of theoretical models. This chapter provides some simple evidence on the potential long-run relationship between the fiscal deficit and the multilateral real effective exchange rate for the United States.

The notion that the fiscal balance plays an important role in the long-run real exchange rate has some empirical support. The fiscal balance of the United States relative to that of its major trading partners bears a significant and positive relationship to the real exchange rate as measured by the CPI-based REER after accounting for the effects of other variables in the long run. Specifically, an increase in the fiscal deficit of the United States relative to its trading partners, all else equal, tends to depreciate the real exchange rate in the long run. In-sample, the predictions of the model for the real effective rate are quite close to the actual value of REER, tracking the mid-1980s appreciation and depreciation.

Nonetheless, the results should be viewed with considerable caution. First, the long-run relationship of the fiscal variable to the other variables is not particularly strong. The results suggest that the effect of fiscal policy on the real exchange rate is largely subsumed in the net foreign asset position. Second, given the nature of the relative fiscal variable, in particular the fact that it is a flow and that it appears to revert to its mean, it may be inappropriate to model it as containing a unit root process, even though the unit-root tests support this specification. Such tests can be quite unlikely to reject the unit-root null hypothesis

CHART III-2
UNITED STATES
FITTED AND ACTUAL VALUES: MODEL FOR REER



Source: International Financial Statistics; and staff estimates.

even when that null hypothesis is false. ^{1/} Third, it could be argued that fiscal balances can have important short-run effects on short-run real exchange rate dynamics, while the corresponding stock of debt is relevant for the long-run equilibrium exchange rate. Future analysis could remedy both these problems by including public debt stocks and fiscal balances as separate variables.

In addition, a more detailed analysis could consider a richer array of fiscal variables. For example, the real effective exchange rate could be affected in the long run by both taxation and spending policies. In particular, a reduction in fiscal spending that is matched by reduced taxes (leaving the fiscal deficit unchanged) may still affect the long-run real exchange rate if government preferences for traded over nontraded goods differ from those of the private sector. Hence, it would be useful to examine the significance (in both economic and statistical senses) of each separately. Further work in this vein would include such variables in the analysis.

Finally, the empirical work focused on the long-run relationship between fiscal policy and the real effective exchange rate. A possible avenue for future research on the topic would be to examine the implications for short-run dynamics in the exchange rate. Such analysis would be especially pertinent given the disparate predictions that theory yields for the short run and long run. This would also provide an opportunity to extend the data set in order to include recent episodes, and to increase the frequency to quarterly if possible, in order to explore richer short-run dynamics.

^{1/} See, e.g., Campbell and Perron (1991).

References

- Black, Richard, Douglas Laxton, David Rose, and Robert Tetlow, "The Bank of Canada's New Quarterly Projection Model, Part 1: The Steady-State Model: SSQPM," Bank of Canada Technical Report No. 72, November 1994.
- Campbell, John Y., and Pierre Perron, "Pitfalls and Opportunities: What Macroeconomists Should Know About Unit Roots," NBER Macroeconomics Annual 1991, pp. 141-99.
- Edwards, Sebastian, Real Exchange Rates. Devaluation and Adjustment, (Cambridge: MIT Press, 1989).
- _____, and Sweder van Wijnbergen, "Tariffs, The Real Exchange Rate, and the Terms of Trade: On Two Popular Propositions in International Economics," Oxford Economic Papers, Vol. 39 (1987), pp. 458-464.
- Faruquee, Hamid, "Long-Run Determinants of the Real Exchange Rate: A Stock-Flow Perspective," Staff Papers, International Monetary Fund (Washington), Vol. 42 No. 1 (March 1995), pp. 80-107.
- Hamilton, James D., Time Series Analysis, (Princeton: Princeton University Press, 1994).
- Masson, Paul R., Jeroen Kremers, and Jocelyn Horne, "Net Foreign Assets and International Adjustment: The United States, Japan, and Germany," IMF Working Paper WP/93/33, (Washington: International Monetary Fund, April 1993).
- Macklem, Tiff, David Rose, and Robert Tetlow, "Government Debt and Deficits in Canada: A Macro Simulation Analysis," Bank of Canada Working Paper 95-4, May 1995.
- Marsh, Ian W., and Stephen P. Tokarick, "Competitiveness Indicators: A Theoretical and Empirical Assessment," IMF Working Paper WP/94/29, (Washington: International Monetary Fund, March 1994).
- Ostry, Jonathan, "The Balance of Trade, Terms of Trade, and the Real Exchange Rate: An Intertemporal Maximizing Framework," Staff Papers, International Monetary Fund (Washington), Vol. 35 (December 1988), pp. 541-73.
- Pesaran, M. Hashem, and Yongcheol Shin, "Long-Run Structural Modelling." Working Paper, Trinity College (Cambridge), September 1994.
- Williamson, John, "Introduction," in John Williamson, ed., Estimating Equilibrium Exchange Rates, (Washington: Institute for International Economics, 1994).

Data

The data series were calculated as follows. All the series are identical to those used in Faruquee (1994), except for the fiscal balance series, which was not used in Faruquee (1994).

REER: Multilateral CPI-based real effective exchange rate. The series is rebased to equal 100 in 1985, then expressed in logarithms. Source: International Financial Statistics.

TOT: Terms of trade (export unit value divided by import unit value). The series is rebased to equal 100 in 1985, then expressed in logarithms. Source: International Financial Statistics.

TNT: Index of the price of traded goods relative to the price of non-traded goods, proxied by the ratio of CPI to WPI, for the United States relative to G-7 partner countries excluding Canada. The index is constructed as $\log(TNT_{US}) - \sum_j w_j \log(TNT_{Other\ G-7})$, where w_j is the weight used in REER for country j rescaled for the omission of non-G-7 countries. Each TNT_j series is scaled to equal 1 in 1985. Source for basic data: International Financial Statistics.

NFA: Net foreign assets as a percentage of GDP, in units where 0.01 = one percent. Source: Masson, Kremers, and Horne (1993).

FBAL: Fiscal balance as a percentage of GDP relative to partner countries. Source: International Financial Statistics. The index is constructed as $FBAL_{US} - \sum_j w_j FBAL_{Other\ G-7}$, where w_j is the weight used in REER for country j rescaled to account for the omission of non-G-7 countries. Each $FBAL_j$ is rescaled to equal 100.0 in 1985, in order to account for differences in coverage and other non-comparabilities across countries.

IV. Trends in the International Use of the U.S. Dollar 1/

1. Introduction

Concerns about the status of the dollar as an international currency have surfaced periodically since the inception of the Bretton Woods system, which established a dominant role for the U.S. dollar in the international financial system. In the early 1960s, Robert Triffin (1960) pointed out the growing inconsistency between the expanding use of the dollar as a convertible international reserve asset and the fixed stock of gold reserves of the United States. In the second half of the 1970s, many believed that a decline in the international role of the dollar would be an inevitable result of a diminishing international role of the United States, the collapse of the Bretton Woods system, and the eroding internal value of the dollar. The fall in its exchange value was identified as a symptom of the currency's declining role.

In a series of papers in the early 1980s, Kenen pointed out that the theory was running ahead of the data: many studies were trying to explain the supposedly dwindling role of the dollar, but few actually were measuring it. 2/ Kenen concluded that despite a decline in its status as a reserve currency and a drop in its use in international trade, the dollar was still by far the dominant currency in the international financial system.

Recently, concerns about a decline in the role of the dollar have resurfaced, owing in part to the dollar's weakness against the other main international currencies and reports that central banks are increasingly diversifying their reserve holdings. A number of studies have reported recently on the trends in the international use of currencies other than the dollar. For example, Tavlas (1990, 1992) documents the increasing role of the deutsche mark and the Japanese yen in the international financial system. Of course, an expanded use of other currencies implies a declining role for the dollar, but there has been no recent study that examines the trends for the dollar directly. This chapter addresses this issue. It defines and quantifies various measures of the dollar's role in the international financial system, and briefly points out the factors that promote the international use of a currency.

The data show that the dollar's status as the world's main international currency does not seem to have diminished significantly. While the dollar has lost its role as the sole vehicle currency in foreign exchange markets and its share in the Eurocurrency market continues to decline, according to most other measures the decline in its importance has been reversed in recent years. The most notable examples are the shares of the dollar in international reserves, in new international syndicated bank credits, and in outstanding loans to developing countries.

1/ Prepared by S. Erik Oppers.

2/ See Kenen (1981, 1982a, 1982b, 1983).

Moreover, the use of U.S. dollar notes for transaction and hoarding purposes abroad has expanded, as evidenced by large and increasing exports of U.S. currency in recent years. It is now estimated that close to \$100 billion of U.S. currency has been exported since 1990 alone, adding to a stock held abroad that is now estimated to be between 50 and 70 percent of the total U.S. currency in circulation. 1/

2. The international uses of a currency

The international uses of a national currency can be classified much in the same way as its domestic uses: as a unit of account, a means of payment, and a store of value. Following Kenen (1983), the frame of reference outlined in Table IV-1 is adopted here.

The dollar is used internationally in the three main functions of money, both privately and by governments. As a unit of account, it is used to define exchange parities, to invoice international trade, and to quote prices in international commodity markets, both in the United States and abroad. As a means of payment, it is used as a vehicle currency in foreign exchange markets, both by private entities and by governments in exchange-market intervention operations. It is also used in cash transactions in a number of countries, mainly in South America and Eastern Europe. As a store of value, its most obvious use is that of reserve asset held by central banks. It is also widely used, however, as currency of denomination for loans, bonds and deposits, and as a stable-value asset in high-inflation economies.

Three factors appear to be important for determining whether a currency takes on a reserve currency status.

First, there should be confidence in the value of the currency. This is particularly important for the role of a currency as a store of value and is one of the main reasons for the use of U.S. currency in countries with high and variable rates of inflation. A currency's stable external value is promoted by political stability and sound economic policies in the issuing country. Long track records of low inflation and political stability have contributed to the growing international use of the Swiss franc, the German mark, and the Japanese yen, for example. 2/

Second, a country's financial markets should be well-developed. It is important that they be broad--with a large assortment of financial services--as well as deep--with well-developed secondary markets--and substantially free of controls. This lowers transaction costs and helps

1/ Porter and Judson (1995).

2/ Tavlas (1990, 1992).

Table IV-1. United States: The International Use of the Dollar

Function	Private Use	Official use
Unit of account	Currency used in trade invoicing; used to quote prices in international commodity markets.	Currency used in defining exchange parities.
Means of payment	Vehicle currency in foreign exchange markets; used in cash transactions abroad.	Intervention currency in foreign exchange markets.
Store of value	Currency of denomination for deposits, loans, and bonds; held as cash abroad.	Currency held as reserve asset.

Source: Kenen (1983).

promote the position of a country's financial center as a banking center to the world.

Third, the currency should be in widespread use. An international currency will be favored simply because many others are using it: widespread use of a currency lowers transactions costs and instills confidence. The importance of widespread use introduces a certain "path dependency" in the choice of vehicle currency. Once a currency gains the status of international currency, it will tend to have an advantage over others. For example, the pound sterling retained its status as an international currency, long after the decline of the United Kingdom's role as the major economic and financial world power, by virtue of its longstanding and widespread use. Only when confidence in its value was tarnished by recurring exchange market crises and sustained depreciation did sterling lose its importance.

All three of these factors were important in establishing the dollar as the main international currency after World War II. First, it was sanctioned as the main reserve currency in the Bretton Woods system, which gave it an instant platform for widespread international use. Second, the United States was the largest economy in the world, as well as the largest trading nation. And third, perhaps most importantly, the international community was confident that the macroeconomic policies of the United States would preserve the internal and external value of its currency.

In many respects the dollar has lost ground in these areas, especially against the deutsche mark and the yen. The United States is still the largest exporter in the world, but it is followed closely now by Germany and Japan. Even though the United States' inflation performance has improved, U.S. inflation today remains higher than that of Germany and Japan. In addition, the United States has switched from a net creditor position to a net debtor position, with sizable fiscal and current account deficits. In the exchange markets, the dollar has lost 62 percent of its value against the deutsche mark and 76 percent against the yen since 1970.

3. Trends in the use of the dollar as an international unit of account

There are limited data available on the currency denomination of trade invoices. Tavlas (1990) cites two studies on invoicing practices in major countries. 1/ Their data, presented in Table IV-2, show a tendency for the use of the dollar to decline from 1980 to 1987, in favor of the other major currencies. However, it is difficult to draw conclusions on the basis of only two years of data.

Table IV-3 presents data on currency pegs. The early 1980s saw a tendency for pegs against the dollar to be abandoned in favor of pegs vis-à-vis a basket of currencies. Since the mid-1980s, however, the composite baskets have lost some of their appeal, and their number is back

1/ Page (1981) and Black (1989a).

**Table IV-2. United States: Currency Denomination of Trade
Invoicing in France, Germany, Italy, Japan,
the United Kingdom, the United States, and OPEC**

(In percent)

	U.S. Dollar	Deutsche Mark	Japanese Yen	Pound Sterling	French Franc	Italian Lira
<hr/>						
<u>Exports</u>						
1980	59.2	17.5	3.4	8.7	8.2	2.9
1987	46.2	23.1	6.5	9.3	10.1	4.8
<u>Imports</u>						
1980	64.2	16.0	1.0	8.1	8.5	2.1
1987	52.5	20.4	3.5	8.8	10.2	4.5

Sources: Tavlas (1990); and Fund staff estimates.

Table IV-3. United States: Exchange Rate Arrangements of Fund Members 1/

	<u>U.S. Dollar</u>		<u>French Franc</u>		<u>Currencies Pegged to:</u>				<u>Other Currencies</u>		<u>Other Arrangements</u>	
	<u>Number</u>	<u>Percent</u>	<u>Number</u>	<u>Percent</u>	<u>SDR</u>		<u>Composite</u>		<u>Number</u>	<u>Percent</u>	<u>Number</u>	<u>Percent</u>
1980	39	28	14	10	15	11	22	16	4	3	46	33
1981	39	27	14	10	15	11	21	15	5	4	48	34
1982	38	26	13	9	15	10	23	16	5	3	52	36
1983	33	23	13	9	12	8	27	18	5	3	56	38
1984	34	23	13	9	11	7	31	21	5	3	54	36
1985	31	21	14	9	12	8	32	21	5	3	55	37
1986	32	21	14	9	10	7	30	20	5	3	60	40
1987	38	25	14	9	8	5	27	18	5	3	59	39
1988	36	24	14	9	7	5	31	21	5	3	58	38
1989	32	21	14	9	7	5	35	23	5	3	59	39
1990	25	16	14	9	6	4	35	21	5	3	69	48
1991	24	15	14	9	6	4	33	23	4	3	75	45
1992	24	14	14	8	5	3	29	17	12	7	83	50
1993	21	12	14	8	4	2	26	15	8	5	102	58
1994	23	13	14	8	4	2	21	12	8	4	108	61
1995	23	13	14	8	3	2	20	11	8	4	111	62

Source: IMF International Financial Statistics (various issues).

at where it stood in the late 1970s. The number of dollar pegs continued to decline in the late 1980s, but it has stabilized since. The dollar remains the most popular SDR currency to use for a peg, while the number of currencies pegged to the SDR has declined sharply. These trends, however, may simply reflect a shift toward more flexible exchange rate arrangements in general.

4. Trends in the use of the dollar as an international medium of exchange

A currency is said to be a vehicle currency in exchange markets if it is used as intermediary currency in a trade between two other currencies. For example, a trader in London wanting to buy Dutch guilders with Belgian francs might first sell the francs for dollars and then use the dollars to buy guilders. These trades occur when the sum of the bid-ask spreads in the dollar markets for both currencies is smaller than the spread in the guilder-franc market. This is frequently the case for the smaller currencies, as wide bid-ask spreads are a characteristic of illiquid markets.

Charts IV-1 and IV-2 show that in the two major currency trading centers in the world, New York and London, the role of the dollar as a vehicle currency has begun to decline quite sharply. Traditionally, almost all cross-currency trades used the dollar as a vehicle currency: for example, in 1986 only 3 percent of all currency trades in London did not involve the dollar. This percentage has increased in recent years, however, to 21 percent in 1992, reflecting a clear trend toward direct cross-currency trades. This is most likely the result of more integrated international capital markets, a higher volume of cross-border capital flows, and a deepening of the cross-currency exchange markets, all of which tend to lower bid-ask spreads. Chart IV-2 shows that even in New York the percentage of trades not involving the dollar has risen from 4 percent in 1989 to 11 percent in 1992. ^{1/}

Just as the dollar is used often as vehicle currency in private exchange-market transactions, monetary authorities might prefer to use the dollar in their operations in the exchange markets as well. In particular, because of the greater depth of the dollar exchange market, and because a high proportion of the international reserves of most countries is held in dollars, central banks often have used the dollar as intervention currency, even to defend exchange rates against other currencies.

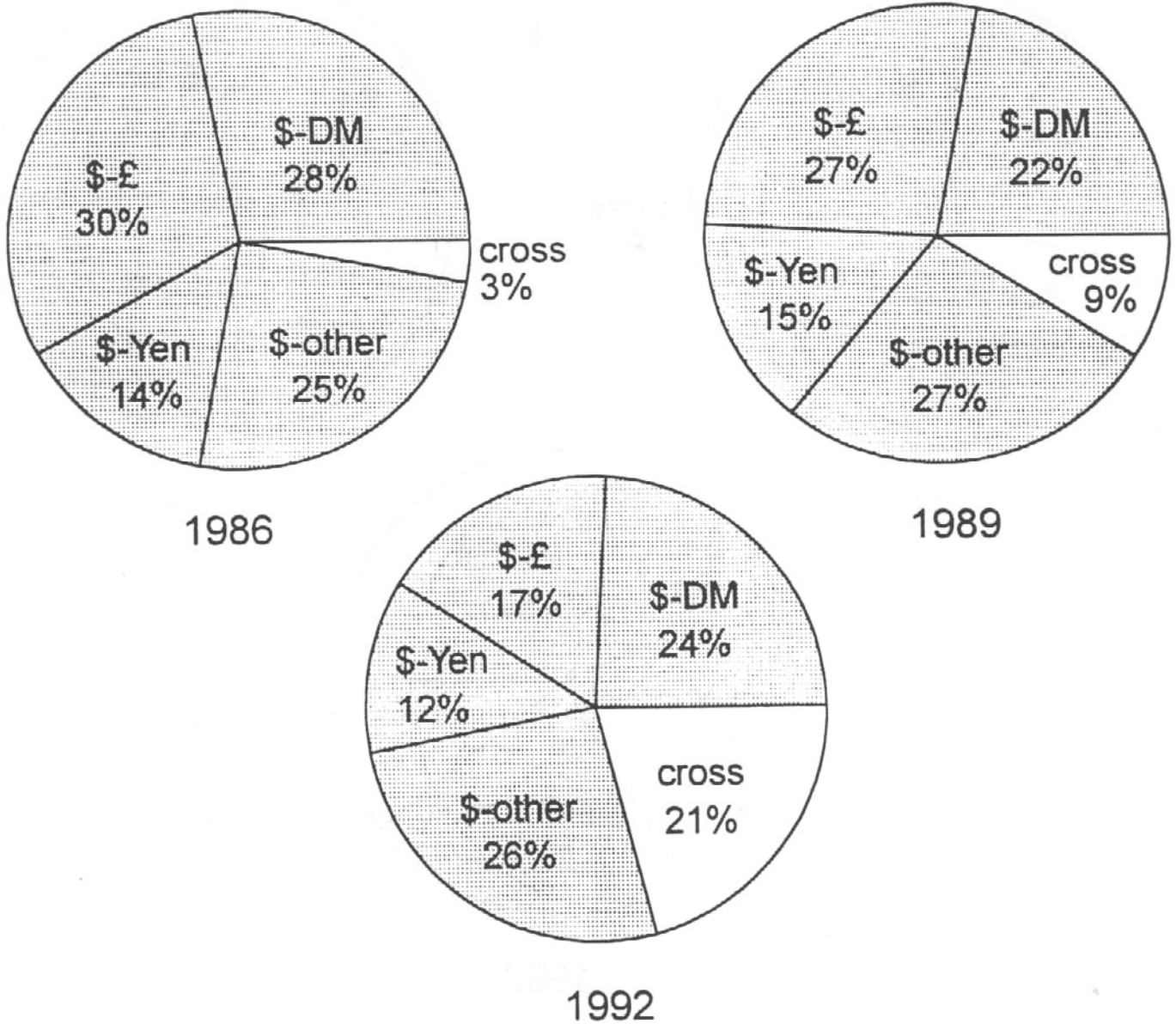
As an example, Table IV-4 gives the currency distribution of foreign exchange intervention in the first decade of the EMS. In the early years of the system, the dollar was clearly favored, even though most intervention was aimed at defending parities of the European currencies vis-à-vis the deutsche mark. In the second half of the 1980s intervention using the deutsche mark overtook dollar intervention, suggesting that the official use of the dollar as a vehicle currency in exchange markets also declined.

^{1/} No data on cross-currency trades in New York are available for 1986.

CHART IV-1

UNITED STATES

CURRENCY COMPOSITION OF FOREIGN EXCHANGE TRADING IN LONDON

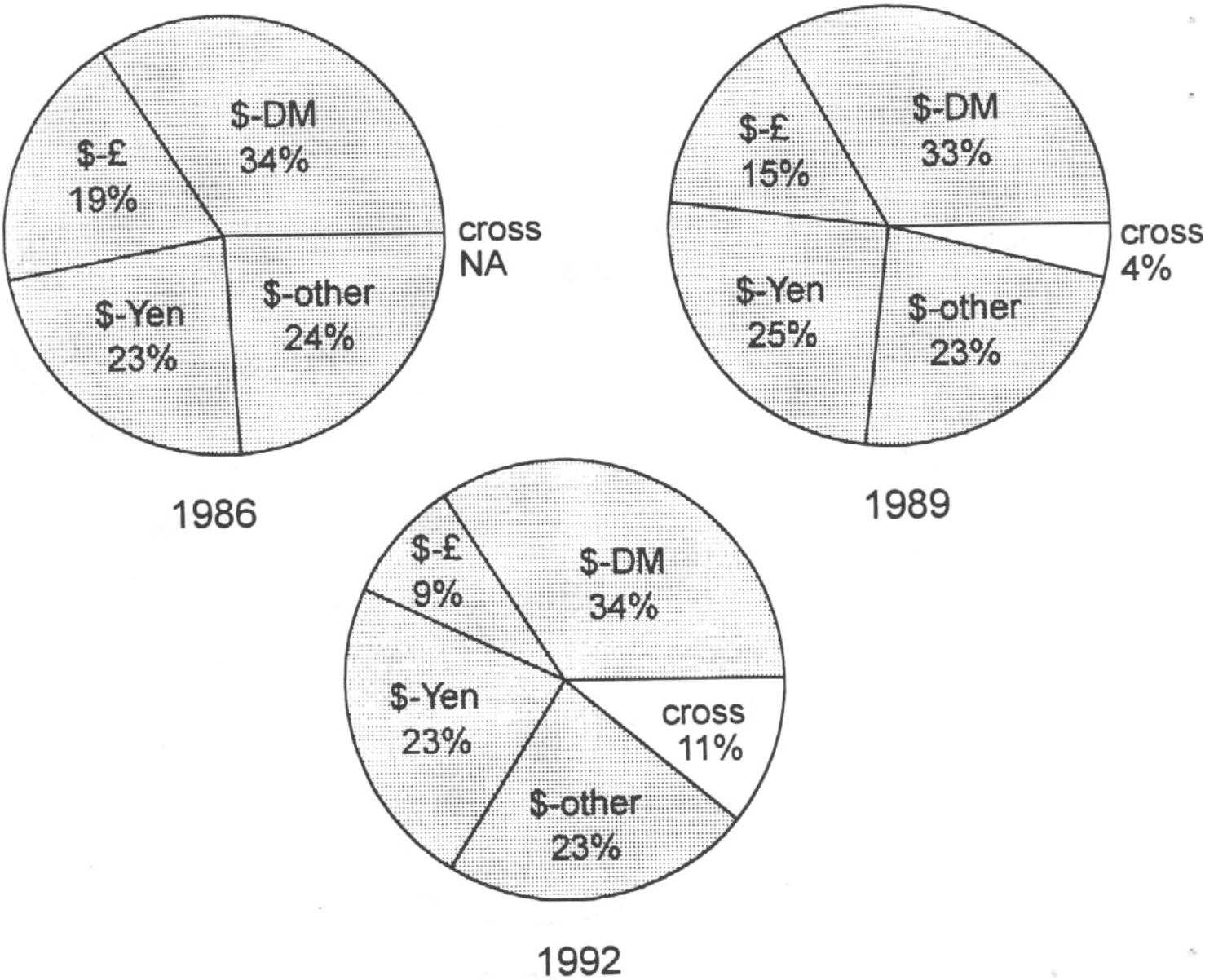


Source: BIS.

CHART IV-2

UNITED STATES

CURRENCY COMPOSITION OF FOREIGN EXCHANGE TRADING IN NEW YORK



Source: BIS.

**Table IV-4. United States: Currency Distribution of
Foreign Exchange Intervention in the European Monetary System**

(In percent of total intervention)

	Dollar	DM	Other EMS ^a	Other
1979-82	71.5	23.7	3.5	1.3
1983-85	53.7	39.4	4.1	2.8
1985-87	26.3	59.0	12.7	2.0

Source: Tavlas (1990), Table 14.

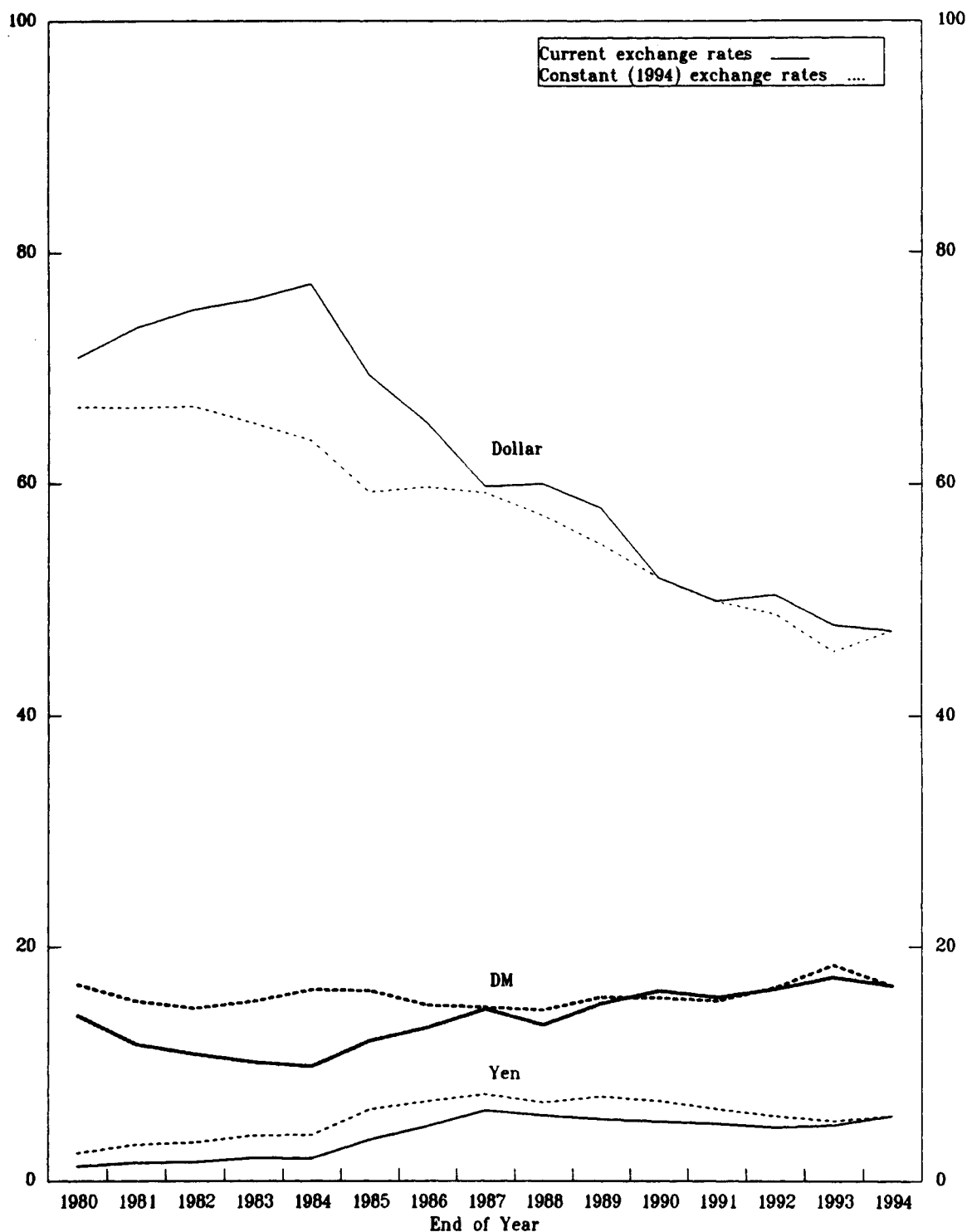
5. Trends in the use of the dollar as an international store of value

Table IV-5 and Chart IV-3 give data on the currency distribution of Eurocurrency deposits. The top panel reports the shares of the major currencies calculated at current exchange rates. The dollar's share has been on a downward trend since the mid-1980s, from a high of 77 percent in 1984 to a low of 47 percent in 1994. The relative decline of the dollar has been matched by a significant increase in the shares of most of the other major international currencies. The increase in the share of "other" currencies, including the share the Bank of International Settlements (BIS) reports as "unallocated" has been particularly strong. Data shown in the lower panel of Table IV-6 and the dashed lines in Chart IV-3 give the shares of the various currencies using constant end-1994 exchange rates, thus eliminating the effect of the large changes in many of the cross currency rates over the past decade and a half. On the basis of these data the decline in the dollar share since 1985 is smaller, and the shares of the deutsche mark and the yen have been virtually constant since that time.

Table IV-6 and Chart IV-4 provide the currency distribution of international syndicated bank credits. During the first half of the 1980s the share of the yen increased sharply, from 1 percent in 1981 to over 16 percent in 1986. This was matched by a drop in the dollar share from 86 percent in 1981 to under 60 percent in 1987. Subsequently, however, the share of the yen dropped, reaching 1 percent in 1991. The sterling share rose to over 17 percent in 1987, but fell sharply thereafter. The ECU share rose to about 12 percent in 1992, but also has fallen in subsequent years. In recent years, the dollar has regained most of its former dominance, with its share back over 80 percent. The pattern of shares measured in constant exchange rates is similar.

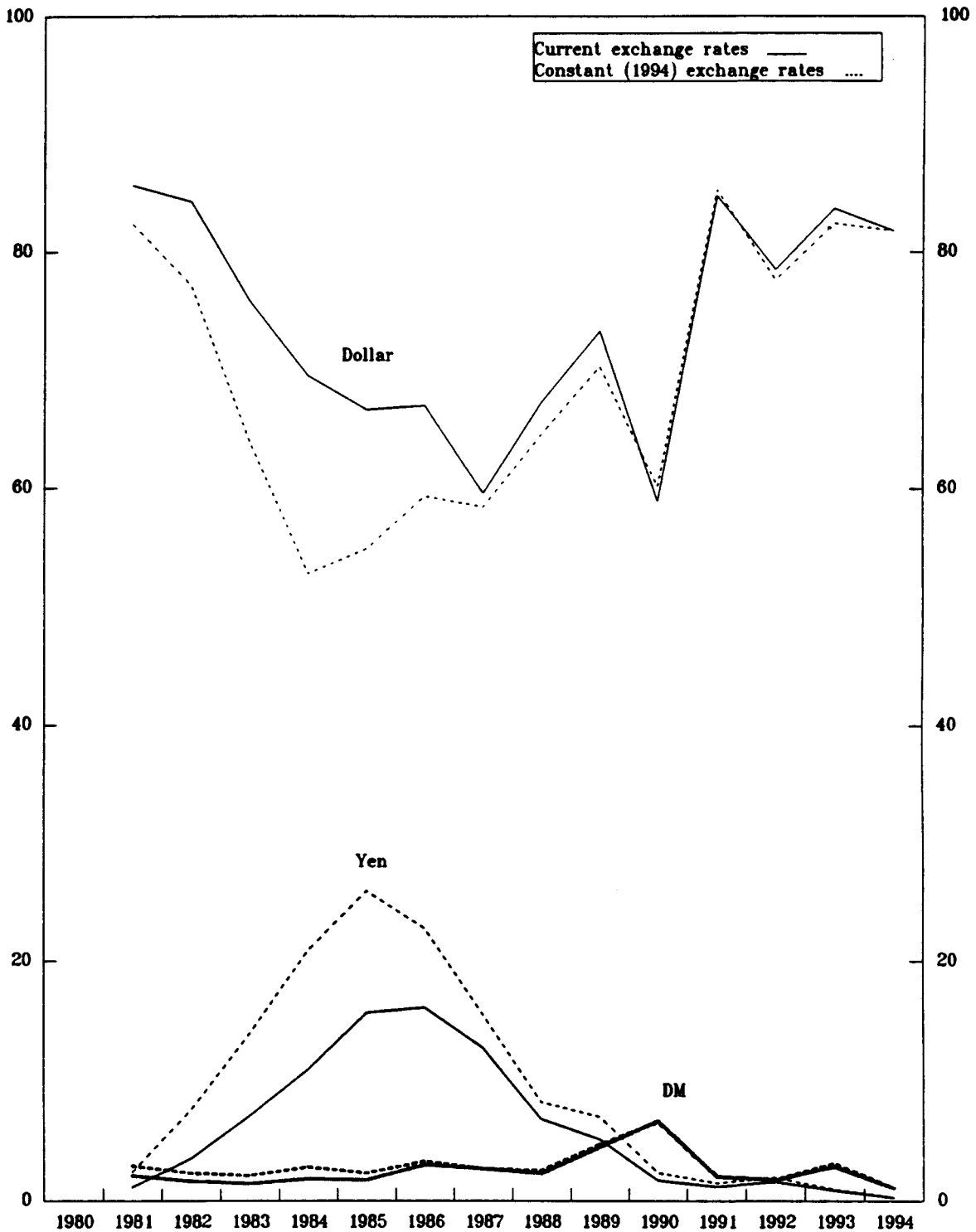
The share of the dollar in new external bond issues has been quite stable in the past six or seven years, after a drop in the mid-1980s. Table IV-7 and Chart IV-5 show that the dollar's share fell from around 60 percent in the early 1980s to between 30 and 40 percent at present. The lower dollar share in the past decade was not related to increased shares for the traditional international currencies such as the yen, the mark, and the Swiss franc. In fact, the combined share of these currencies was lower in 1994 than it was in 1980, especially when measured in constant exchange rates. Instead, the drop in the dollar share was related to an increase in new bond issues denominated in currencies such as Canadian dollar, French franc, Italian lira, Luxembourg franc, Australian dollar, Dutch guilder, and Spanish peseta whose share increased from 7 percent in 1980 to about 21 percent in 1994. Table IV-8 and Chart IV-6 show that a slow downward trend in the share of the dollar-denominated developing country debt since 1980 has been reversed in recent years. The share was at 44 percent in 1993, up from a low of 40 percent in 1991.

UNITED STATES
CURRENCY DISTRIBUTION OF EUROCURRENCY DEPOSITS
(In percent)



Source: BIS, International Banking and Financial Market Developments.

UNITED STATES
CURRENCY DISTRIBUTION OF EXTERNAL BANK LOANS
(In percent)

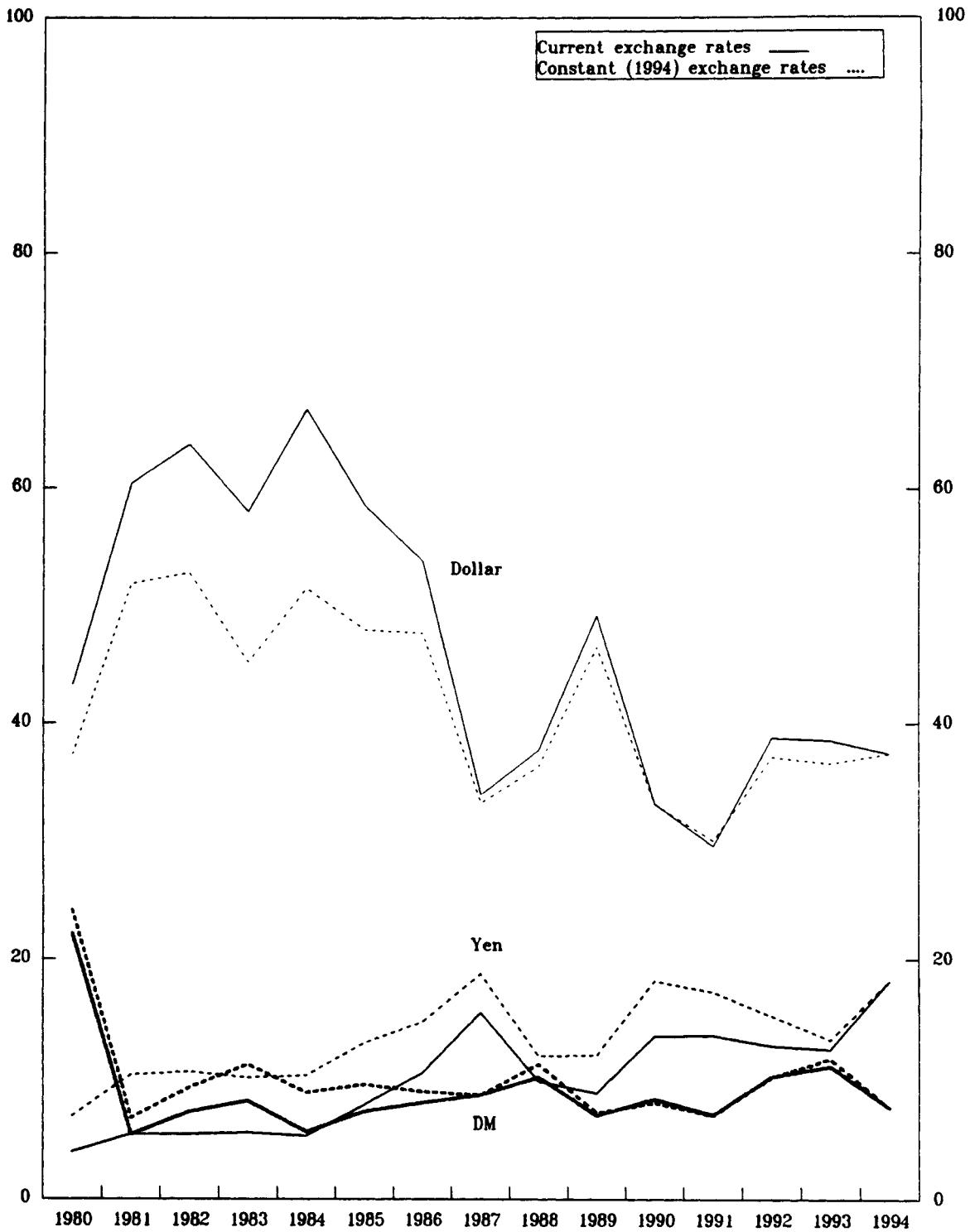


Source: OECD Financial Market Trends.

CHART IV-5

UNITED STATES

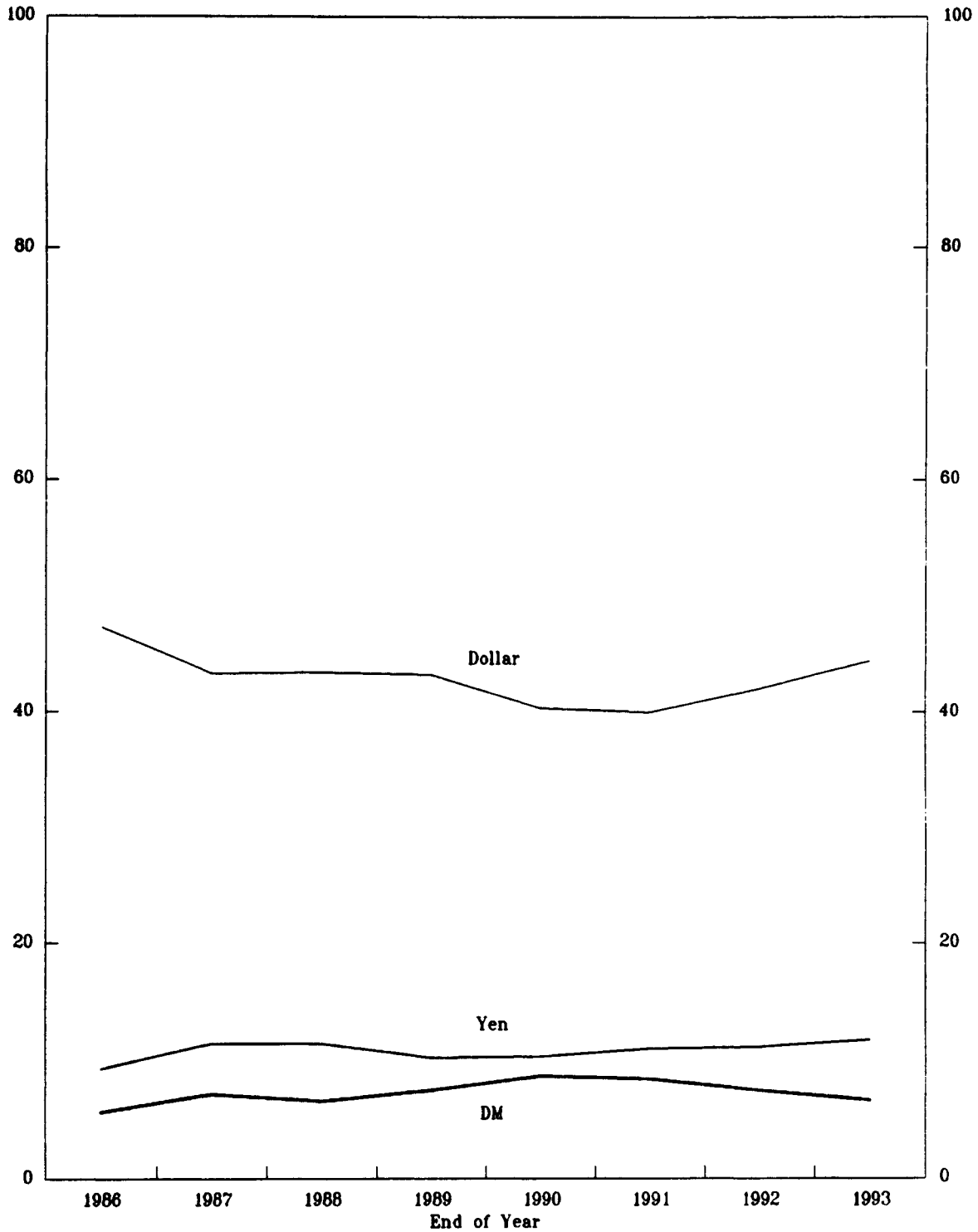
CURRENCY DISTRIBUTION OF NET GROSS ISSUES OF EXTERNAL BONDS
(In percent)



Source: OECD Financial Market Trends.

CHART IV-6

UNITED STATES
CURRENCY DISTRIBUTION OF DEVELOPING COUNTRY DEBT
(In percent)



Source: World Bank, World Debt Tables.

Table IV-5. United States: Currency Composition of Eurocurrency Deposits 1/

(In percent)

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
(Current exchange rates)															
U.S. dollar	70.9	73.4	75.0	75.9	77.2	69.4	65.2	59.8	60.0	57.9	51.9	49.9	50.4	47.8	47.3
Japanese yen	1.2	1.5	1.6	1.9	1.9	3.5	4.6	6.0	5.5	5.2	5.0	4.9	4.5	4.7	5.5
Deutsche mark	14.1	11.6	10.8	10.1	9.7	12.0	13.1	14.7	13.3	15.2	16.2	15.7	16.4	17.4	16.7
French franc	1.6	1.1	1.1	1.0	0.8	1.3	1.3	1.5	1.3	1.4	2.3	2.8	3.8	3.8	3.4
Swiss franc	6.2	6.9	5.8	5.7	4.8	6.7	7.4	7.9	5.4	4.7	5.6	5.1	4.7	4.3	4.5
Pound sterling	2.7	1.9	1.5	1.3	1.4	2.0	2.2	2.9	3.4	3.4	4.2	3.8	3.6	3.4	3.4
ECU	...	...	...	0.6	1.4	2.5	2.8	3.1	3.0	3.5	4.5	5.5	5.2	4.9	4.5
Other, including unallocated	3.3	3.5	4.3	3.4	2.8	2.6	3.3	4.2	8.1	8.6	10.2	12.3	11.2	13.7	14.7
(End-1994 exchange rates) 2/															
U.S. dollar	66.6	66.6	66.7	65.3	63.7	59.3	59.7	59.2	57.2	54.8	51.9	49.8	48.8	45.5	47.3
Japanese yen	2.3	3.1	3.3	3.9	3.9	6.0	6.8	7.3	6.7	7.1	6.8	6.1	5.5	5.1	5.5
Deutsche mark	16.7	15.3	14.8	15.3	16.3	16.2	15.0	14.8	14.6	15.7	15.7	15.4	16.5	18.5	16.7
French franc	1.3	1.1	1.2	1.4	1.3	1.6	1.4	1.5	1.4	1.5	2.2	2.7	3.8	4.0	3.4
Swiss franc	7.8	8.6	7.8	8.1	7.9	9.1	8.4	7.6	5.9	5.3	5.5	5.3	5.1	4.6	4.5
Pound sterling	1.6	1.4	1.3	1.2	1.5	1.9	2.1	2.4	2.8	3.1	3.4	3.1	3.6	3.5	3.4
ECU	...	...	...	0.8	2.0	3.0	2.9	2.9	3.0	3.4	4.0	5.1	5.2	5.1	4.5
Other, including unallocated	3.6	4.0	5.0	4.1	3.4	2.9	3.7	4.3	8.4	9.1	10.5	12.5	11.5	13.8	14.7

Sources: Bank of International Settlements (BIS); International Banking and Financial Market Developments; International Financial Statistics (IFS), (various issues); and Fund staff estimates.

1/ Data refer to liabilities side of "Currency Breakdown of Reporting Banks Cross-Border Positions" in foreign currencies as reported by the BIS.

2/ Data adjusted using end-of-year exchange rates against the dollar from IFS.

Table IV-6. United States: Currency Composition of International Syndicated Bank Credits

(In percent)

	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
(Current exchange rates) 1/														
U.S. dollar	85.7	84.2	75.8	69.5	66.6	67.0	59.6	67.2	73.3	58.9	84.8	78.5	83.7	81.8
Japanese yen	1.1	3.5	7.0	10.9	15.6	16.1	12.7	6.8	5.1	1.7	1.2	1.6	0.9	0.3
Deutsche mark	2.1	1.6	1.4	1.8	1.8	3.0	2.7	2.3	4.5	6.7	2.1	1.7	2.9	1.1
Swiss franc	0.4	0.1	0.6	1.3	2.7	2.1	0.8	0.3	0.3	0.1	0.6	0.3	0.4	0.1
Pound sterling	1.3	2.9	3.9	3.9	2.8	6.4	17.1	14.6	9.2	17.5	4.0	1.8	2.0	8.6
ECU	...	0.3	0.9	2.2	7.4	2.2	2.8	3.3	4.3	8.7	3.8	12.2	5.1	3.2
Other	9.4	7.3	10.4	10.2	3.0	3.2	4.3	5.4	3.3	6.4	3.6	3.9	5.2	4.9
(Constant end-1994 exchange rates) 2/														
U.S. dollar	82.3	77.2	64.0	52.8	54.9	59.3	58.4	64.6	70.3	60.2	85.2	77.6	82.4	81.8
Japanese yen	2.4	7.5	13.8	20.9	25.9	22.7	15.5	8.3	7.0	2.3	1.5	1.9	1.0	0.3
Deutsche mark	2.9	2.3	2.1	2.8	2.3	3.3	2.7	2.5	4.7	6.6	2.0	1.8	3.1	1.1
Swiss franc	0.4	0.1	0.8	1.8	3.2	2.2	0.8	0.3	0.3	0.1	0.6	0.3	0.4	0.1
Pound sterling	1.7	4.1	5.5	5.9	3.7	7.0	16.3	16.1	10.4	17.7	4.2	1.9	2.2	8.6
ECU	...	0.3	0.8	2.3	6.6	2.1	2.3	2.7	4.0	7.2	3.2	12.5	5.3	3.2
Other	10.3	8.5	13.0	13.5	3.4	3.3	4.0	5.4	3.2	5.9	3.3	3.9	5.6	4.9

Sources: Organization for Economic Cooperation and Development (OECD) Financial Market Trends (various issues); International Financial Statistics (IFS) (various issues); and Fund staff estimates.

1/ Data adapted from "Currency Composition of External Bank Loans" reported by the OECD.

2/ Data have been adjusted using end-of-year exchange rates against the dollar from International Finance Statistics (IFS).

Table IV-7. United States: Currency Composition of New Gross Issues of External Bonds

(In percent)

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
(Current exchange rates) 1/															
U.S. dollar	43.2	60.4	63.7	58.0	66.7	58.5	53.9	34.0	37.8	49.3	33.3	29.7	38.8	38.6	37.5
Japanese yen	3.9	5.4	5.4	5.5	5.2	7.8	10.4	15.5	9.7	8.7	13.5	13.5	12.7	12.4	18.1
ECU	...	...	1.0	2.7	2.5	4.7	3.4	4.3	4.9	5.5	8.1	10.9	6.4	1.4	1.8
Pound sterling	3.0	3.0	2.4	3.8	4.5	4.2	4.6	8.7	10.6	7.0	9.5	8.5	6.3	8.9	7.2
Canadian dollar	0.7	1.4	1.6	1.4	2.1	1.7	2.3	3.2	6.1	4.5	2.7	7.2	4.5	6.0	3.0
Swiss franc	19.6	17.0	15.3	17.1	10.7	9.6	10.7	14.4	11.0	7.5	10.5	6.8	5.4	5.7	4.8
Deutsche mark	22.2	5.4	7.2	8.1	5.6	7.3	8.0	8.6	10.1	6.9	8.3	7.0	10.1	11.0	7.6
French franc	3.0	1.3	0.2	0.2	...	1.0	1.7	1.4	1.3	2.2	4.3	6.0	7.4	8.1	6.7
Italian lira	...	...	...	...	...	...	...	...	...	...	2.4	3.1	2.0	2.2	3.9
Luxembourg franc	0.7	0.4	...	...	...	...	...	...	...	...	2.0	1.9	1.7	0.7	2.5
Australian dollar	...	...	...	0.3	0.3	1.8	1.5	4.7	4.0	2.6	2.2	1.4	1.4	0.8	1.8
Dutch guilder	2.3	1.9	1.9	2.0	1.5	1.1	1.3	1.2	1.2	1.0	0.6	1.1	2.0	2.4	2.9
Other	1.4	3.8	1.3	0.9	0.9	2.2	2.2	4.2	3.3	4.7	2.6	2.7	1.3	1.6	2.2
(Constant end-1994 exchange rates) 2/															
U.S. dollar	37.3	51.9	52.8	45.3	51.5	48.0	47.8	33.3	36.4	46.6	33.3	30.1	37.2	36.6	37.5
Japanese yen	6.9	10.2	10.5	10.0	10.2	12.9	14.7	18.8	11.8	11.9	18.2	17.2	15.2	13.2	18.1
ECU	...	...	1.1	3.1	3.4	5.3	3.5	3.9	5.0	5.4	7.3	10.2	6.2	1.5	1.8
Pound sterling	1.7	2.1	1.9	3.2	4.7	3.8	4.3	7.1	8.8	6.5	7.7	7.2	6.2	8.9	7.2
Canadian dollar	0.5	1.0	1.1	1.0	1.5	1.4	2.0	2.9	5.0	3.5	2.2	6.0	3.9	5.4	3.0
Swiss Franc	22.8	20.0	19.3	22.2	16.3	12.4	11.7	13.7	12.1	8.3	10.4	7.1	5.8	6.2	4.8
Deutsche mark	24.3	6.7	9.2	11.1	8.8	9.5	8.9	8.6	11.2	7.2	8.0	7.0	10.1	11.6	7.6
French franc	2.2	1.2	0.3	0.2	...	1.2	1.8	1.3	1.4	2.3	4.1	5.9	7.2	8.5	6.7
Italian lira	...	...	...	...	...	...	...	...	...	...	1.7	2.3	1.7	2.2	3.9
Luxembourg franc	0.6	0.4	...	...	...	...	...	...	...	...	1.9	1.9	1.7	0.8	2.5
Australian dollar	...	...	...	0.2	0.2	1.7	1.6	4.9	3.5	2.4	2.2	1.4	1.5	0.8	1.8
Dutch guilder	2.4	2.3	2.4	2.8	2.4	1.5	1.5	1.2	1.3	1.0	0.6	1.1	2.0	2.6	2.9
Other	1.4	4.1	1.5	1.0	1.1	2.4	2.3	4.2	3.5	4.9	2.4	2.5	1.3	1.6	2.2

Sources: Organization for Economic Cooperation and Development (OECD) Financial Market Trends (various issues); International Financial Statistics (various issues); and Fund staff estimates.

1/ Data adapted from OECD Financial Market Trends.

2/ Data adjusted using dollar exchange rates from IFS.

Table IV-8. United States: Currency Composition of Long-Term
Developing Country Debt

(In percent) 1/

	1980	1986	1987	1988	1989	1990	1991	1992	1993
U.S. dollar	47.2	47.3	43.3	43.4	43.2	40.4	40.0	42.0	44.4
Japanese yen	6.1	9.3	11.4	11.4	10.2	10.3	11.0	11.1	11.7
Deutsche mark	6.4	5.7	7.2	6.6	7.5	8.7	8.5	7.5	6.7
French franc	4.6	4.0	4.8	4.5	4.7	5.3	5.2	4.8	4.2
Swiss franc	1.5	1.7	2.2	1.9	1.7	1.9	1.6	1.3	1.2
Pound sterling	3.1	2.0	2.4	2.4	2.2	2.2	2.1	1.7	1.6
Multiple currency	10.1	10.0	13.2	13.2	13.5	14.6	14.7	15.0	14.8
Other	8.0	6.7	7.3	8.4	8.8	9.0	8.9	8.4	7.9

Source: World Bank World Debt Tables, 1994-95 and 1993-94.

1/ Data as reported by the World Bank do not add up to 100 percent.

A substantial portion of the stock of U.S. currency is located abroad. In quite a number of countries, such as Liberia, Panama, Argentina, and the economies in transition, U.S. notes serve both as a medium of exchange and as a store of value. For example, Kamin and Ericsson (1993) estimate that the amount of U.S. currency in circulation in Argentina might be as high as \$1,000 per capita, or \$30 billion. However, estimates of the total stock and flow abroad have been hard to come by. In a recent paper, various techniques were used to estimate the flow of U.S. currency abroad, and some of this data is reproduced in Chart IV-7. ^{1/} Net exports of currency show a strong upward trend, reaching almost \$24 billion in 1994. The authors estimate that between 50 and 70 percent of the outstanding stock of U.S. currency is held abroad, which is equivalent to between \$200 and \$280 billion.

The most watched indicator of the international use of the dollar is perhaps its role as an international reserve currency. In recent years, fears have been voiced that a massive portfolio shift away from the dollar by the world's central banks could lead to a dollar crisis in exchange markets. Indeed, it is sometimes suggested that one of the reasons for the steep depreciation of the dollar over the past year or so has been its declining role as a reserve asset.

IMF data on international reserve holdings can be examined to evaluate this claim, but these numbers need to be adjusted to provide an accurate picture of the trend in the currency composition of reserves. Since 1979, member countries of the European Monetary System have deposited gold and foreign currency with the European monetary authorities in exchange for balances of official ECUs. Central banks' reports regarding international reserves since then include their holdings of ECUs directly, and no longer include the dollar balances against which these ECUs have been issued. Consequently, a substantial amount of dollar reserves has been hidden from view. To get an accurate picture, the dollar portion of ECUs needs to be added back in (Table IV-9, and Charts IV-8, IV-9, and IV-10).

These data suggest that the dollar remains the world's principal reserve asset. A declining trend in its share, from a high of 71 percent in 1981 to a low of 56 percent in 1990, has since been partly reversed, with the share climbing back to 63 percent in 1994. The shares of the yen and the mark, the dollar's main rivals, have held steady since the mid-1980s. This picture is reinforced if the data are adjusted for changes in exchange rates. The lower panel of Table IV-9 shows the shares of the various currencies using constant end-1994 exchange rates. Calculated on this basis, the "quantity" share of the dollar reached a low of 53 percent in 1985, but has since returned to the levels of the early 1980s. In contrast, the shares of the yen and the deutsche mark on this basis have declined since the mid-1980s.

^{1/} See a Federal Reserve Board paper by Porter and Judson (1995).

Table IV-9. United States: Currency Composition of Official Holdings of Foreign Exchange, End-of-Year 1/

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
(In billions of SDRs)															
Total	251.8	252.6	248.4	264.8	304.7	299.5	297.2	362.3	405.7	456.3	509.0	532.2	548.4	616.2	672.9
U.S. dollar	174.8	178.8	173.7	185.4	210.5	191.3	195.8	239.3	256.9	268.8	285.1	309.5	344.1	390.2	424.4
Pound sterling	7.3	5.2	5.7	6.6	8.8	8.9	7.6	8.7	11.0	12.3	17.4	19.3	18.8	20.8	25.5
Deutsche mark	37.3	32.4	30.3	30.9	38.2	45.0	43.1	52.4	63.1	86.1	95.2	89.0	79.6	95.5	104.2
French franc	4.3	3.3	2.5	2.1	2.3	2.7	2.4	3.0	4.2	6.6	12.0	15.2	13.7	13.7	13.8
Swiss franc	8.0	6.7	6.4	6.1	6.1	6.9	6.0	7.1	7.7	6.8	7.2	7.0	6.6	8.2	7.6
Dutch guilder	3.3	2.7	2.6	2.0	2.1	2.9	3.3	4.5	4.3	5.0	5.6	5.7	3.5	3.9	3.4
Japanese yen	10.9	10.7	11.5	12.9	17.4	23.9	23.3	27.2	30.6	35.1	44.6	49.7	46.4	53.7	57.1
Unspecified	5.8	12.8	15.7	18.8	19.2	17.8	15.8	20.2	27.8	35.6	41.9	36.7	35.9	30.2	36.9
(Shares at current exchange rates)															
U.S. dollar	69.4	70.8	69.9	70.0	69.1	63.9	65.9	66.1	63.3	58.9	56.0	58.2	62.7	63.3	63.1
Pound sterling	2.9	2.1	2.3	2.5	2.9	3.0	2.5	2.4	2.7	2.7	3.4	3.6	3.4	3.4	3.8
Deutsche mark	14.8	12.8	12.2	11.7	12.5	15.0	14.5	14.5	15.6	18.9	18.7	16.7	14.5	15.5	15.5
French franc	1.7	1.3	1.0	0.8	0.8	0.9	0.8	0.8	1.0	1.4	2.4	2.9	2.5	2.2	2.0
Swiss franc	3.2	2.6	2.6	2.3	2.0	2.3	2.0	1.9	1.9	1.5	1.4	1.3	1.2	1.3	1.1
Dutch guilder	1.3	1.1	1.1	0.8	0.7	1.0	1.1	1.2	1.1	1.1	1.1	1.1	0.6	0.6	0.5
Japanese yen	4.3	4.3	4.6	4.9	5.7	8.0	7.8	7.5	7.6	7.7	8.8	9.3	8.5	8.7	8.5
Unspecified	2.3	5.1	6.3	7.1	6.3	6.0	5.3	5.6	6.9	7.8	8.2	6.9	6.5	4.9	5.5
(Shares at constant end-1994 exchange rates)															
U.S. dollar	63.8	62.4	59.8	57.9	53.6	52.6	59.7	64.9	60.3	55.3	55.0	57.3	60.6	61.0	63.1
Pound sterling	1.7	1.5	1.9	2.2	3.0	2.7	2.4	2.0	2.2	2.5	2.7	3.0	3.4	3.4	3.8
Deutsche mark	17.2	16.5	16.0	17.0	19.7	19.7	16.4	14.5	17.0	19.4	17.7	16.1	14.6	16.6	15.5
French franc	1.3	1.2	1.1	1.0	1.1	1.0	0.9	0.8	1.1	1.5	2.2	2.7	2.5	2.4	2.0
Swiss franc	3.9	3.2	3.4	3.2	3.1	3.0	2.3	1.9	2.1	1.7	1.4	1.3	1.3	1.4	1.1
Dutch guilder	1.5	1.3	1.4	1.1	1.1	1.3	1.3	1.3	1.2	1.1	1.0	1.0	0.6	0.7	0.5
Japanese yen	8.1	8.3	9.3	9.4	11.2	13.2	11.3	9.1	9.1	10.4	11.6	11.5	10.2	9.4	8.5
Unspecified	2.4	5.6	7.2	8.2	7.3	6.5	5.7	5.6	7.1	8.1	8.3	6.9	6.7	5.0	5.5

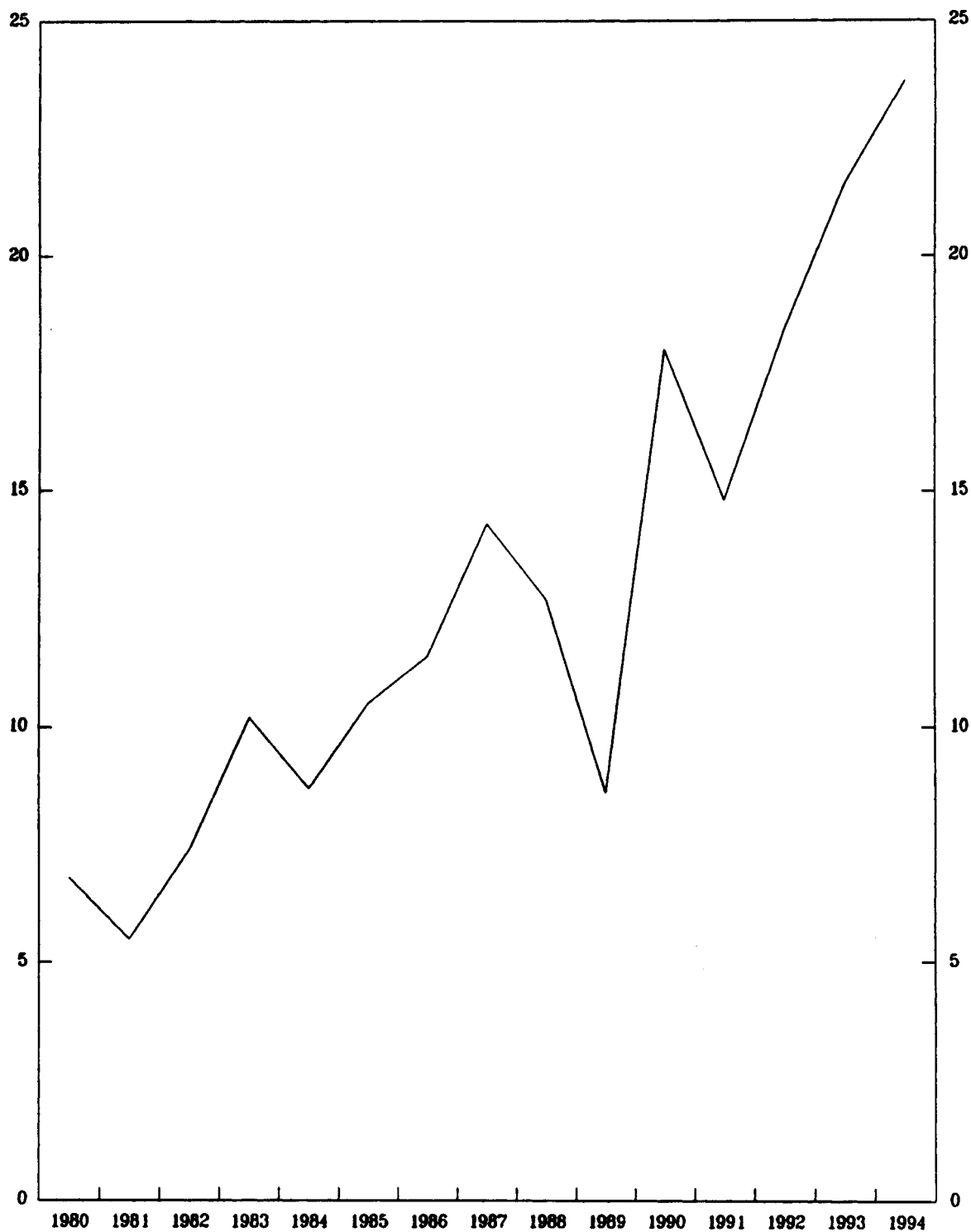
Source: Unpublished International Monetary Fund data.

1/ Dollar portion of ECUs added to U.S. dollar portion.

- 47 -

CHART IV-7

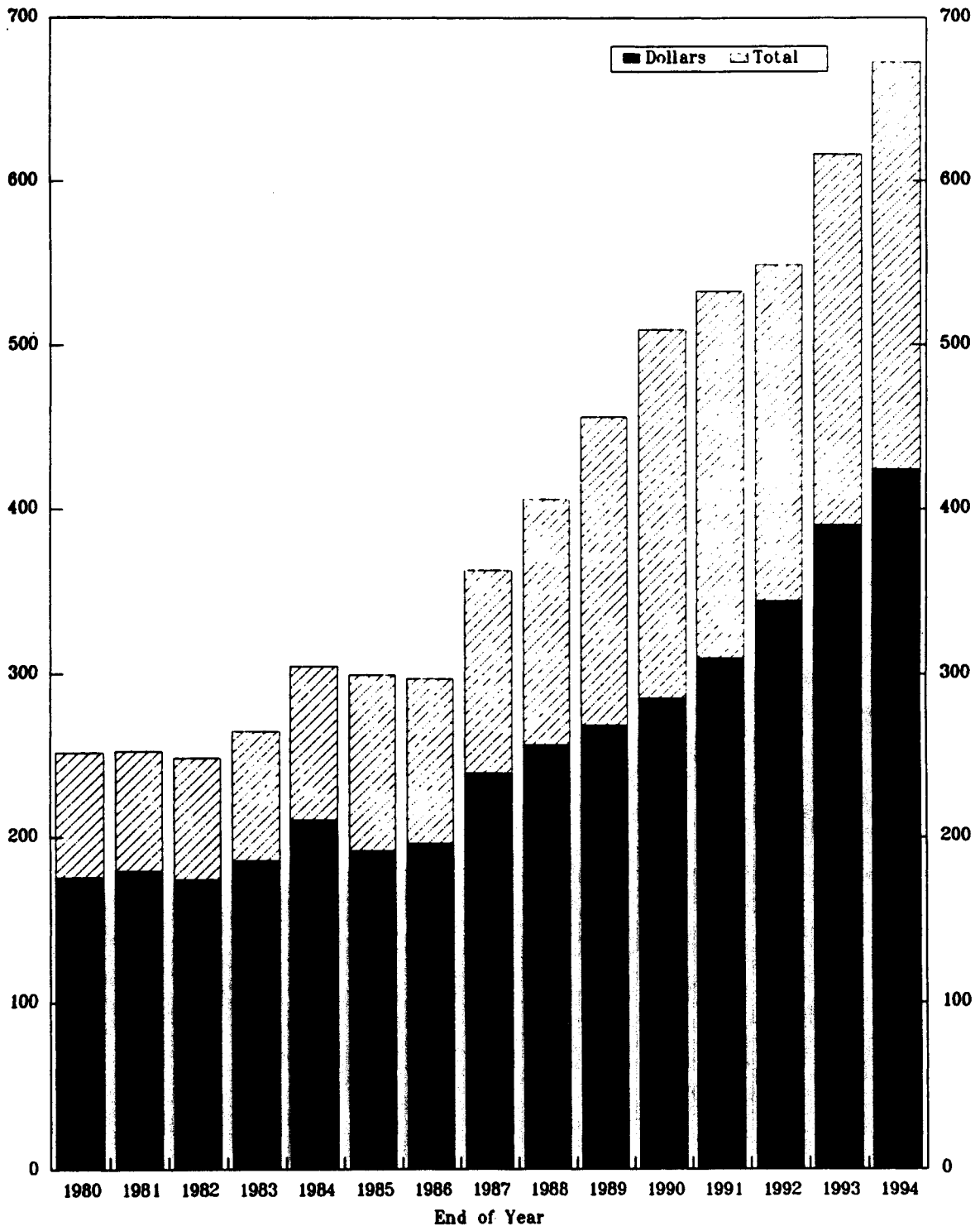
UNITED STATES
NET FLOW OF U.S. CURRENCY ABROAD
(in billions of dollars)



Source: Porter and Judson (1995).

CHART IV-8

UNITED STATES
OFFICIAL HOLDINGS OF FOREIGN EXCHANGE 1/
(In billions of SDRs)



Source: IMF.

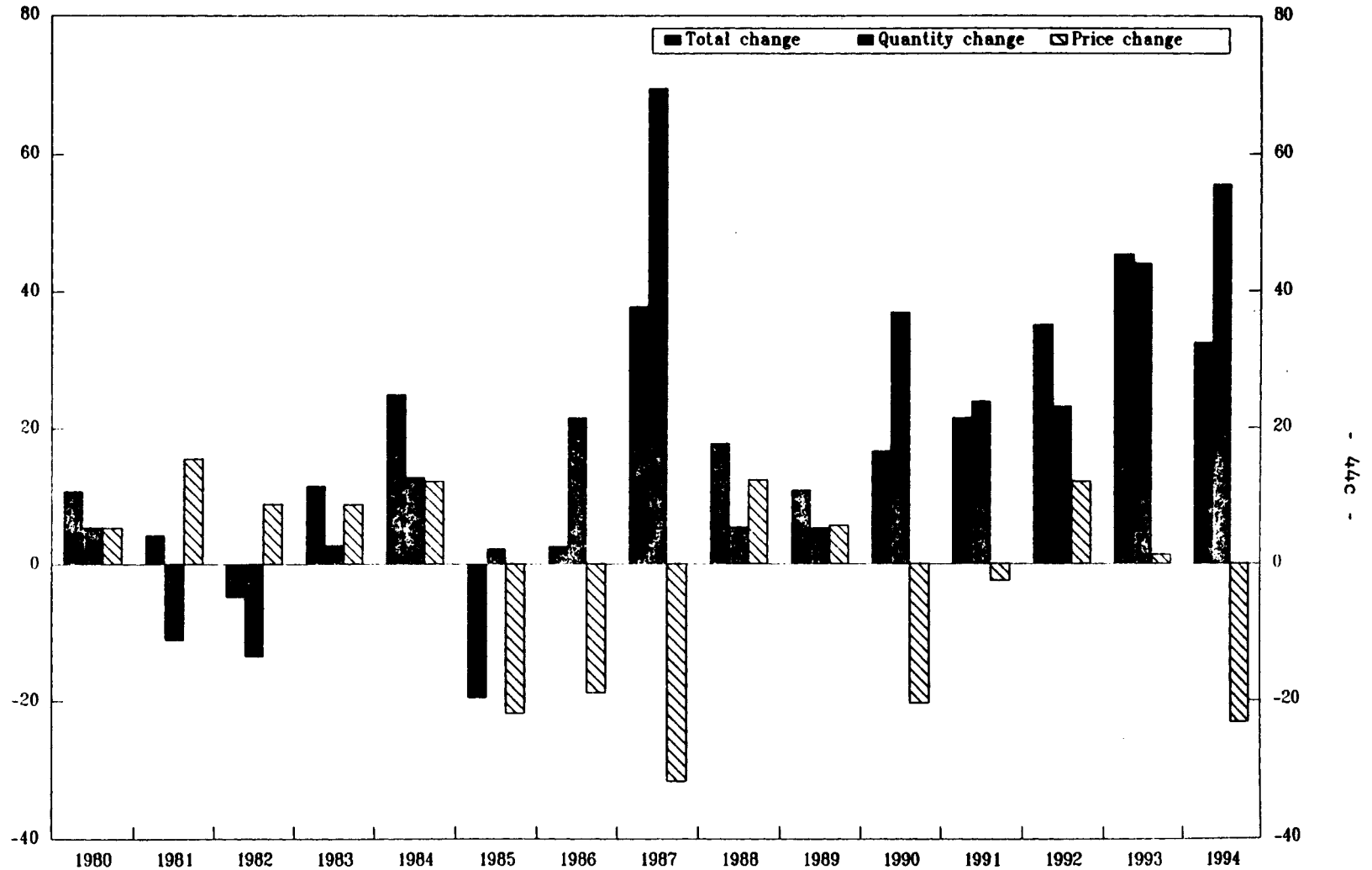
1/ Dollar portion of ECUs added to U.S. dollars.

CHART IV-9

UNITED STATES

CHANGE IN OFFICIAL HOLDINGS OF U.S. DOLLARS

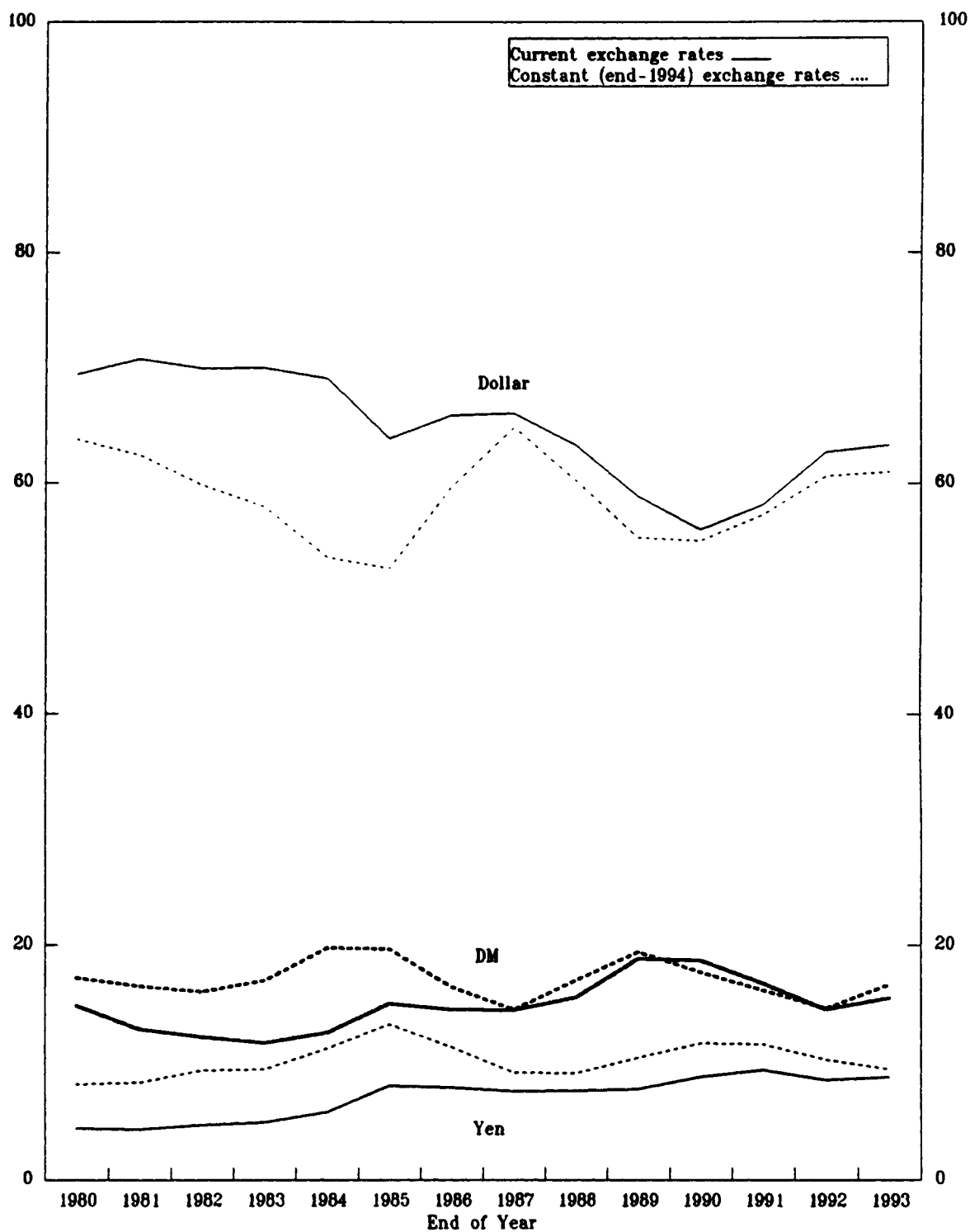
(In billions of SDRs)



Source: IMF.

UNITED STATES

SHARE OF CURRENCIES IN OFFICIAL HOLDINGS OF FOREIGN EXCHANGE 1/
(In percent)



Source: IMF.

1/ Dollar portion of ECUs added to U.S. dollars.

Chart IV-9 shows that central banks have added to their dollar stocks in every year since 1982. In response to the continued weakness of the dollar, central banks' purchases have increased sharply in recent years, reaching \$79 billion in 1994. These additions have more than made up for the decline in the dollar share that resulted from its depreciation vis-à-vis the other major reserve currencies.

There have been news reports that central banks of several East Asian countries have recently begun to switch some of their dollar holdings to yen. 1/ This portfolio shift would not be fully captured in the data in Table IV-9 for two reasons. First, the data do not include all official reserve activity. 2/ Second, some of the dollar sales have been too recent to be captured by the end-1994 data in Table IV-9. China's central bank, for example, reportedly has reduced its dollar share of reserves from 90 percent at the end of 1994 to 75 percent during early 1995. 3/ However, since these dollar sales have been accompanied by quite substantial intervention purchases of dollars by industrial nations, it is unclear whether they have reversed the recent increase in the dollar's share in world-wide reserve holdings.

6. Conclusion

In a number of dimensions, the dollar's role in the international financial system does appear to have declined: it recently has lost its monopoly position as a vehicle currency in the foreign exchange markets, and its use in international trade seems to be on a downward trend. The share of the dollar in eurocurrency deposits has also declined significantly since the mid-1980s. In most other respects the dollar has regained ground in recent years: its share in new and outstanding international syndicated bank loans is back near the levels of the early 1980s, and its share in the world's international reserves has gone up by more than 7 percentage points since 1990. There is a question, however, to what extent this increase was prompted by central banks' intervention to resist the depreciation of the dollar or by an increased desire to hold dollars as reserve assets.

The United States continues to benefit from the role of the dollar as a key currency. The global demand for U.S. dollar-denominated assets leads to lower U.S. interest rates than would otherwise be the case. The international use of the dollar that most benefits the United States--namely, the use of currency abroad--has been expanding in recent years. The

1/ In this report, the term "country" does not in all cases refer to a territorial entity that is a state as understood by international law and practice. It also covers some territorial entities that are not states, but for which economic policies are formulated and statistical data are maintained on a separate and independent basis.

2/ Taiwan Province of China--with a \$93 billion stock of international reserves, the second biggest reserve holder in the world--reportedly has reduced its holdings of dollars by about 4 percentage points in each of the last several years to about 57 percent of its total reserve holdings by the end of 1994, and by another 3 percentage points by March 1995. See Frankel (1995).

3/ See Financial Times (May 10, 1995).

Federal Reserve has estimated that since 1981 the United States has enjoyed a cumulative \$64 billion in seigniorage revenues from the use of dollar cash abroad. 1/2/

The dollar's role of principal international currency has not gone unchallenged, however. Confidence in the dollar has been hurt by large and persistent U.S. current account deficits and its associated weakness in the exchange markets. The deutsche mark and the yen have gained a major role in the international financial system over the past 20 years, mainly because of Germany and Japan's better track records on inflation and currency appreciation, but also as a result of the broadening, deepening, and deregulation of their financial markets. As is occasionally pointed out, these currencies possess the right characteristics for continued expansion of their international role. 3/

1/ See Frankel (1995).

2/ Black (1989b) defines seigniorage as the difference between the rate of interest and the cost of providing a currency. In other words, the U.S. Government earns seigniorage on dollar notes and coins because it gets use of those funds without having to pay interest. For example, by bringing a \$10 bill in circulation the Government can sell an equal amount less in interest-bearing debt, saving a yearly flow of interest payments on \$10. This suggests an alternative way to estimate the yearly flow of seigniorage from the rest of the world to the United States. This flow is equal to the interest payments that non-U.S. residents are willing to give up in return for the monetary services that their stock of dollar cash provides.

3/ See Tavlas (1990, 1992).

References

- Bank for International Settlements, Survey of Foreign Exchange Market Activity (Basle: Bank for International Settlements, February 1990).
- _____, International Banking and Financial Market Developments, various issues.
- Bank of England, "The Foreign Exchange Market in London," Quarterly Bulletin Vol. 32, No. 4 (London: Bank of England, November 1992), pp. 408-417.
- Black, Stanley, (1989a) "Transactions Costs and Vehicle Currencies," International Monetary Fund Working Paper WP/89/96, November 1989.
- _____, (1989b), "Seigniorage" in The New Palgrave: Money (New York: W.W. Norton, 1989)
- Frankel, Jeffrey A., "Still the Lingua Franca: The Exaggerated Death of the Dollar," Foreign Affairs, Vol. 74, No. 4 (July/August 1995), pp. 9-16.
- International Monetary Fund, International Financial Statistics, various issues.
- Kamin, Steven B., and Neil R. Ericsson, "Dollarization in Argentina," International Finance Discussion Paper, No. 460, Board of Governors of the Federal Reserve System, November 1993.
- Kenen, Peter B., "The Role of the U.S. Dollar as Unit of Account and Means of Payment in International Trade," International Finance Section Research Memorandum, Princeton University, 1981.
- _____, "The Role of the U.S. Dollar as Store of Value in International Financial Markets," International Finance Section Research Memorandum, Princeton University, 1982a.
- _____, "The Role of the U.S. Dollar in Pegging Exchange Rates," International Finance Section Research Memorandum, Princeton University, 1982b.
- _____, "The Role of the Dollar as an International Currency," Group of Thirty Occasional Papers, No. 13 (New York: Group of Thirty, 1983).
- OECD, Financial Market Trends, various issues.
- Page, S.A.B., "Currency Invoicing in International Trade," National Institute Economic Review, No. 85 (March 1991), pp. 60-72.
- Porter, Richard D., and Ruth A. Judson, "The Location of U.S. Currency: How Much is Abroad?" Unpublished Manuscript, Board of Governors of the Federal Reserve System, June 1995.

Tavlas, George S., "On the International Use of Currencies: The Case of the Deutsche Mark," International Monetary Fund Working Paper WP/90/3, January 1990.

_____, The Internationalization of Currencies: An Appraisal of the Japanese Yen, (Washington: IMF Occasional Paper No. 90, January 1992).

Triffin, Robert, Gold and the Dollar Crisis: The Future of Convertibility (New Haven: Yale University Press, 1960).

World Bank, World Debt Tables, various issues.

V. Capital Flows and Exchange Rate Volatility:
Evidence from the United States 1/

1. Introduction

Under the Bretton Woods fixed exchange rate regime, a broad array of capital controls in almost all industrial countries kept cross-border capital flows at modest levels. For the United States, the capital account balance averaged a mere -0.4 percent of GDP from 1960 to 1971. However, since the breakdown of the Bretton Woods system and the dismantling of capital controls by most industrial countries, cross-border movements of capital have risen dramatically. Driven by a marked shift in private capital flows during the mid-1980s, the capital account balance of the United States swung by about 5 percentage points of GDP (Chart V-1); large, although less dramatic, swings in private capital flows have continued to characterize the 1990s (Chart V-1 and Table V-1).

These substantial fluctuations in cross-border capital flows often have been blamed for the increased exchange rate volatility of the 1980s and 1990s. 2/ Short-term speculative capital, or "hot money," has been singled out particularly as the most volatile of capital flows and strongly linked with exchange rate instability. 3/ Concerns that large and volatile capital flows increase exchange rate volatility have led some to advocate a transaction tax on purchases and sales of foreign exchange as a way of reducing speculative foreign exchange transactions and, therefore, "excess" exchange rate volatility. 4/ These arguments stress a positive relationship between the volume of cross-border capital flows and the volatility of the exchange rate.

Another strand in the literature has focused on the effects of greater exchange rate uncertainty on the demand for domestic and foreign assets. A conclusion that emerges from this theoretical literature is that, for risk-averse agents, greater exchange rate volatility creates a bias towards domestic assets. 5/ An increase in exchange rate volatility should therefore reduce the size of net cross-border capital flows and increase the correlation between domestic saving and investment. With this in mind,

1/ Prepared by Carmen M. Reinhart.

2/ See, for instance, Eichengreen, Rose, and Wyplosz (1995) and Obstfeld and Rogoff (forthcoming).

3/ See Asea and Rose (1995), Frankel (1988a), Eichengreen, Tobin, and Wyplosz (1995), and Obstfeld and Rogoff (forthcoming).

4/ See, for instance, Eichengreen, Tobin, and Wyplosz (1995); these authors point out that, in order to be effective, the tax would have to apply to all jurisdictions and the rate would have to be equalized across markets. See also Reinhart and Smith (1995) for a recent review of this literature.

5/ See, for instance, Wihlborg (1978) and Bacchetta and van Wincoop (1994).

Table V-1. United States: Capital Account

(In billions of dollars)

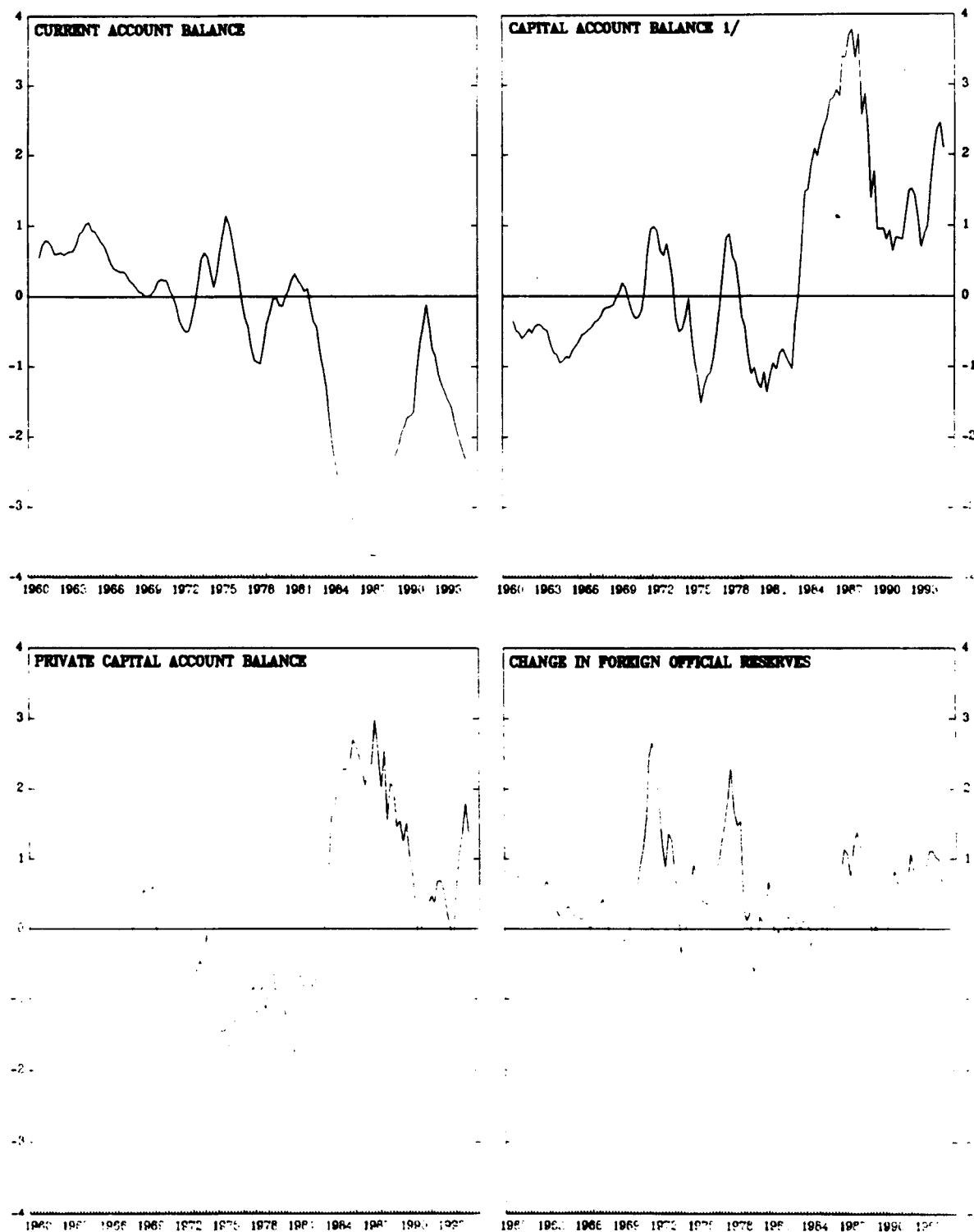
	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995 ^{1/}
Capital account	121.3	171.5	140.9	49.7	51.8	46.6	85.0	63.9	165.5	84.5
Private capital	87.4	116.0	102.1	65.3	17.8	20.8	41.9	-6.5	121.1	20.4
Direct investment	18.5	31.0	41.8	30.9	18.0	-5.2	-31.1	-31.5	0.1	-34.5
U.S. residents	-17.1	-27.2	-15.4	-36.8	-29.9	-31.3	-41.0	-72.6	-49.4	-73.6
Foreign residents	35.6	58.2	57.3	67.7	47.9	26.1	9.9	41.1	49.5	39.1
Securities	70.5	29.2	38.7	46.3	-29.7	9.2	21.6	-37.9	42.6	158.2
U.S. residents	-4.3	-5.3	-7.8	-22.1	-28.8	-44.7	-45.1	-141.8	-49.8	-23.1
Foreign residents	74.8	34.5	46.6	68.4	-0.9	54.0	66.7	103.9	92.4	181.3
Net U.S. bank flows	16.8	44.4	9.8	-6.4	12.2	8.8	37.8	50.8	115.3	-103.3
Nonbank capital	-18.4	11.3	11.7	-5.6	17.3	8.0	13.6	12.1	-36.9	--
Official capital, net	33.9	55.5	38.9	-15.5	34.0	25.9	43.1	70.4	44.4	64.1
U.S. official reserves	0.3	9.1	-3.9	-25.3	-2.2	5.8	3.9	-1.4	5.3	-21.3
Foreign official reserves	35.6	45.4	39.8	8.5	33.9	17.2	40.9	72.1	39.4	85.3
Other items	-2.0	1.0	3.0	1.3	2.3	2.9	-1.7	-0.3	-0.3	0.1
Statistical discrepancy	29.9	-4.4	-12.7	53.1	39.9	-39.7	-17.1	36.0	-14.3	77.5

Source: Bureau of Economic Analysis, U.S. Department of Commerce (supplied by Haver Analytics).

^{1/} First quarter at an annual rate.

CHART V-1

UNITED STATES
EXTERNAL ACCOUNT INDICATORS
(Four-quarter moving sum as a percent of GDP)



Source: Bureau of Economic Analysis, U.S. Department of Commerce (supplied by Haver Analytics)

1/ Excludes government securities

several developing countries that have recently experienced a surge in capital inflows have widened their exchange rate flotation bands. The aim of this policy shift was to make short-term rates of return more uncertain for foreign investors and, thus, discourage short-term capital inflows. 1/

A different, but related, literature has focused on the effects of increased exchange rate volatility on trade and the export sector. The focus of the empirical work in this area has been to test the hypothesis that the increased exchange rate volatility of recent years has had an adverse effect on trade; the findings of these studies for the United States and some of its major trading partners have been mixed. 2/

There has been relatively little empirical work on the interaction between exchange rate volatility and capital flows, despite the growing importance of this issue and despite the fact that the capital account is the mirror image of the current account. 3/ A few studies have examined how exchange-rate uncertainty affects foreign direct investment (FDI). 4/ Some of these studies have argued that increased exchange rate uncertainty increases FDI, as manufacturers use FDI to substitute for reduced exports. There is some evidence for the United States suggesting that the increase in exchange rate uncertainty during the mid-1980s had a positive effect on gross FDI flows, although the implications for net flows is less conclusive. 5/

This chapter takes a step toward filling that gap by focusing on capital account developments. The aim is to review the basic stylized facts that characterize the U.S. capital account and to examine the links between capital flows and their potential determinants--including exchange rate and interest rate uncertainty. The next section reviews how the composition of net capital flows has evolved over time, the volatility profile of the various types of capital account transactions, and the linkages between official and private flows. Section 3 examines the relationship between exchange rate volatility and cross-border capital movements; the following section revisits an earlier literature that links capital flows to rate-of-return differentials. The patterns of official intervention in foreign exchange markets that have an effect on the capital account are reviewed in Section 5, while the last section summarizes the main findings.

2. Capital account developments and characteristics

Private capital transactions can be grouped into four main categories: FDI, portfolio investment, and net changes in U.S. banks' and nonbank

1/ See Reinhart and Dunaway (1995).

2/ As Qian and Varangis (1994) discuss in a recent review of this literature, some studies have found supporting evidence while others have not.

3/ Exceptions are Frankel (1988a and 1988b).

4/ See Cushman (1985) and (1987) and Caves (1988).

5/ Cushman (1987).

liabilities to foreigners. 1/2/ As Chart V-2 highlights, until the early 1980s, the United States consistently recorded net outflows of FDI. Net portfolio investment flows during the 1960s and 1970s were quite modest and accounted for less than half a percent of GDP. 3/ Bank flows, which presumably is the component of the capital account with the shortest maturity, accounted for most of the variation in the capital account balance until the surge in FDI and portfolio investment in the early 1980s.

In 1994, two developments played a prominent role in accounting for the rising surplus in the capital account. First, U.S. banks borrowed heavily from their foreign branches by issuing large time deposits in the form of "senior bank notes" (see Table V-1). Secondly, acquisition of foreign securities by U.S. investors slowed markedly. This latter development, which persisted into the first quarter of 1995, reflected in part the effects of rising U.S. interest rates and in part the winding down of "emerging-markets fever" from its 1993 peak (Table V-2).

Before turning to the question of how capital flows are linked to other macroeconomic variables, it is useful to examine how the various components of the capital account interact and how their volatility has evolved over time. There are several observations that stand out from Chart V-3. First, the volatility of all the components of private capital flows, even relative to nominal GDP, has increased over time, with the upturn becoming more pronounced since the mid-1980s. 4/ Second, bank flows are considerably more volatile than other private flows. Third, changes in net foreign official reserves are far more volatile than U.S. official reserves, suggesting a much more active role in foreign exchange market intervention by foreign central banks than by the U.S. monetary authorities. Lastly, there is little difference between the volatility of FDI and that of portfolio investment. This last observation runs counter to the commonly-held view that FDI is a "more stable" form of foreign investment while

1/ Official capital flows consist of changes in U.S. official reserve assets and changes in foreign official assets in the United States; the statistical discrepancy represents the sum of credits and debits in the balance of payments statement with the sign reversed. See U.S. Department of Commerce (1990) for details.

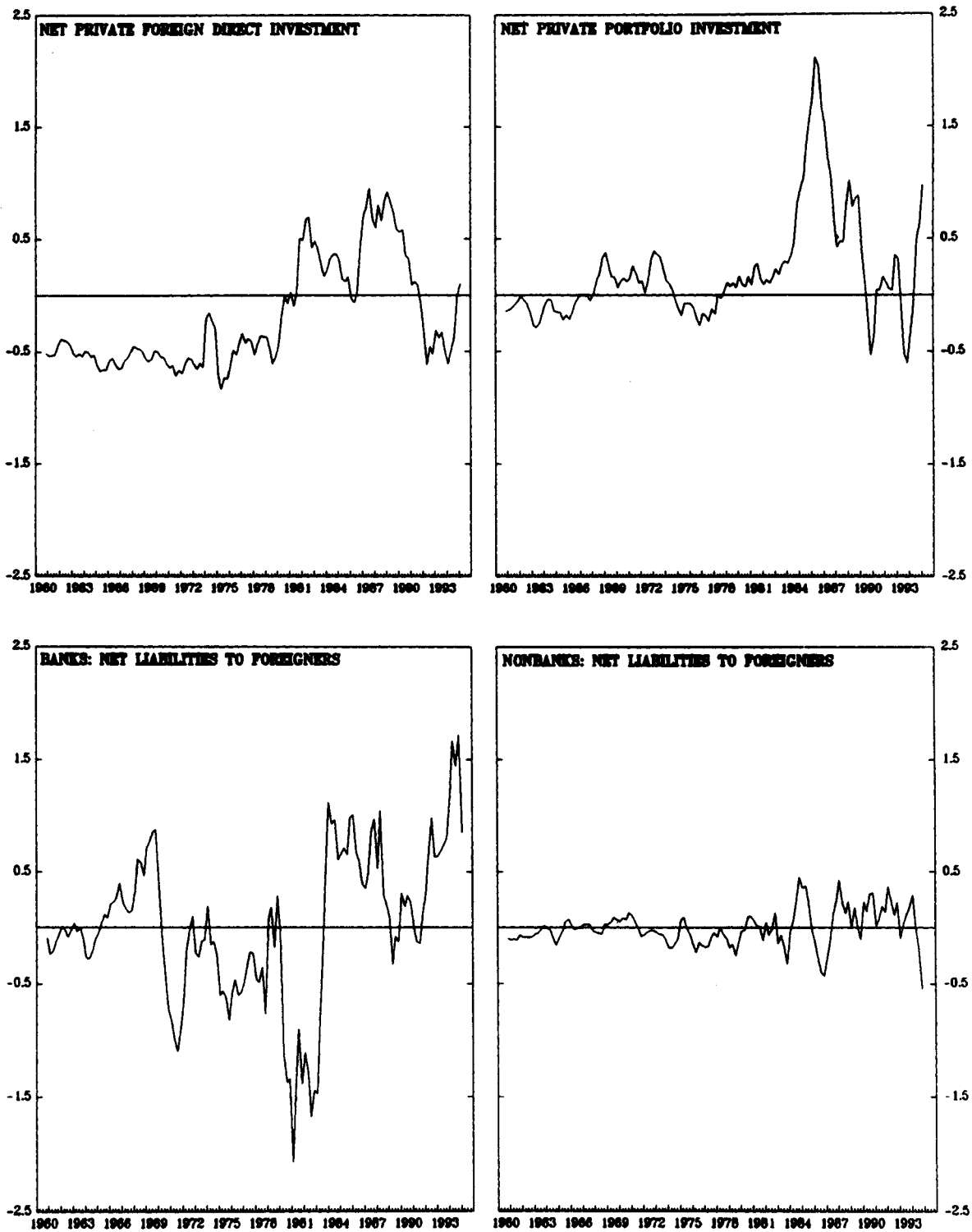
2/ The capital account, which attempts to measure transactions in financial assets between residents and nonresidents, may be particularly vulnerable to measurement error. Hence, any results and inference drawn from this data must be interpreted with some caution.

3/ These trends also became evident in other industrial countries, see Turner (1991).

4/ Volatility is measured as the mean absolute quarterly change over a rolling five-year period. All capital flow measures are expressed as a percent of GDP; these ratios are stationary series with well-defined variances.

CHART V-2

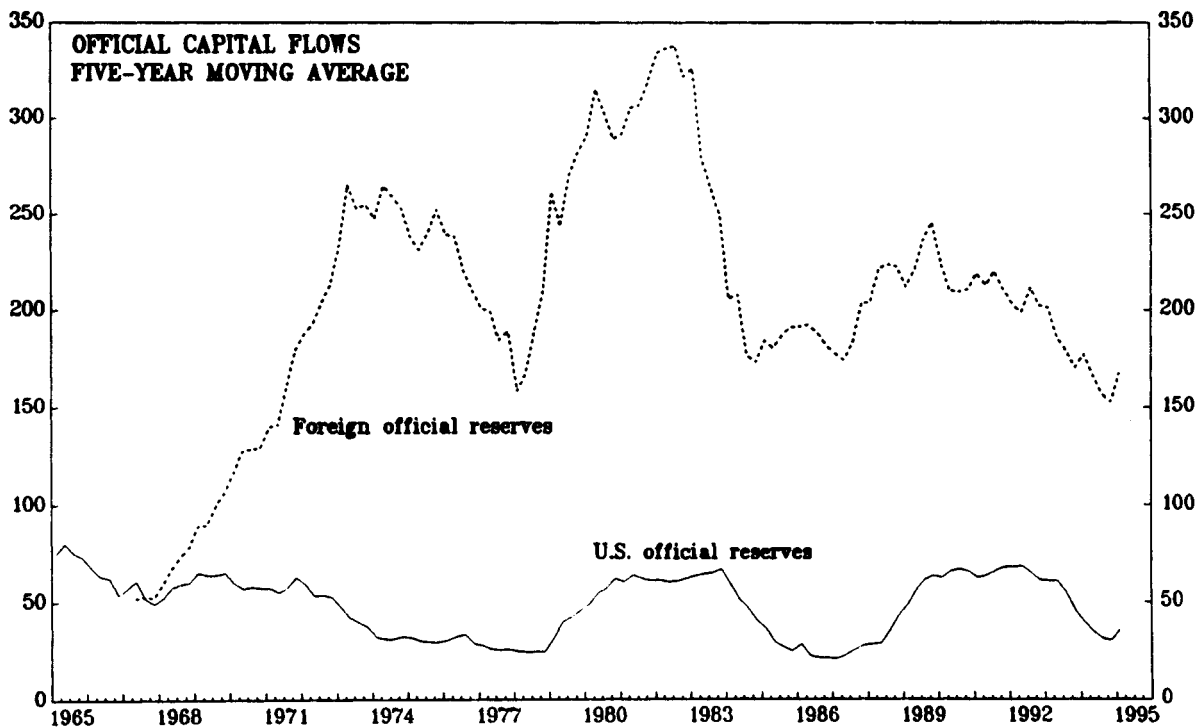
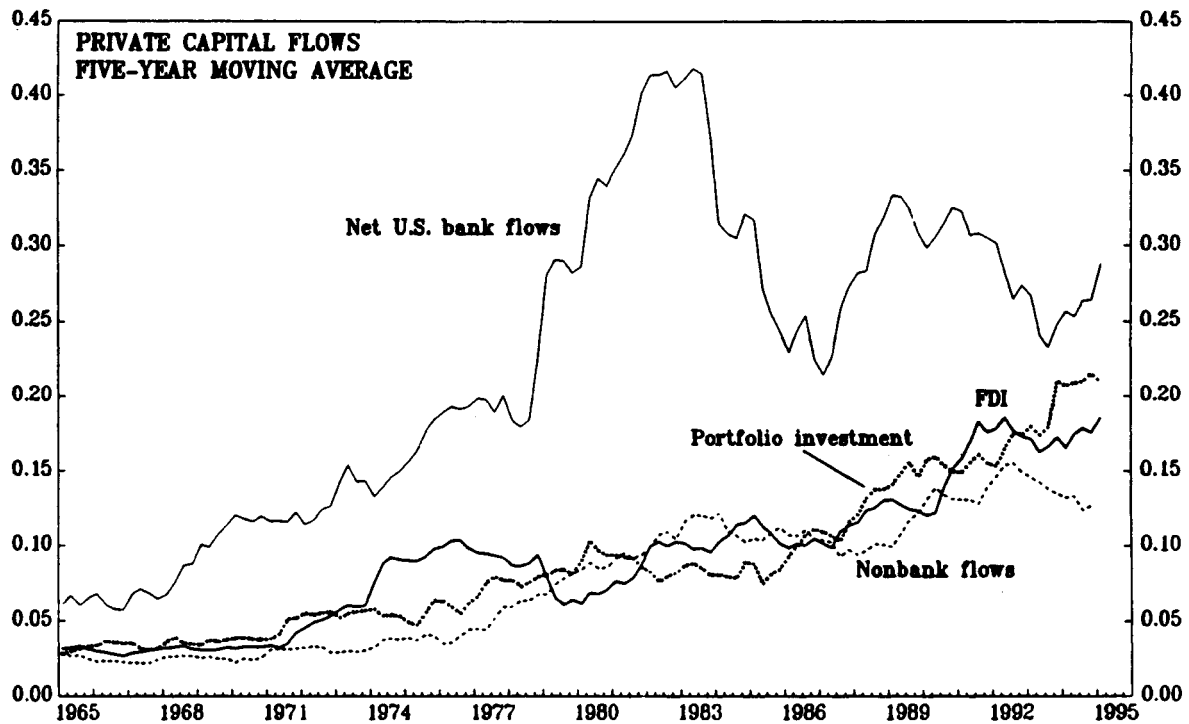
UNITED STATES
COMPONENTS OF PRIVATE CAPITAL FLOWS
(Four-quarter moving sum as a percent of GDP)



Source: Bureau of Economic Analysis, U.S. Department of Commerce (supplied by Haver Analytics).

CHART V-3

UNITED STATES
VOLATILITY OF NET CAPITAL FLOWS
(Mean absolute quarterly deviation as a percent of GDP)



Sources: Bureau of Economic Analysis, U.S. Department of Commerce (supplied by Haver Analytics); and staff estimates.

Table V-2. United States: Net Purchases of Long-Term Foreign Securities by U.S. Investors in Selected Emerging Markets

(In billions of dollars)

	1992	1993	1994	1995 ^{1/}
<u>Stocks</u>				
Argentina	12	2,345	1,713	592
Brazil	1,067	1,738	855	328
Mexico	2,765	5,151	1,205	796
Indonesia	175	302	1,309	-88
Malaysia	235	1,100	21	-264
Thailand	320	48	190	-540
<u>Six-country total</u>	<u>4.574</u>	<u>10.684</u>	<u>5.293</u>	<u>824</u>
<u>Bonds</u>				
Argentina	37	2,904	2,542	-644
Brazil	-45	-119	5,642	740
Mexico	1,367	6,354	2,431	1,104
Indonesia	-15	362	645	16
Malaysia	-479	413	543	52
Thailand	313	27	-171	-48
<u>Six-country total</u>	<u>1.178</u>	<u>9.941</u>	<u>11.632</u>	<u>1.220</u>

Source: Treasury Bulletin, various issues.

^{1/} First quarter at an annual rate.

portfolio investment is thought to have more "hot money" characteristics. ^{1/}

Simple pairwise correlations between the various components of the capital account provide information on the interaction between different types of flows. For instance, Table V-3 suggests that changes in foreign official holdings of reserves are significantly and negatively correlated with private capital flows, with the total as well as with two of the three largest components; this may reflect a leaning-against-the-wind policy in foreign exchange markets by foreign central banks. By contrast, U.S. official reserves are not significantly correlated with any component of the private capital account. The positive and significant correlation between portfolio investment and FDI also suggests that although conceptually distinct, these two types of flows may be difficult to distinguish in practice. The high correlation between the private capital account balance and bank flows reflects the relative importance of bank flows in driving the capital account throughout most of the sample period.

The next section examines whether there is any systematic relationship between exchange rate volatility and capital flows.

3. Exchange rate volatility, excess returns, and capital flows

If large and volatile capital flows increase exchange rate volatility, then one would expect that a measure of exchange rate volatility would be positively correlated with the absolute level of flows. That is, exchange rate volatility would ensue from both large inflows and large outflows. If, alternatively, the greater exchange rate volatility creates a bias towards domestic assets, then exchange rate volatility should be negatively correlated with the absolute level of capital flows. As regards official capital flows, one rationale for central bank intervention in foreign exchange markets is to insure orderly market conditions. Because volatility rises in periods of turmoil, then a positive correlation may be expected between absolute changes in reserves and exchange rate volatility.

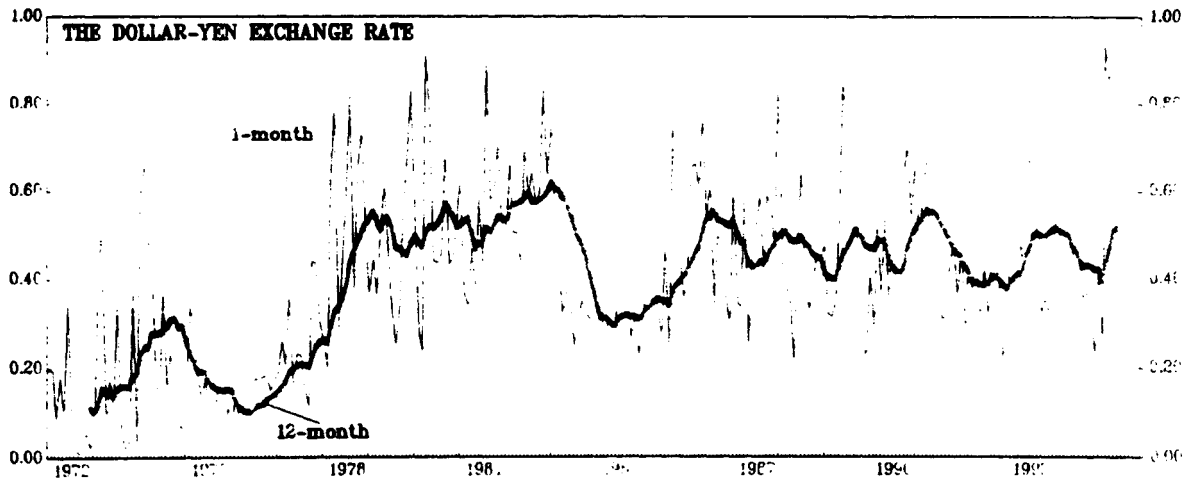
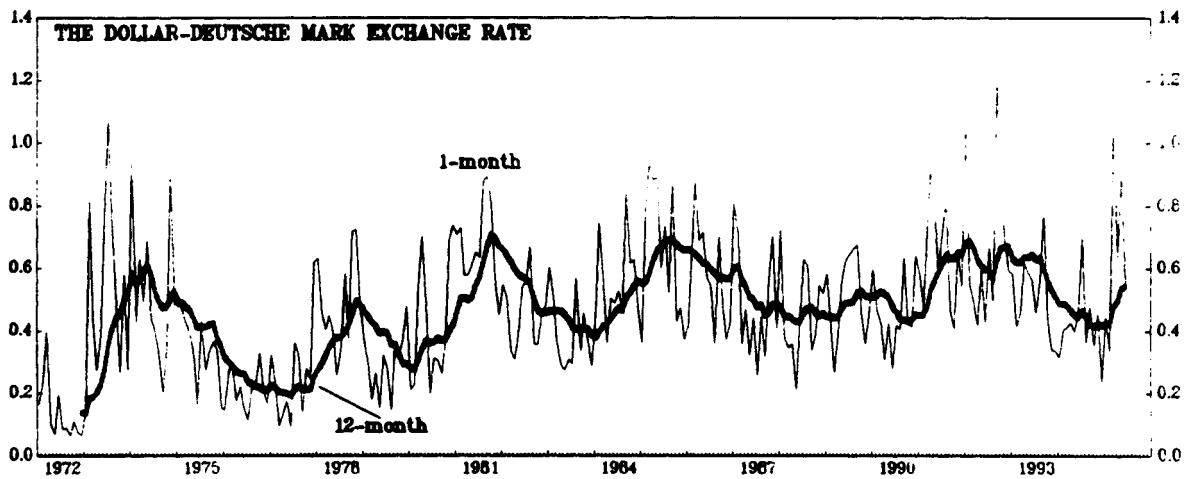
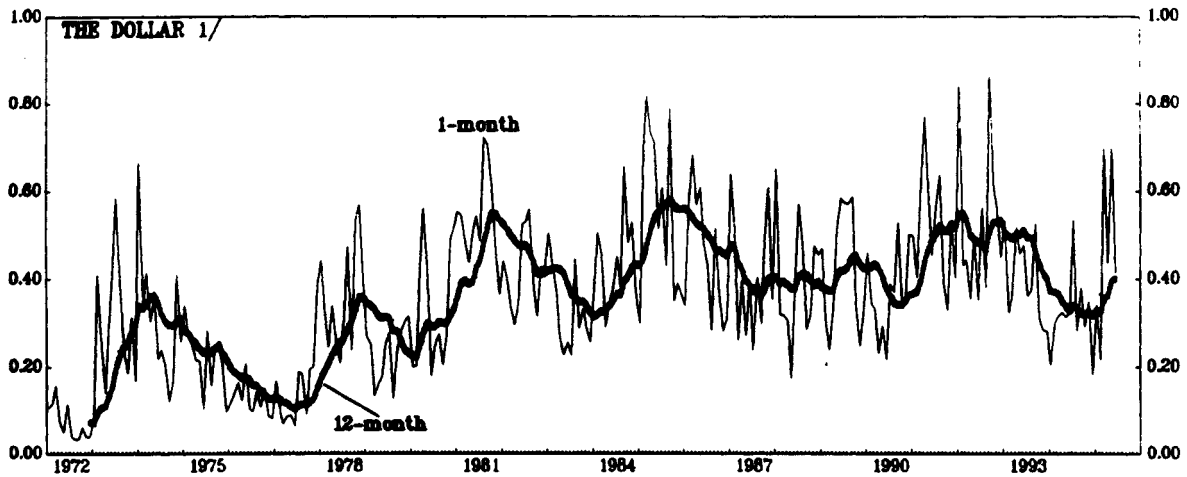
To obtain a measure of exchange rate volatility, daily exchange rate data is employed; volatility is calculated as the mean absolute daily percent change in the value of the dollar against a particular currency (i.e., the yen or deutsche mark) or a basket of currencies over the month (or the quarter). ^{2/} The exchange rate index used is that reported by the Federal Reserve. ^{3/} Chart V-4 plots the monthly volatility measures as

^{1/} Examining the time series properties of various components of the capital account for five industrial countries (including the United States) and five developing countries, Claessens, Dooley, and Warner (1994) arrive at a similar conclusion.

^{2/} For a discussion of the advantages of using this measure of volatility see Anderson and Grier (1992).

^{3/} For the details of the construction of this index, see Board of Governors of the Federal Reserve (1978).

UNITED STATES
EXCHANGE RATE VOLATILITY
(Moving average of mean absolute daily percent change)



Sources: Board of Governors of the Federal Reserve System, and staff estimates.

Note: Only the average exchange value of the dollar is shown; the currencies of the
major trading partners.

Table V-3. United States: The Interaction of Private and Official Capital
Flows--Contemporaneous Pairwise Correlations
1972:1-1995:1

	Private Capital Account (1)	Foreign Direct Investment (2)	Portfolio Investment (3)	Net U.S. Bank Flows (4)	Nonbank Flows (5)	U.S. Official Reserves (6)	Foreign Official Reserves (7)
Private capital account	1.00						
	--						
Foreign direct investment	0.49 <u>1/</u> (0.09)	1.00					
	--						
Portfolio investment	0.56 <u>1/</u> (0.08)	0.29 <u>1/</u> (0.10)	1.00				
	--						
Net U.S. bank flows	0.77 <u>1/</u> (0.07)	0.01 (0.11)	0.12 (0.10)	1.00			
	--						
Nonbank flows	0.20 <u>1/</u> (0.10)	0.00 (0.11)	0.18 <u>1/</u> (0.10)	0.09 (0.10)	1.00		
	--						
U.S. official reserves	0.02 (0.11)	-0.05 (0.10)	-0.12 (0.11)	0.10 (0.11)	0.11 (0.10)	1.00	
	--						
Foreign official reserves	-0.40 <u>1/</u> (0.09)	-0.25 <u>1/</u> (0.10)	-0.14 (0.10)	-0.35 <u>1/</u> (0.09)	-0.04 (0.11)	0.27 <u>1/</u> (0.10)	1.00
	--						

Notes: Standard errors are in parentheses. The private capital account balance, column (1), equals the sum of its components, columns (2) through (5).

1/ Significant at the 5 percent confidence level or higher.

well as a 12-month moving average. In all three panels the latter half of the 1980s and the 1990s reveal a pattern of higher peaks and higher troughs than during the 1970s. 1/

Table V-4 reports the contemporaneous correlations for the various components of the capital account with exchange rate volatility. The total capital account balance (including the statistical discrepancy) is positively and significantly correlated with exchange rate volatility. Although other factors are not controlled for and no "causal" interpretation can be drawn from a simple correlation, this positive relationship would appear to be in line with the hypothesis that larger capital flows result in more volatile exchange rates. With the exception of FDI, all the components of the private capital account are positively correlated with the volatility measure. Among the individual components, however, the strongest correlation is with portfolio flows. Neither U.S. nor foreign official reserves appear related to exchange rate volatility. As shown in Section 5, this absence of a systematic relationship may result from the use of quarterly data, which may be too aggregated to detect systematic patterns in official flows.

To examine whether there was any kind of temporal causal relationship between exchange rate volatility and the volatility of capital flows, a simple bivariate vector autoregression (VAR) was estimated in these variables. 2/ In one set of VARs the exogenous variable was limited to a constant (these results are reported in Table V-5), in a second set of VARs a time trend was included as well. The results of both sets of estimates were qualitatively the same. None of the categories of capital flows helped explain future exchange rate volatility (i.e. no causal relationship was detected). However, past exchange rate volatility did help explain portfolio flows and nonbank flows, but not in the way predicted by theory. The results presented in Table V-5 suggest that an increase in exchange rate volatility raises the volatility of portfolio investment and nonbank flows. 3/

As noted earlier, the prediction of models with risk-averse agents and exchange rate uncertainty is the opposite: capital flows (both inflows and

1/ The volatility measure was regressed against a constant and a time trend and the coefficients estimated using the Generalized Method of Moments (GMM) to allow for the presence of a moving average process in the error term as well as for more general forms of heteroskedasticity. In all cases, the time trend was positive and statistically significant. However, using comparable daily data through 1989 and nonparametric tests, Anderson and Grier (1992) do not find significant evidence of higher exchange rate volatility during the post-1979 period.

2/ The absolute value of the various components of capital flows is the measure of volatility used.

3/ Impulse responses, not shown in this paper, illustrate how an increase in exchange rate volatility raises the volatility of capital flows.

Table V-4. United States: Exchange Rate Volatility and Capital
Flows--Contemporaneous Pairwise Correlations
1972:1-1995:1

	Absolute value of:							
	Capital Account Balance (1)	Private Capital Account (2)	Foreign Direct Investment (3)	Portfolio Investment (4)	Net U.S. Bank Flows (5)	Nonbank Flows (6)	U.S. Official Reserves (7)	Foreign Official Reserves (8)
Exchange rate volatility	0.30 <u>1/</u> (0.10)	0.07 (0.11)	-0.09 (0.11)	0.32 <u>1/</u> (0.10)	0.12 (0.12)	0.18 <u>1/</u> (0.10)	0.05 (0.11)	-0.12 (0.11)

Notes: Standard errors are in parentheses. The private capital account balance, column (2), equals the sum of its components, columns (3) through (6). The capital account balance, column (1), equals the sum of columns (2), (7), and (8) plus the statistical discrepancy.

1/ Significant at the 5 percent confidence level or higher.

Table V-5. United States: Exchange Rate Volatility and Capital
Flows--Causality Tests
1972:1-1995:1

	Exchange Rate Volatility Equation: Do Capital Flows Granger-Cause Exchange Rate Volatility?		Capital Flows Equation: Does Exchange Rate Volatility Granger-Cause Capital Flows?	
	F-statistic	Probability Value	F-statistic	Probability Value
<u>Absolute value of:</u>				
Capital account balance	0.27	(0.85)	1.92	(0.13)
Private capital account	0.26	(0.85)	0.14	(0.94)
Foreign direct investment	0.12	(0.95)	0.70	(0.56)
Portfolio investment	0.10	(0.96)	3.79	(0.01) <u>1/</u>
Net U.S. bank flows	0.55	(0.65)	0.21	(0.89)
Nonbank flows	2.17	(0.10)	3.42	(0.02) <u>1/</u>
U.S. official reserves	0.64	(0.59)	0.33	(0.80)
Foreign official reserves	1.16	(0.33)	2.27	(0.08)

1/ Significant at the 5 percent confidence level or higher.

outflows) would be smaller when exchange rate volatility increases. Of course, these results could simply reflect the influence of an omitted variable. For instance, if during periods in which exchange rate volatility is high rates-of-return differentials tend to be wider, then the higher volatility of portfolio flows is due to larger desired adjustments in the agents' portfolios and not to increased exchange rate volatility per se.

The next section examines the relationship between the various categories of capital flows and some of its determinants.

4. Excess returns, interest rate volatility, and capital flows

In a traditional portfolio-balance model where domestic and foreign assets are imperfect substitutes, capital flows are explained by excess returns,

$$i - i^* - \Delta s^e$$

where i stands for the domestic interest rate, i^* is a comparable foreign interest rate, and the last term denotes the expected change in the spot exchange rate. If rational expectations are assumed, then the expectations term may be replaced by the ex post changes in the exchange rate. Alternatively, expectations could be measured directly by using survey data. 1/ Risk considerations also will affect the direction of capital flows. If domestic interest rates are more volatile than foreign interest rates, other things equal, more capital will flow abroad.

The interest rate on a 3-month Treasury bill is used as a measure of i ; an index of 3-month foreign treasury bills that matches the country composition and uses the same weights as the exchange rate index is the measure of i^* ; and the actual change in the multilateral spot exchange rate index between the current period (t) and the period in which the t -bill matures ($t+3$) is our measure of Δs^e .

The contemporaneous correlations between excess returns and the components of the capital account are reported in the first row of Table V-6. Both the total balance and the balance of the private capital account show a positive and significant correlation with excess returns. The two components of private flows that show the strongest links with the excess return measure are bank flows and portfolio investment. The absence of a significant correlation for FDI is due, in all probability, to our use of a short-term interest rate differential; as argued elsewhere, a more relevant rate of return may be a bond yield, which may more closely reflect the rate of return on capital. 2/ Official flows show no correlation with excess returns. This last observation is not surprising, since the motivation for central bank intervention has less to do with taking advantage of existing

1/ See, for instance, Dominguez and Frankel (1993).

2/ See Cushman (1985).

Table V-6. United States: Capital Flows, Excess Returns, and Interest Rate Volatility--Contemporaneous Pairwise Correlations
1972:1-1995:1

	Capital Account Balance (1)	Private Capital Account (2)	Foreign Direct Investment (3)	Portfolio Investment (4)	Net U.S. Bank Flows (5)	Nonbank Flows (6)	U.S. Official Reserves (7)	Foreign Official Reserves (8)
Excess returns	0.33 <u>1/</u> (0.10)	0.25 <u>1/</u> (0.11)	-0.03 (0.12)	0.24 <u>1/</u> (0.11)	0.22 <u>1/</u> (0.11)	0.01 (0.12)	-0.07 (0.12)	0.08 (0.12)
Ratio of domestic to foreign short-term interest rate volatility	-0.11 (0.12)	-0.05 (0.12)	0.16 (0.11)	0.13 (0.12)	-0.32 <u>1/</u> (0.10)	0.15 (0.11)	-0.16 (0.11)	-0.14 (0.12)

Notes: Standard errors are in parentheses. The private capital account balance, column (2) equals the sum of its components, columns (3) through (6). The capital account balance, column (1), equals the sum of columns (2), (7), and (8) plus the statistical discrepancy.

1/ Significant at the 5 percent confidence level or higher.

arbitrage opportunities than with stabilizing exchange markets in times of turmoil or achieving some exchange rate objective.

To assess the potential impact of domestic and foreign interest rate uncertainty on cross-border capital movements, first a measure of interest rate volatility was constructed along the lines of the measure used for the exchange rate. Daily data were used to construct the monthly and quarterly indices. Chart V-5 plots the volatility indices for the domestic and foreign rate, as well as a comparable index for a U.S. 10-year Treasury note (not used in the econometric analysis). Since what should matter for the decision whether to invest domestically or abroad is relative volatilities, the bottom left-hand panel of Chart V-5 shows the ratio of domestic to foreign volatility.

Several features are worth noting. First, as is well known, domestic interest rate volatility rose sharply during the period when the Federal Reserve targeted nonborrowed reserve (October 1979-1982). Second, domestic short-term interest rate volatility declined in the 1990s to its lowest level during the post-1972 period, while the volatility of long rates remains consistently higher in the 1990s than throughout most of the 1970s. Third, domestic short-term interest rates tend to be more volatile than foreign ones.

The third row of Table V-6 reports the correlations between our proxy for relative interest rate volatilities and the measures of capital flows. Bank flows, which are predominantly short-term flows, show a significant and negative correlation. Perhaps, not surprisingly, for banks not only the level but also the variability of interest rates matter.

5. Foreign official intervention

To examine further what drives foreign official capital flows and, in particular, what factors lead to foreign official foreign exchange intervention, we incorporate monthly data (which are available since mid-1989) on foreign official assets held at the Federal Reserve in the analysis. Foreign official assets held at the U.S. Federal Reserve provide a useful proxy for foreign reserve holdings of U.S. dollars since central banks routinely invest dollar reserves in U.S. Treasury securities, which are held with the Federal Reserve. ^{1/} The data are used to revisit some of the questions as to how foreign reserve holdings of U.S. dollars interact with exchange rate volatility and exchange rate trends.

While, as noted earlier, no systematic relationship (contemporaneous or causal) was detected between exchange rate volatility and the absolute value of changes in reserves using quarterly data, such a relationship is present

^{1/} While this series does include holdings by foreign official institutions other than central banks, those amounts account for a relatively small proportion of the total. The series excludes deposits and U.S. Treasury securities held for international and regional organizations.

at the monthly frequency. Consistent with the view that intervention increases when exchange markets become volatile, the correlation between the two variables is positive and significant (Table V-7, top panel). The relationship is contemporaneous, as no temporal causal patterns are evident.

Besides intervening to calm disorderly markets, intervention by many foreign central banks often takes the form of systematically leaning against the wind, suggesting a negative relationship between changes in the dollar and changes in reserves. This systematic negative relationship shows up as both a significant contemporaneous correlation (Table V-7, top panel) and as a causal relationship from exchange rate changes to reserve changes (Table V-7, bottom panel). This pattern of intervention was particularly evident in early 1995; as the dollar came under pressure against the yen and the deutsche mark, Federal Reserve holdings of government securities for foreign official institutions rose sharply (Chart V-6). ^{1/}

6. Concluding remarks

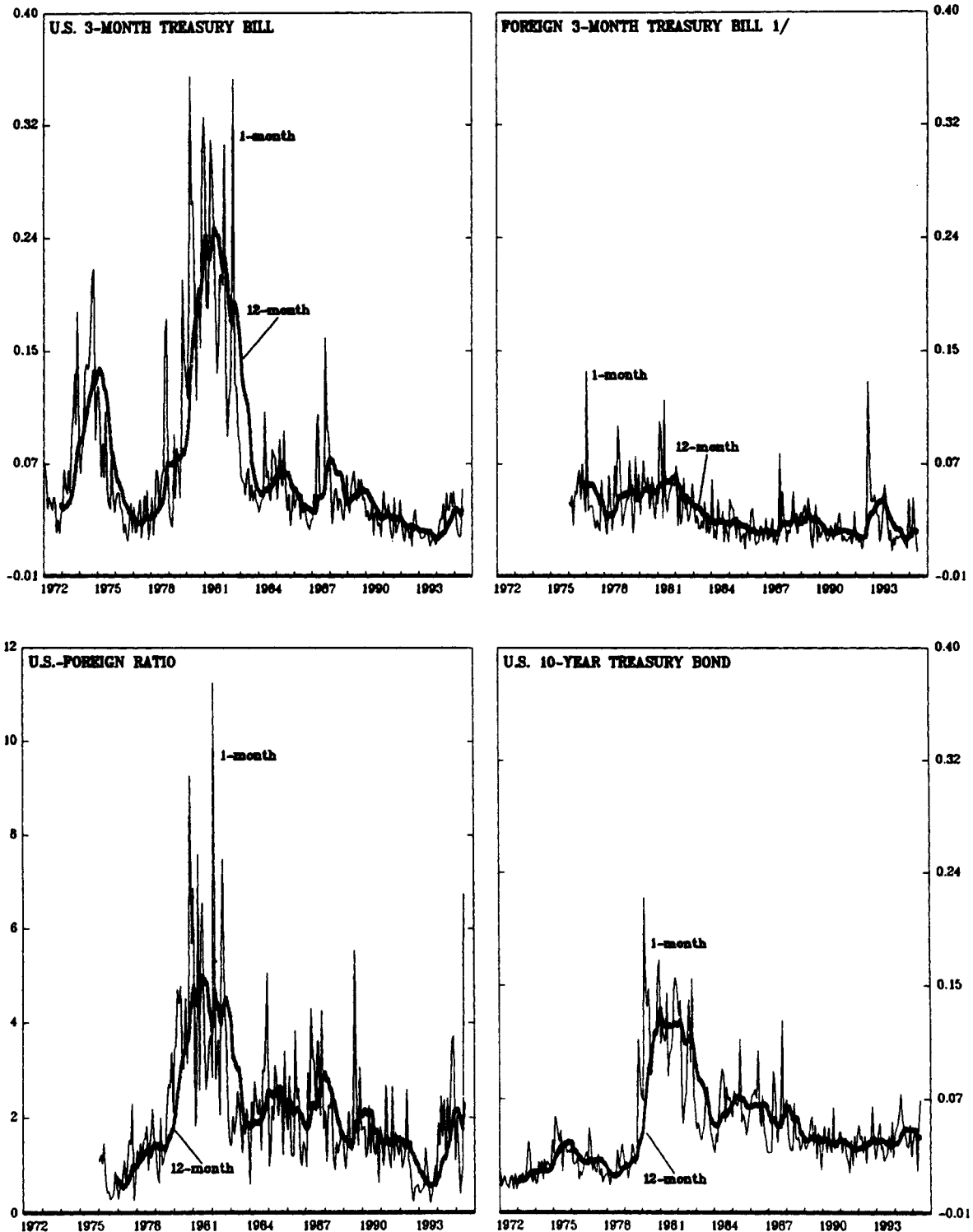
With regard to the patterns and determinants of private capital flows in the U.S. balance of payments, several empirical regularities emerge from the previous analysis.

- All the major categories of private capital flows, as well as exchange rates, have tended to become more volatile over time.
- There is little evidence to suggest that foreign direct investment is any less volatile than other components of the capital account. Indeed, the positive and significant correlation between portfolio investment and FDI suggests that, although conceptually distinct, these two types of flows may be difficult to distinguish in practice.
- The volatility of some types of capital flows, particularly portfolio investment and nonbank flows, is positively associated with exchange rate volatility.
- Bank flows and portfolio investment appear to be significantly linked with short-term interest rate differentials, more so than other components of the capital account.
- There appears to be a relationship between domestic and foreign short-term interest rate volatility and bank flows; other things equal, a rise in the volatility of domestic interest rates relative to the volatility of foreign rates tends to increase capital outflows.

As to the characteristics and determinants of official capital flows, the main observations that are suggested by the foregoing analysis are that:

^{1/} See also Wrightson Associates (March 31, 1995).

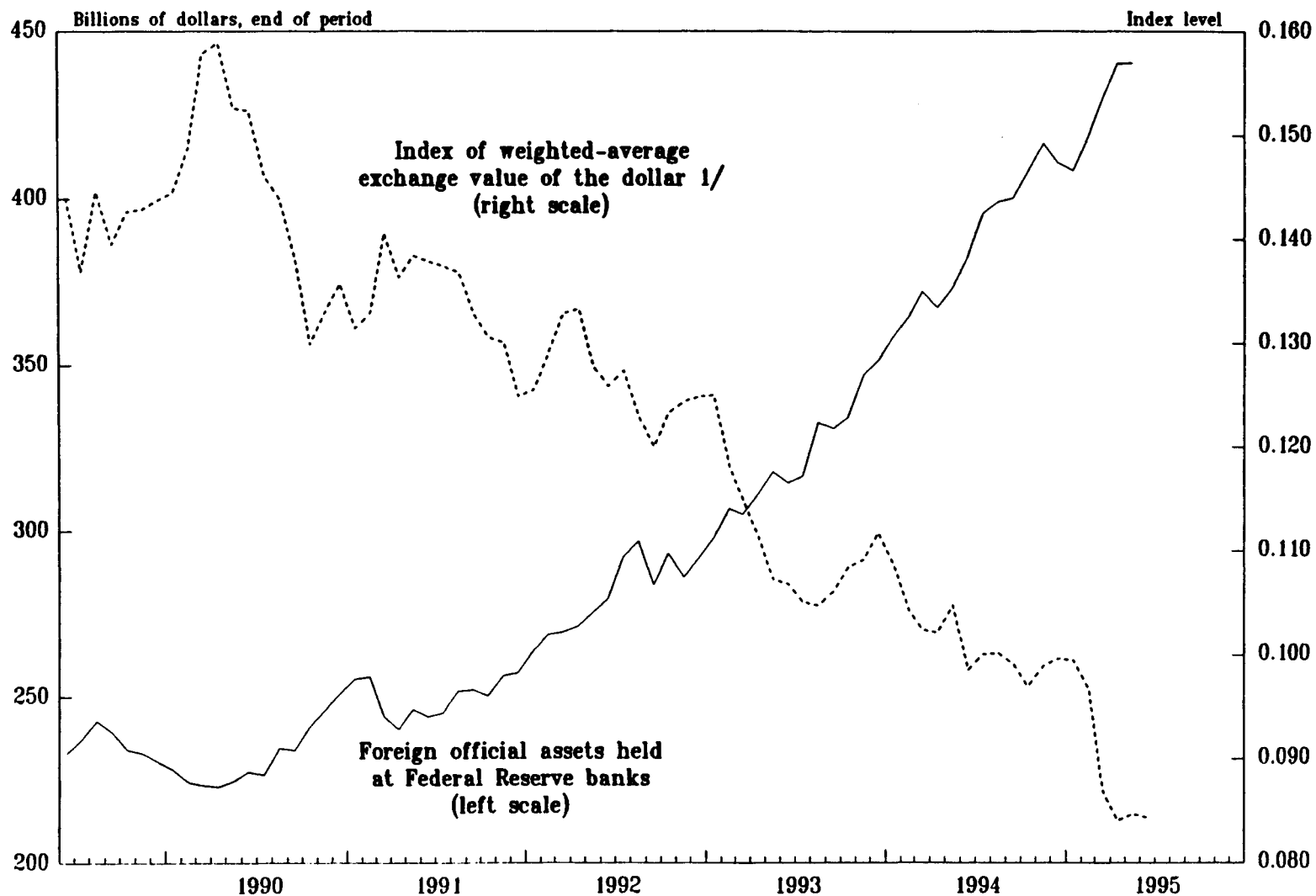
UNITED STATES
INDICATORS OF INTEREST RATE VOLATILITY
(Moving average of mean absolute daily deviation)



Sources: Board of Governors of the Federal Reserve System; and staff estimates.

1/ Index of foreign 3-month treasury bills. The country composition and weights are the same as those used in the exchange rate index.

UNITED STATES
FOREIGN OFFICIAL ASSETS AND THE DOLLAR



Sources: Board of Governors of the Federal Reserve System; and staff estimates.

1/ A decline in the index denotes a depreciation. Index of weighted-average exchange value of the U.S. dollar against the currencies of ten industrial countries.

Table V-7. United States: Foreign Official Intervention, Exchange Rate Volatility, and Changes in the Dollar
1989:6-1995:6

A. Contemporaneous Pairwise Correlations

	<u>Exchange Rate Volatility</u>	<u>Monthly Percent Change in the Dollar</u>
Absolute value of change in foreign official reserves held in custody	0.29 (0.11)	...
Actual change in foreign official reserves held in custody	...	-0.20 (0.12)

B. Causality Tests

	<u>F-statistic</u>	<u>Probability</u>
1) Exchange rate volatility and the absolute value of foreign official reserves held in custody.		
Does exchange rate volatility Granger-cause foreign official intervention?	0.89	(0.42)
2) Changes in the dollar and actual changes in foreign official reserves held in custody.		
Does foreign official intervention lean against the wind?	2.72	(0.07)

Notes: An increase in the dollar index denotes an appreciation. The optimum number of lags according to the Akaike and Schwarz criteria is two. Standard errors are in parentheses.

- The behavior of foreign official reserves is very different from the behavior of U.S. official reserves.
- Foreign official reserve changes appear to be driven in part by a leaning against the wind strategy in foreign exchange markets. Specifically, foreign official reserve changes are negatively and significantly correlated with private capital flows and with changes in the exchange value of the dollar.
- The evidence also suggests that foreign central banks' intervention increases with exchange rate volatility.

References

- Anderson, Margot, and David Alan Grier, "Robust, Non-Parametric Measures of Exchange Rate Variability," Applied Economics, Vol. 24 (1992), pp. 951-8.
- Asea, Patrick K., and Colin Rose, "Sharks, Speculative Attacks and the Hump-Shaped Distribution," (University of California, Los Angeles, mimeographed, 1995).
- Bacchetta, Philippe, and Eric van Wincoop, "Net Capital Flows Under Exchange Rate and Price Volatility," Studienzentrum Gerzensee Working Paper No. 94.03, (1994).
- Board of Governors of the Federal Reserve System, Federal Reserve Bulletin, Vol. 64 (August 1978), p. 700.
- Caves, Richard E., "Exchange-Rate Movements and Foreign Direct Investment in the United States," Harvard Institute of Economic Research Discussion Paper No. 1383, (May 1988).
- Claessens, Stijn, Michael P. Dooley, and Andrew Warner, "Portfolio Capital Flows: Hot or Cool?," in Portfolio Investment in Developing Countries, Stijn Claessens and Sudarshan Gooptu eds., World Bank Discussion Papers No. 228, (Washington: The World Bank, December 1993).
- Cushman, David, O., "Real Exchange Rate Risk, Expectations, and the Level of Direct Investment," Review of Economics and Statistics, Vol. 67 (May 1985), pp. 297-308.
- _____, "Exchange-Rate Uncertainty and Foreign Direct Investment in the United States," Weltwirtschaftliches Archive, Vol. CXXIV (1987), pp. 322-35.
- Eichengreen, Barry, Andrew K. Rose, and Charles Wyplosz, "Exchange Market Mayhem: The Antecedents and Aftermath of Speculative Attacks, (prepared for the Economic Policy Panel, April 21-22, 1995).
- _____, James Tobin, and Charles Wyplosz, "Two Cases for Sand in the Wheels of International Finance," The Economic Journal, Vol. 105 (January 1995), pp. 162-72.
- Dominguez, Kathryn, and Jeffrey Frankel, "Foreign Exchange Intervention: An Empirical Assessment," in On Exchange Rates, (Cambridge: MIT Press, 1993), pp. 327-46.
- Frankel, Jeffrey A., "International Capital Mobility and Exchange Rate Volatility," in International Payments Imbalances in the 1980s, Norman S. Fieleke ed., Conference Series No. 32, (Boston: Federal Reserve Bank of Boston, 1988a), pp. 162-88.

- _____, "International Capital Flows and Domestic Economic Policies," in The United States and the World Economy, Martin Feldstein ed., (Chicago: University of Chicago Press, 1988b).
- Obstfeld, Maurice, and Kenneth Rogoff, "The Exchange Rate in Monetary Policy," Journal of Economic Perspectives, (forthcoming).
- Qian, Ying, and Panos Varangis, "Does Exchange Rate Volatility Hinder Export Growth? Additional Evidence," Empirical Economics, Vol. 19 (1994), pp. 371-96.
- Reinhart, Carmen M., and Steven Dunaway, "Monetary, Exchange Rate, and Fiscal Policy Responses to Previous Surges of Capital Flows," in International Capital Markets: Developments, Prospects, and Policy Issues, (Washington: International Monetary Fund, 1995).
- _____, and R. Todd Smith, "Controls on Capital Flows: The Experience with Quantitative Measures and Capital Flow Taxation," in International Capital Markets: Developments, Prospects, and Policy Issues, (Washington: International Monetary Fund, 1995).
- Turner, Philip, "Capital Flows in the 1980s: A Survey of Major Trends," BIS Economic Papers No. 30, (Basle: Bank for International Settlements, April 1991).
- U.S. Department of Commerce, Bureau of Economic Analysis, The Balance of Payments of the United States: Concepts, Data Sources, and Estimating Procedures, (Washington: U.S. Government Printing Office, May 1990).
- Wihlborg, Clas, "Currency Risks in International Financial Markets," Princeton Studies in International Finance, No. 44 (1978).
- Wrightson Associates, Money Market Observer, (March 31, 1995).

VI. Asymmetries in the U.S. Output-Inflation Process 1/

1. Introduction

In several instances, Federal Reserve officials have stated that if the stance of U.S. monetary policy had not tightened in 1994, the inflationary risks associated with exceeding potential output would have been large and the process of containing these inflationary forces would have required a much more severe tightening in monetary conditions. This view may be based on a model with an asymmetric output-inflation nexus in which inflation and inflation expectations respond more to positive output gaps than they do to negative gaps. 2/

If this view of the world is correct, then allowing the economy to produce in excess of its potential will be costly because the monetary tightening and negative output gaps that will be required later to rein in inflationary pressures will be larger than otherwise. 3/ Indeed, policy rules that fail to guard against overheating will result in significantly larger monetary business cycles and permanent losses in output. 4/ Moreover, policy rules that guard against the emergence of excess demand will reduce the variance of aggregate demand and raise the mean level of output.

This view of the business cycle is significantly different from that embodied in linear models of the output-inflation process. Indeed, linear models suggest that there are small costs or perhaps even some benefits from delaying interest rate hikes in the face of positive aggregate demand shocks that drive output above potential.

Despite the obvious importance of this issue for the conduct of monetary policy, econometric studies of the United States have generally not found evidence that capacity constraints create a significant nonlinearity in the output-inflation nexus. Indeed, Gordon (1994), for example, claims that there is no evidence of nonlinearity in the U.S. data, while Eisner (1994) presents evidence that inflation may respond more to negative gaps

1/ Prepared by D. Laxton.

2/ For example, Chairman Greenspan in recent testimony before the Congress explained that "In modern economies output levels may not be so rigidly constrained in the short run as they used to be when large segments of output were governed by facilities such as the old hearth steel furnaces that had rated capacities that could not be exceeded for long without breakdown. Rather, the appropriate analogy is a flexible ceiling that can be stretched when pressed, but as the degree of pressure increases, the extent of the flexibility diminishes."

3/ In the discussion below output gaps are defined such that positive values are associated with excess demand and upward pressure on inflation. Some researchers follow Arthur Okun's convention and define gaps the other way round.

4/ See for example, Clark, Laxton, and Rose (1995).

than to positive gaps. 1/ The linear models estimated by Gordon imply that the average level of output will be independent of the parameters in the monetary policy rule, while Eisner's model predicts that policies that increase the variance of output will actually raise the average level of output. An exception is the work by Laxton, Meredith, and Rose (1994), which shows that, if the Phillips Curve is assumed to be identical across the G-7 economies, there is fairly strong evidence of asymmetries. In a more recent paper, Turner (1995) relaxes this restriction and finds some evidence of asymmetry in the U.S. data.

This paper builds on the results reported by Turner and argues that the inability of previous empirical work to discern evidence asymmetries in the U.S. data has been the result of the use of inappropriate measures of the output gap. The remainder of this paper is organized in the following way. Section 2 presents the basic model that is used to test for the existence of asymmetry in the U.S. output-inflation process. In Section 3, empirical results are presented that confirm the existence of asymmetries in the U.S. data. Section 4 employs a small model of the U.S. economy to compare the policy implications of the asymmetric model with those of the linear model.

2. Models of the Phillips curve

The Phillips curve model of inflation assumes that inflation is driven by inflation expectations and the output gap. The simplest form of the model can be written as:

$$\pi_t = \pi_{t+1}^e + \beta \text{ gap}_t + \epsilon_t^\pi \quad (1)$$

where: π is inflation, π^e is expected inflation, "gap" is the difference between actual output and a measure of potential output, and ϵ^π represents a disturbance term. The disturbance term represents the effects on inflation of factors other than aggregate demand. This could include cost-push factors such as an exogenous increase in wage demands or the effect of large changes in relative prices such as the change in the price of crude oil that occurred in the 1970s.

Equation 1 implies that the main source of inertia in inflation dynamics is rigidities in expectations. If combined with an assumption of model-consistent or rational expectations, the model implies that inflation can be adjusted costlessly. In other words, an announced and credible reduction in the target inflation rate can be achieved without any output

1/ Eisner's model uses unemployment gaps. He finds that a reduction in unemployment is less inflationary if the economy is booming and unemployment is initially below the natural rate than if unemployment is initially above the natural rate. The statement in the text assumes that there is a direct relationship between excess demand conditions in the goods market and excess demand conditions in the labor market.

costs as long as the expected inflation term in Equation 1 moves one-for-one with the announced change in the target.

The fact that it has proved difficult to reduce inflation without creating a negative output gap has led to a number of extensions to the above model of inflation. One extension considers the possibility that inflation is costly to adjust (for example, owing to the existence of contracts). This argument is often used to justify the addition of lagged values of inflation on the right-hand-side of Equation 1. In this case, even a fully credible announced change in the inflation target would not be achieved without some output costs in the short run. A second extension focuses on how expectations are formed. For example, if there is a backward-looking element to expectations formation, the addition of lagged inflation in Equation 1 also can be justified. Thus, additional lags in Equation 1 can arise either from intrinsic inflation dynamics, which are independent of expectations, or from inertia in expectations formation, or both. 1/

The resulting model is often referred to as the "backward- and forward-looking components" model (see Buiter and Miller (1985)). In this model, inflation is determined, at least partially, by historical conditions--the backward-looking component--while the forward-looking component responds to new information about the future. The extended dynamic model can be written as:

$$\pi_t = A(L)\pi_{t-1} + B(L)\pi_{t+1}^e + \beta \text{ gap}_t + \epsilon\pi_t \quad (2)$$

This equation, however, is linear in that the effect on inflation of a disturbance or a change in the gap is the same (in absolute value) regardless of whether output is above or below potential. By contrast, in an asymmetric model of the Phillips curve, inflation would respond differently to changes in the output gap depending on whether the economy was above or below its long-run potential. A simple extension of the model that would test the hypothesis of asymmetries would add positive output gaps to the model and test if the estimated parameter(s) on the additional term(s) can help explain inflation. 2/

Gordon (1994) examines this issue by augmenting his simple, backward-looking, inflation-unemployment model with positive unemployment gaps but finds no statistical evidence in favor of either asymmetry. These results contrast with those reported by Laxton, Meredith, and Rose (1994), who find strong empirical evidence in the G-7 data that positive output gaps have more powerful effects on inflation than negative output gaps. One explanation for the different results could be that the assumptions used by Gordon and others may have been biased against finding asymmetric effects in

1/ See Buiter and Miller (1985) or Fuhrer and Moore (1994) for further discussion of these issues.

2/ This simple functional form can be thought of as a linear approximation to a more general convex function.

the Phillips curve. In particular, it is critical for econometricians to recognize the implications of asymmetry for the measurement of the output gaps that enter the Phillips Curve in order to identify properly the asymmetric model.

One important implication is that the mean value of the gap that enters the Phillips curve will be negative if the curve is convex--i.e., if excess demand shocks have a large effect on inflation. Only in the case of global linearity will it be appropriate to impose a mean value of zero. In other words, in order to test the hypothesis that positive gaps have larger effects on inflation than negative gaps, it is critical that the mean value of the output gap that enters the Phillips Curve be unconstrained.

For example, the Phillips curve should be specified as

$$\pi_t = A(L)\pi_{t-1} + B(L)\pi_{t+1}^e + \beta \text{gap}^*_t + \gamma \text{gappos}^*_t + \epsilon_t \quad (3)$$

where $\text{gap}^* = y - \bar{y} + \alpha$ and gappos^* represents the positive values of these adjusted gaps. Here we define \bar{y} to be the value of potential output in a linear and purely symmetric world. If positive gaps have larger effects than negative gaps--if $\gamma > 0$ --and there is some variance in aggregate demand conditions, α must be less than zero for inflation to be bounded. ^{1/} If short-run capacity constraints are truly a feature of the U.S. economy, imposing α to be zero will bias γ towards zero and bias standard tests for the presence of asymmetry towards false rejection. The implications of not accounting for the possibility that $\alpha < 0$ are discussed in the following section.

3. Testing for asymmetries in the U.S. data

The trend level of output is measured using a simple two-sided moving average filter of actual output. In Laxton, Meredith, and Rose (1994) trend output was measured as a simple five-year, centered moving average of actual output (a two-year horizon, forwards and backwards). In this paper, the same approach is used, but the results are reported for a range of alternative horizons (the parameter k below) in the two-sided filter. ^{2/}

^{1/} Clark, Laxton, and Rose (1995a) provide a formal proof of this in a more general model with convexity in the aggregate supply curve. However, the intuition is simple. Suppose that excess demand gaps raise inflation by twice as much as negative gaps reduce it. In such a case, a positive one percent gap that raised inflation would have to be followed by a cumulative negative gap of 2 percent in order to reestablish inflation at its initial level. If this occurred over two periods, the sum of the gaps would be -1.0 percent and the mean value of the gap over these two periods would be -0.5 percent.

^{2/} Output is measured in logarithms to prevent phase shift that arises from growth. If it was not measured in logarithms, gaps constructed with symmetric two-sided filters would not have a zero mean in large samples.

$$\bar{y} = \frac{1}{2K+1} \left[y_t + \sum_{j=1}^K (y_{t+j} + y_{t-j}) \right] \quad (4)$$

A very small value of k implies that potential output is highly correlated with actual output and, in the limit, when $k = 0$, potential output is set equal to actual output at all points in time. This would be consistent with an extreme real-business-cycle view of the world, where prices adjust instantaneously to changes in excess demand. A very large value of k would be consistent with a view that most of the variation in output is associated with movements in the output gap. Given the considerable uncertainty about the role of demand and supply shocks in the economy, results and hypothesis tests are reported for a large range of k values. ^{1/}

Table VI-1 reports econometric estimates of Equation 3 under the assumption that $\alpha = C$, for values of k ranging from 5 to 16 (quarters). In order to hold the estimation period fixed to see how alternative gap measures performed in explaining the same inflation experiences, the sample period for each regression ended in 1990QIV (since the two-sided filter with $k = 16$, requires data on actual output for the years 1991 to 1994). In order to keep the model parsimonious and to take into account the possibility that the measure of inflation expectations used (from the Michigan Survey) has information content for explaining movements in actual inflation, a specification was chosen that includes the contemporaneous value of one-year-ahead inflation expectations as well as 4 lags, where each lag is assumed to have the same weight. In addition, a lagged inflation term was added to allow inflation to allow for intrinsic inertia in inflation dynamics. ^{2/}

Based on these assumptions the value of k that minimizes the standard error of the inflation equation is 8. This estimate suggests that variation in the output gap--as opposed to potential output is the dominant source of variation in output at business cycle frequencies. The preferred model has

^{1/} See Eichenbaum (1990) for an excellent discussion about why our econometric techniques cannot provide very reliable estimates of the relative variance of demand versus supply shocks. Clark, Laxton, and Rose (1995a) show that similar evidence in favor of asymmetries is obtained when one uses other methods that have been advocated in the past to detrend U.S. output.

^{2/} This choice of lag structure doesn't affect the results. The same results are obtained if an unrestricted model with 4 lags on inflation and inflation expectations is estimated or if a triangular distribution on lagged inflation expectations is imposed.

Table VI-1. United States: Biased Tests of Asymmetry

Estimated

$$\text{equation: } \pi_t = \delta \bar{\pi}_{t-4}^e + (1-\delta) \pi_{t-1} + \beta \text{ gap}_t^* + \gamma \text{ gappos}_t^* + \epsilon_t^*$$

where: $\text{gap}_t^* = y - y^* = y - \bar{y} + \alpha$, $\text{gappos}_t^* = \text{positive values of gap}_t^*$

$$\bar{\pi}_{t-4}^e = .2 (\pi_{t-4}^e + \pi_{t-3}^e + \pi_{t-2}^e + \pi_{t-1}^e + \pi_t^e)$$

π = Percent change in the CPI at annual rates

π_{t-4}^e = Michigan Survey measure of inflation expectations

$$\gamma = \frac{1}{2k+1} \left[y_t + \sum_{i=1}^k y_{t+i} + y_{t-1} \right]$$

Data: U.S. Quarterly Data, 1964QI-90QIV.

k	Estimated Coefficients				R ²	σ
	α	γ	β	δ		
5	0.00	0.285 (0.96)	0.593 (3.34)	0.547 (4.73)	.7739	1.6499
6	0.00	0.302 (1.20)	0.497 (3.32)	0.556 (4.91)	.7761	1.6296
7	0.00	0.281 (1.27)	0.435 (3.10)	0.562 (5.02)	.7769	1.6387
8	0.00	0.231 (1.12)	0.414 (3.13)	0.564 (5.07)	.7787	1.6321
9	0.00	0.192 (0.99)	0.391 (3.15)	0.564 (5.14)	.7785	1.6331
9	0.00	0.00	0.484 (4.54)	0.552 (4.61)	.7765	1.6328
10	0.00	0.174 (0.93)	0.362 (3.12)	0.563 (5.25)	.7774	1.6371
11	0.00	0.154 (0.86)	0.341 (3.09)	0.560 (5.31)	.7765	1.6403
12	0.00	0.134 (0.79)	0.326 (3.14)	0.557 (5.33)	.7761	1.6421
13	0.00	0.110 (0.67)	0.316 (3.22)	0.555 (5.28)	.7747	1.6469
14	0.00	0.907 (0.57)	0.308 (3.29)	0.552 (5.21)	.7736	1.6510
15	0.00	0.745 (0.48)	0.301 (3.39)	0.549 (5.13)	.7725	1.6548
16	0.00	0.059 (0.39)	0.296 (3.48)	0.545 (5.04)	.7713	1.6594

1/ T-statistics in parentheses.

two noteworthy features. First, it would appear to reject the hypothesis that $\gamma > 0$ at the usual confidence levels and conclude that there was no compelling evidence of asymmetry in the U.S. Phillips curve. Second, with $k = 8$ the coefficient on the output gap is statistically significant, so there is evidence that inflation is related to the output gap--a Phillips curve exists.

Chart VI-1 illustrates the linear Phillips curve relationship when γ is constrained to equal zero and the model is chosen to maximize the fit of the inflation equation. In this case the optimal k , when both γ and α were imposed to be equal to zero was 11. This equation produced an estimate of δ of 0.548 and for β of 0.524. The top panel in Chart VI-1 plots potential output, under the assumption that α and γ are equal to zero. The middle panel presents the percent change in the CPI measured at annual rates along with the Michigan Survey of one-year-ahead CPI inflation expectations. The bottom panel presents the difference between inflation and its backward- and forward-looking components, e.g.,

$$\pi_t - \delta \bar{\pi}_t - (1-\delta) \pi_{t-1}$$

and the contribution of the output gap, as measured by the coefficient times the output gap, e.g., βgap_t . As can be seen in the chart, there is a tendency for the linear model to underpredict inflation during the two inflationary episodes in the 1970s when there was large and persistent excess demand.

Table VI-2 reports the results of estimating the same model, except this time α is estimated simultaneously along with the other parameters of the model. In this case, the optimal k parameter is 12. Based on this preferred model, there is clear evidence that positive gaps have larger effects on inflation than negative gaps. This is a very similar finding to what was reported in Laxton, Meredith, and Rose (1995). Indeed, the estimated coefficient on the positive gaps ($\beta + \gamma$) is 1.1 or about five times greater than the coefficient on the negative gaps. The estimated value of α is -1.3, suggesting that the mean value of the output gap that enters the Phillips curve is, on average, 1.3 percentage points below measures that are based on trend measures of output. Chart VI-2 illustrates the results for the asymmetric model. In this case, potential output in the top panel is raised by 0.013 to be consistent with the logical implications of this form of asymmetry.

These results illustrate that the output-inflation experience of the United States is consistent with an asymmetric Phillips curve. In particular, the data suggests that the effect on inflation of changes in the output gap is much larger if the economy is above potential. Moreover, the results suggest that the existence of this asymmetry is likely to be falsely rejected unless consideration is given to the downward effect of asymmetries on the average level of the output gap.

Table VI-2. United States: Asymmetric Model of the U.S. Output-Inflation Tradeoff

Estimated

$$\text{equation: } \pi_t = \delta \bar{\pi}_{t-4}^e + (1-\delta) \pi_{t-1} + \beta \text{ gap}_t^* + \gamma \text{ gappos}_t^* + e_t^{\pi}$$

where: $\text{gap}^* = y - y^* = y - \bar{y} + \alpha$, $\text{gappos}^* = \text{positive values of gap}^*$

$$\bar{\pi}_{t-4}^e = .2 (\pi_{t-4}^e + \pi_{t-3}^e + \pi_{t-2}^e + \pi_{t-1}^e + \pi_t^e)$$

π = Percent change in the CPI at annual rates

π_{t-4}^e = Michigan Survey measure of inflation expectations

$$\gamma = \frac{1}{2k+1} \left[y_t + \sum_{i=1}^k y_{t+i} + y_{t-i} \right]$$

Data: U.S. Quarterly Data, 1964Q1-90Q4.

k	Estimated Coefficients				R ²	σ	Wald Test: SL($\alpha, \gamma = 0$)
	α	γ	β	δ			
5	-0.354 (0.99)	0.878 (1.83)	0.458 (2.59)	0.566 (4.65)	.7776	1.6445	0.087
6	-0.441 (1.23)	0.873 (2.19)	0.384 (2.64)	0.576 (4.91)	.7816	1.6296	0.032
7	-0.547 (1.44)	0.813 (2.36)	0.337 (2.55)	0.582 (5.01)	.7821	1.6275	0.022
8	-0.670 (1.73)	0.780 (2.64)	0.308 (2.61)	0.585 (5.20)	.7844	1.6192	0.015
9	-0.770 (2.09)	0.758 (3.21)	0.282 (2.60)	0.586 (5.48)	.7850	1.6168	0.004
10	-0.893 (2.72)	0.772 (3.00)	0.254 (2.52)	0.587 (5.87)	.7851	1.6164	0.010
11	-1.149 (3.27)	0.918 (2.99)	0.218 (2.47)	0.591 (6.07)	.7873	1.6081	0.004
12	-1.256 (3.66)	0.925 (3.16)	0.202 (2.43)	0.593 (6.13)	.7892	1.6010	0.001
13	-1.369 (3.67)	0.916 (3.13)	0.189 (2.47)	0.600 (5.99)	.7890	1.6017	0.001
14	-1.478 (3.13)	0.896 (2.72)	0.177 (2.43)	0.595 (5.88)	.7879	1.6058	0.007
15	-1.661 (3.38)	0.919 (2.69)	0.166 (2.47)	0.593 (5.79)	.7862	1.6123	0.002
16	-1.712 (3.02)	0.866 (2.56)	0.161 (2.49)	0.587 (5.58)	.7834	1.6229	0.010

1/ T-statistics in parentheses.

Chart VI-1
United States

Interpreting U.S. Inflation with a Linear Model

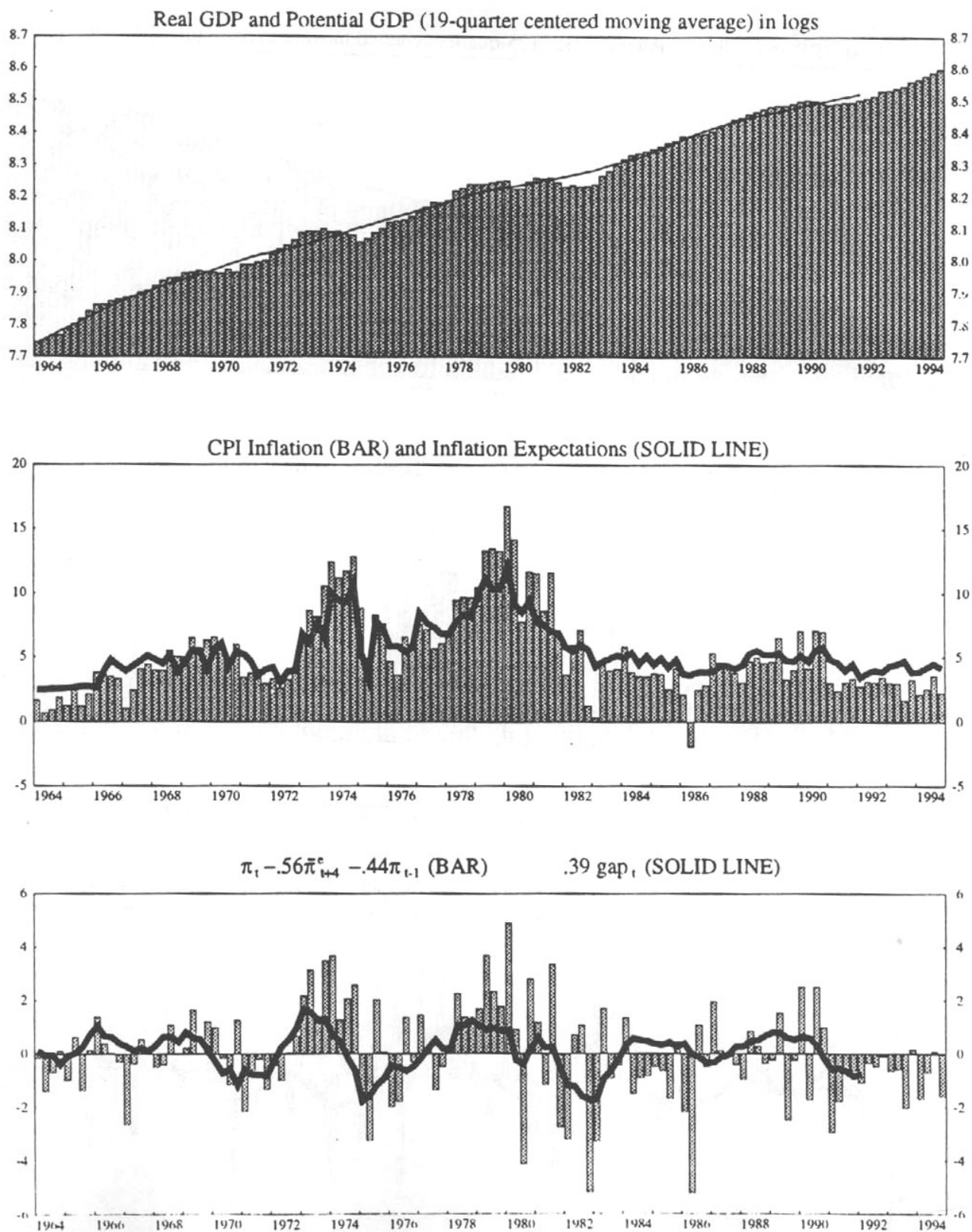
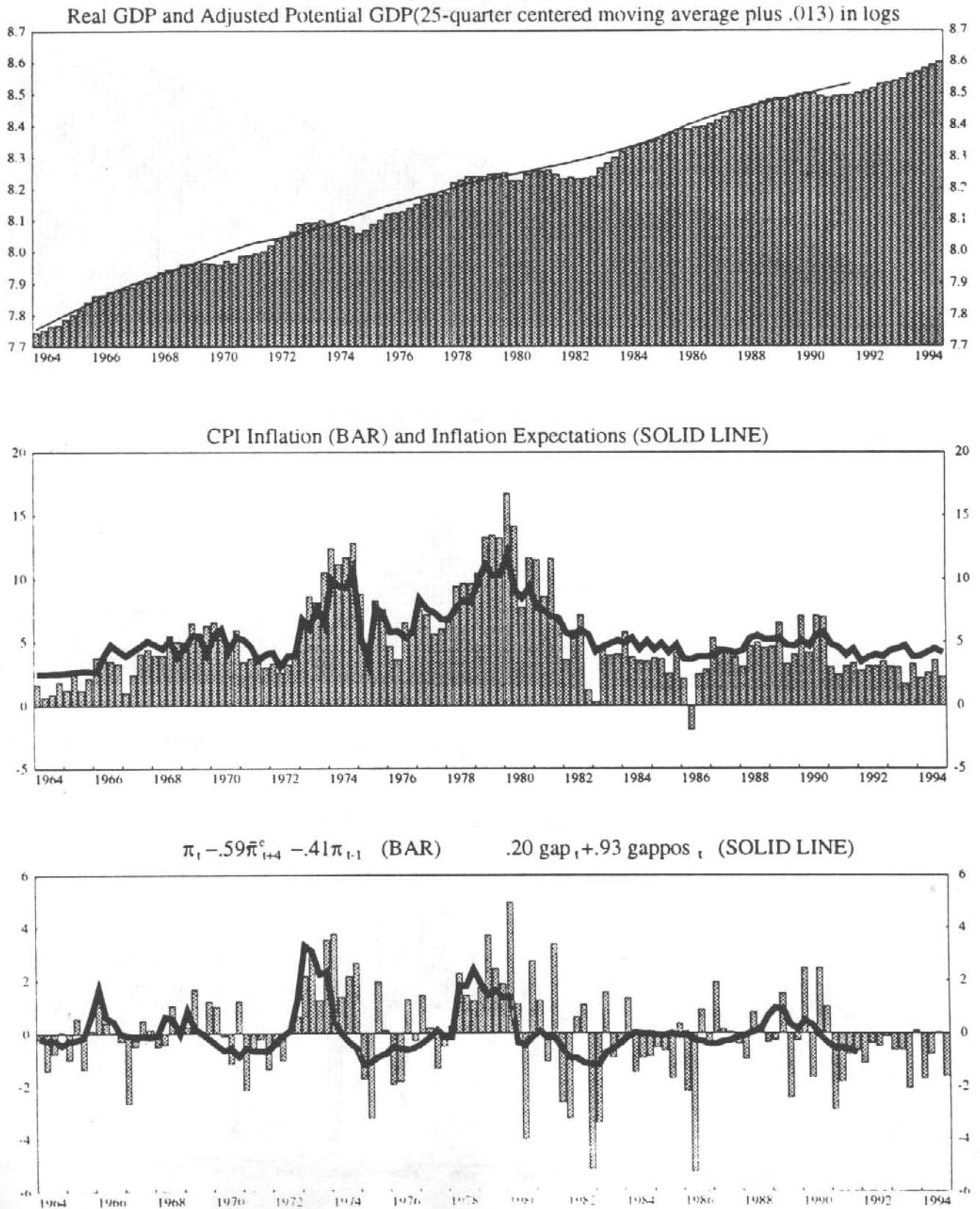


Chart VI-2
United States

Interpreting U.S. Inflation with an Asymmetric Model



4. Policy implications of asymmetries

This section provides a brief discussion of policy implications of linear and asymmetric models of inflation dynamics described above. In particular, the trade-offs faced by a monetary authority are compared by simulating the effect of aggregate demand in a small model of the macro-economy. The effects of a monetary policy rule in which the authorities delay the adjustment in interest rates in response to an increase in demand pressures is compared to a policy rule in which the authorities react in advance of the actual emergence of inflation pressures and the policy control process. The model, which is essentially the same as the one used in Clark, Laxton, and Rose (1995), is sketched below.

If the economy features the asymmetric form of inflation dynamics, then a delay in responding to an inflationary demand shock will engender higher inflation expectations and necessitate a relatively more severe tightening of monetary conditions in the future. In contrast to the linear case, where policy errors are more easily corrected, asymmetric inflation dynamics mean that delaying interest rate hikes in the face of excess demand results in a larger cumulative output loss; the monetary authority is required to impose a much more severe monetary reaction than otherwise in order to reign in higher inflationary pressures. Indeed, an important prediction of the asymmetric model is that the seeds of large recessions are planted when an economy is allowed to exceed its potential.

The model's equations are listed in Table VI-3. In addition to the two versions of the Phillips curve, the model defines the real interest rates as the nominal short-term interest rate less expected inflation. An aggregate demand equation (in terms of the gap) is defined, in which aggregate demand is assumed to be negatively related to the real interest rate lagged two quarters. The lagged effect of interest rates (and monetary policy) on aggregate demand is noteworthy, since it has important implications for the effectiveness of monetary policy. The aggregate demand equation also is a function of lagged values of the gap, which implies that the effects of demand shocks take time to dissipate. ^{1/} The effect of these assumptions is that 5-6 quarters of a persistent real interest rate hike of 100 basis points would reduce the output gap by 0.4 percentage points.

These properties of output dynamics and the monetary policy transmission mechanism have an important implication for the design of monetary policy rules, namely, that monetary policy cannot offset completely the

^{1/} The propagation of demand shocks is represented by a second-order autoregressive structure. All else equal, the effects of a shock are amplified in the second period and then die out slowly. These properties are roughly consistent with the evidence from both reduced-form models of the transmission mechanism (e.g. Roberts 1994a) and more structural models (e.g., Mauskopf 1990).

Table VI-3. United States: A Small Simulation Model of the U.S. Output-Inflation Process

Asymmetric Phillips curve:

$$\pi_t = .593 \bar{\pi}_{t+4}^e + (1-.593) \pi_{t-1} + .202 \text{gap}_t^e + .925 \text{gappos}_t^e + \varepsilon_t^\pi$$

$$\bar{\pi}_{t+4}^e = .2 (\varepsilon \pi_{t+4}^e + \varepsilon-1 \pi_{t+3}^e + \varepsilon-2 \pi_{t+2}^e + \varepsilon-3 \pi_{t+1}^e + \varepsilon-4 \pi_t^e)$$

Linear Phillips curve:

$$\pi_t = .548 \bar{\pi}_{t+4}^e + (1-.548) \pi_{t-1} + .524 \text{gap}_t + \varepsilon_t^\pi$$

Real interest rate:

$$rr_t = rs_t - \pi_{t+4}^e$$

Inflation and inflation expectations:

$$\pi_t = [(P_t/P_{t-1})^4 - 1] * 100, \quad \pi_{t+4}^e = (P_{t+4}/P_t - 1) * 100$$

Aggregate demand equation:

$$\text{gap}_t = 1.074 \text{gap}_{t-1} - .290 \text{gap}_{t-2} - .158 rr_{t-2} + \varepsilon_t^{\text{gap}}$$

Policy reaction function:

$$rs_t - \pi_{t+4}^e = 2(\pi_{t+3} - \pi^*) + \text{gap}_t$$

π = CPI inflation at annual rates
 gap = output gap ($y - \bar{y}$)
 gap^e = $(y - \bar{y} + \alpha) = (y - y^*)$
 rr = real interest rate
 rs = short-term interest rate
 π_{t+4}^e = one-year-ahead inflation expectations
 π^* = inflation target
 P_t = price level

effects of shocks. There will be cycles in economic activity and there will be temporary deviations of inflation from its target level. Thus, the model implies that it will be important for the monetary authorities to be forward-looking in its actions.

The particular forward-looking policy reaction function used is a variant of the rule considered by Bryant, Hooper, and Mann (1993). In setting the short-term interest rate, the monetary authority is assumed to raise the real rate that enters the output equation when there is excess demand in the economy or inflation is expected to be above the target level three quarters ahead. The particular calibration adopted is designed to assure that inflation returns to the target level within a reasonably short period (two years, say) following a shock. The effectiveness of this policy rule is contrasted with an identical rule except that the monetary authorities are assumed to begin reacting to the demand shock with a one quarter delay.

The simulation assumes an impulse shock of 1 percent to aggregate demand--i.e., a 1 percentage point output gap opens on impact, with no further shocks. ^{1/} Charts VI-3 and VI-4 illustrate the effect of the demand shock on the assumption that the Phillips curve is linear. In this case, the effect of a delayed monetary policy response is relatively innocuous. Assuming no delay, the policy rule implies an immediate 270 basis point increase in the short-term interest rate in the first quarter (see Chart VI-3). Inflation rises about 1 percentage point above its baseline level before returning to baseline by the end of 6 quarters. Output rises 1 percent above its baseline value initially, but falls below baseline in the second year, before returning to baseline. The cumulative gain in output is about 2 percent.

If the monetary response is delayed by one quarter, there is a larger hike in short-term interest rates, and inflation edges slightly higher, peaking at about 1.3 percentage points above control, but the cumulative gain in output is even larger, amounting to about 2.5 percent. This illustrates that if the inflation-output tradeoff is linear, the case for aggressive monetary resistance to inflationary demand shocks is less strong. While the monetary authority may be concerned to see inflation rise above the target by more and for a longer period of time, there is no particular cost to delaying interest rate hikes when output exceeds potential output.

This result, however, does not hold in the case of the asymmetric Phillips curve (Charts VI-5 and VI-6). Assuming that the policy response is not delayed, short-term interest rates increase by over 400 basis points in the first quarter, inflation peaks at about 2 percentage points above

^{1/} The simulations reported here are deterministic. Although these types of experiments are useful for developing the basic intuition behind the model, they do not do justice to the full policy implications--see Clark, Laxton, and Rose (1995) for a more extensive analysis of the policy implications of asymmetry in inflation dynamics in a stochastic environment.

control. The effect on output is roughly similar to the case of a linear Phillips curve during the first few quarters. However, the larger effect on inflation in this model requires a much deeper secondary contraction. As a result, the cumulative effect on output is slightly negative.

The consequences of delaying the monetary response to the shock also are much more severe in the presence of asymmetries. Short-term interest rates must be raised substantially higher to combat the cumulating inflationary pressures, as expectations respond to the cumulating excess demand and rising inflation. Inflation now peaks at 3 percentage points above its baseline value. Moreover, in order to bring inflation back under control a much more severe contraction is required. The cumulative change in output is now substantially negative because a large contraction is needed to counteract the inflationary effects caused by the initial temporary boom.

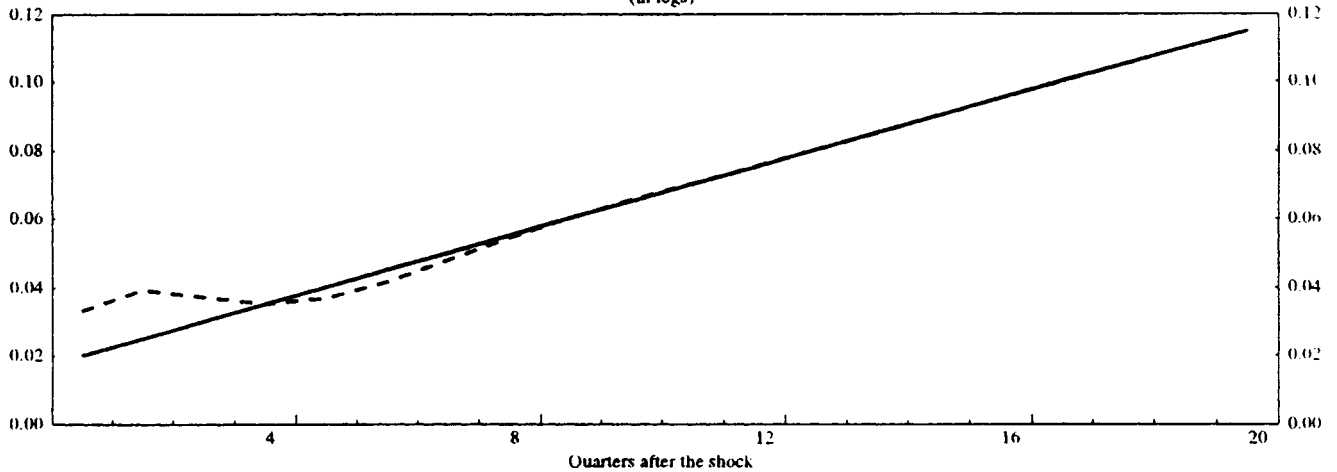
5. Conclusions

Evidence was presented above that suggests that the short-run inflation-output tradeoff is nonlinear in the United States. This in turn implies that excess demand gaps have a larger effect on inflation than excess supply gaps. The policy implications of macroeconomic models that feature explicit short-run capacity constraints can be considerably different than those of models based on simple linear versions of the Phillips Curve. The former suggest that there may be large risks from allowing the economy to overheat, while the latter suggest that the risks may be small. In the face of the empirical evidence presented above, and the potential for significant cumulative losses in output and more extreme variation in economic conditions, the results suggest the merits of a monetary policy that acts well in advance of the emergence of actual inflation pressure.

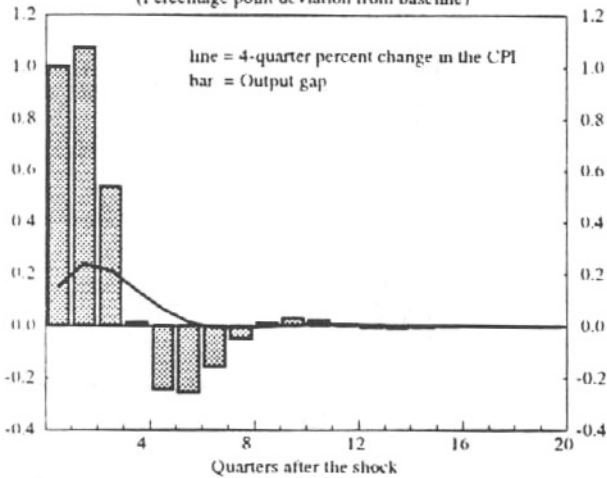
Chart VI-3
United States

Linear Model Responses to a Temporary 1% Positive Demand Shock

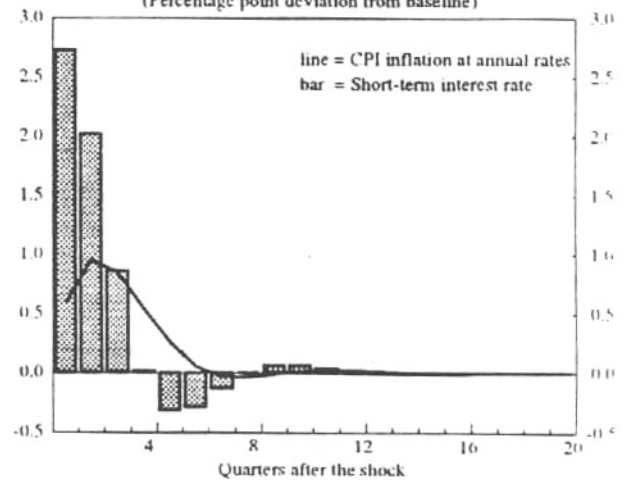
Real GDP and Potential GDP
(in logs)



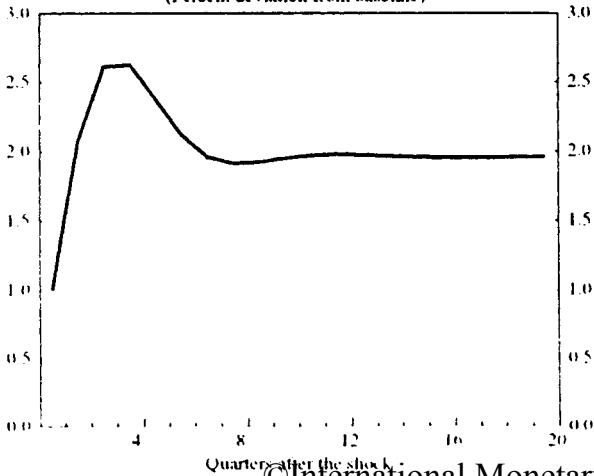
The Output Gap and CPI Inflation
(Percentage point deviation from baseline)



Short-term Interest Rate and Inflation
(Percentage point deviation from baseline)



Cumulative Effect on Real GDP
(Percent deviation from baseline)



Price level
(Percent deviation from baseline)

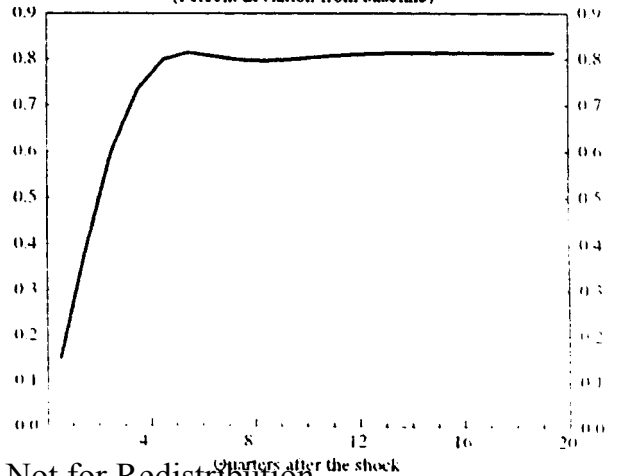
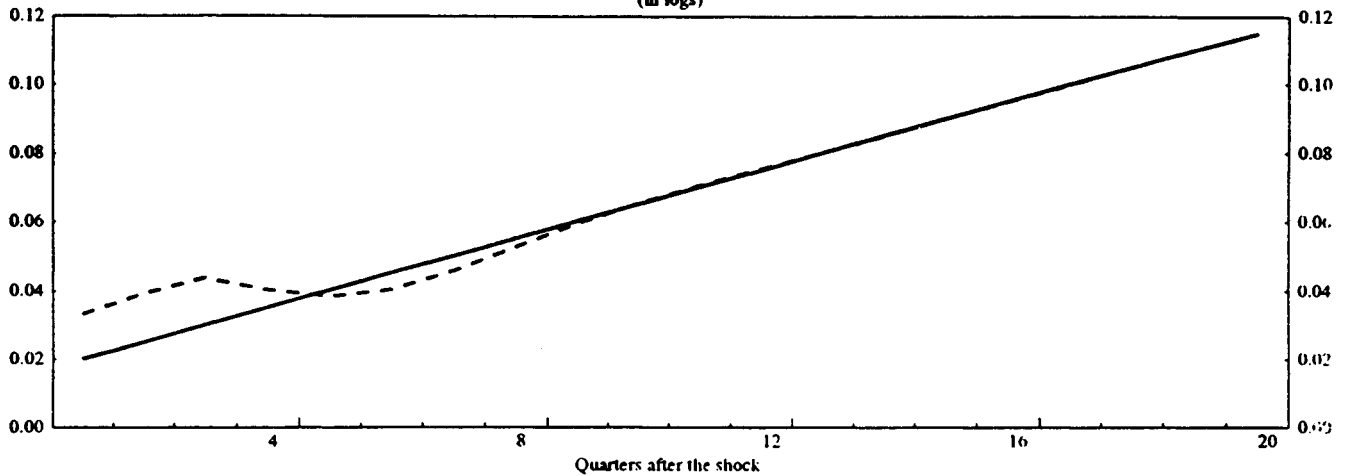


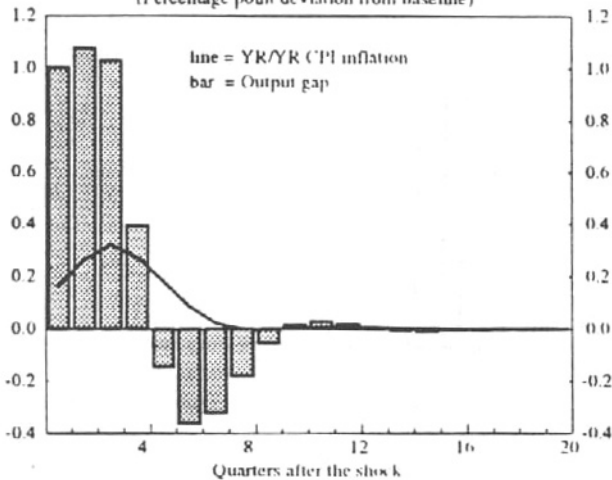
Chart VI-4
United States

**Linear Model Responses to a Temporary 1% Positive Demand Shock:
Delayed Monetary Policy Response**

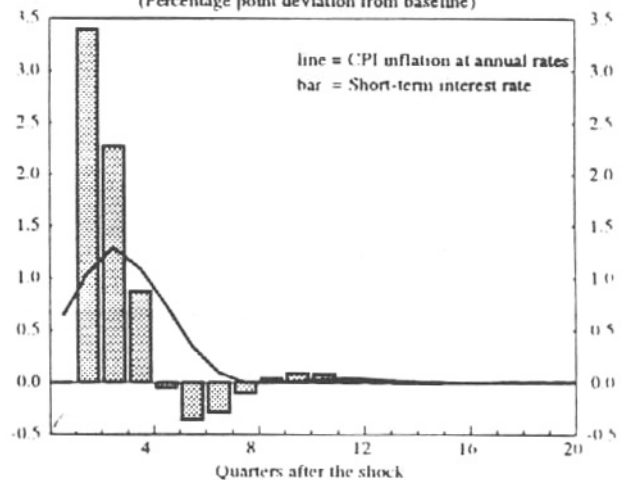
Real GDP and Potential GDP
(in logs)



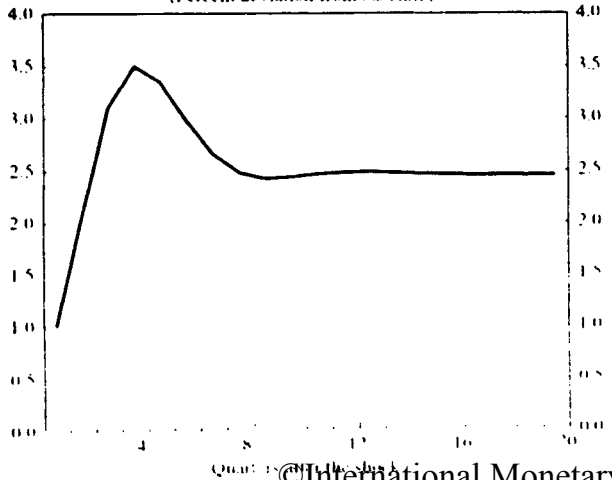
The Output Gap and CPI Inflation
(Percentage point deviation from baseline)



Short-term Interest Rate and Inflation
(Percentage point deviation from baseline)



Cumulative Effect on Real GDP
(Percent deviation from baseline)



Price level
(Percent deviation from baseline)

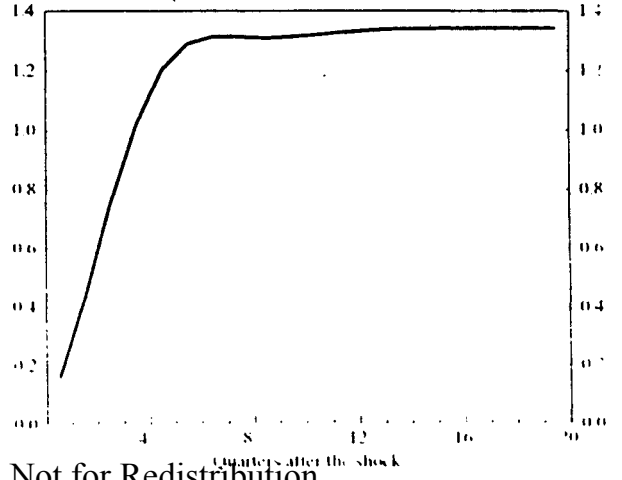
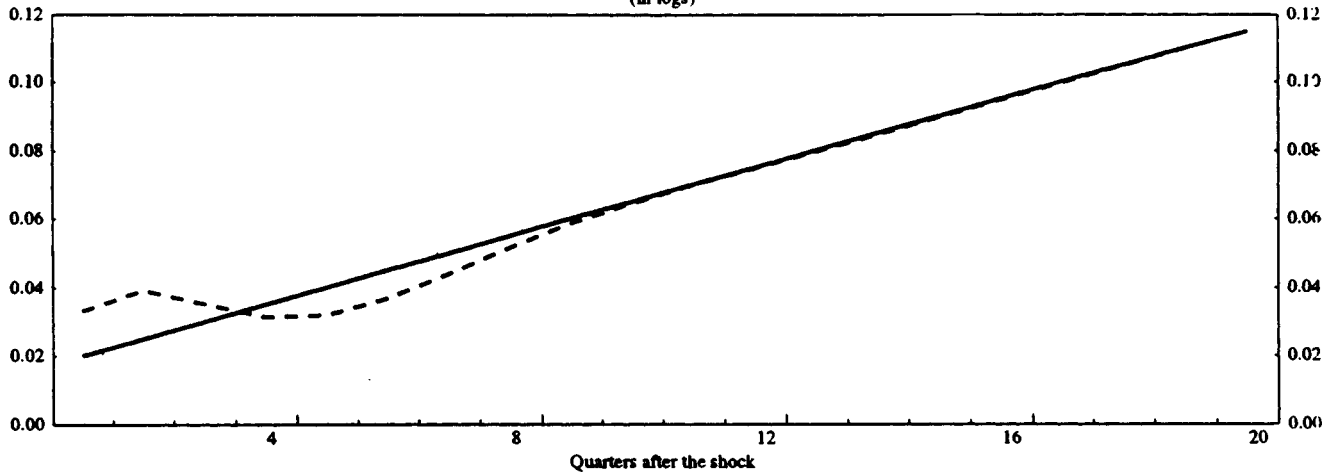


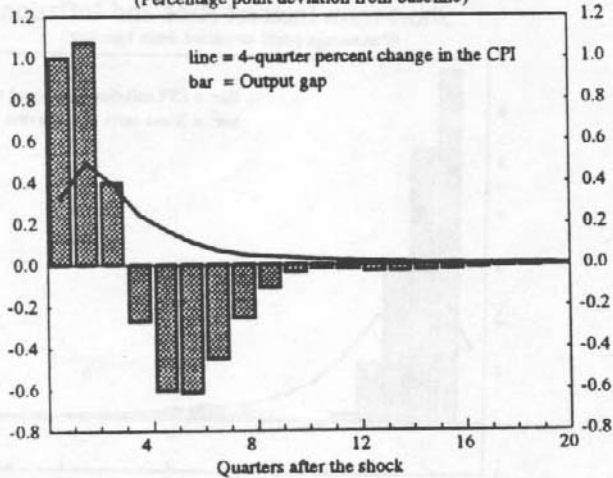
Chart VI-5
United States

Asymmetric Model Responses to a Temporary 1% Positive Demand Shock

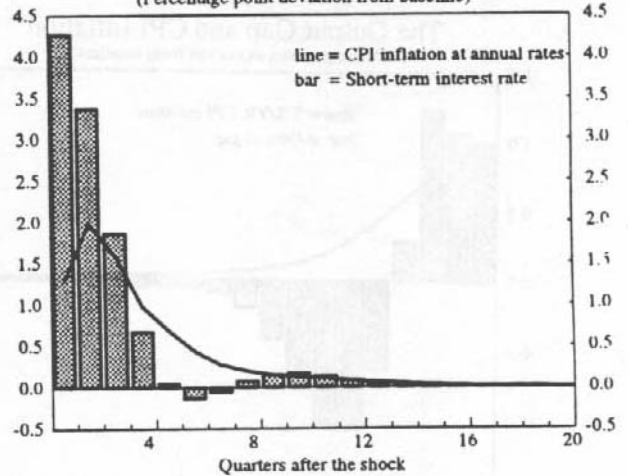
Real GDP and Potential GDP
(in logs)



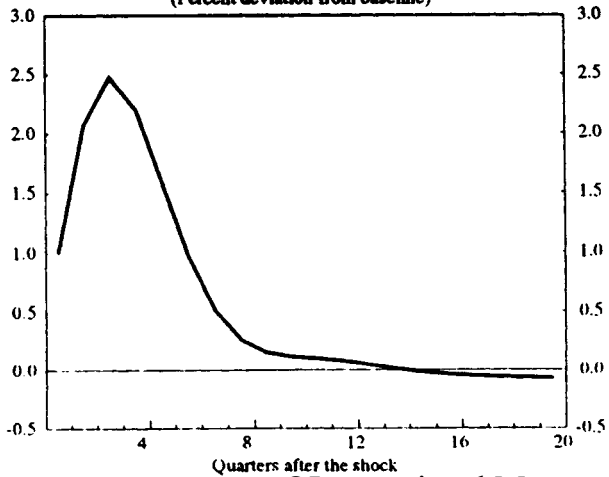
The Output Gap and CPI Inflation
(Percentage point deviation from baseline)



Short-term Interest Rate and Inflation
(Percentage point deviation from baseline)



Cumulative Effect on Real GDP
(Percent deviation from baseline)



Price level
(Percent deviation from baseline)

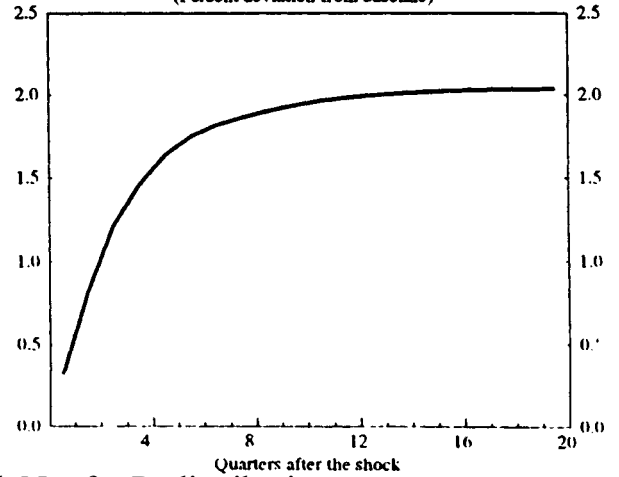
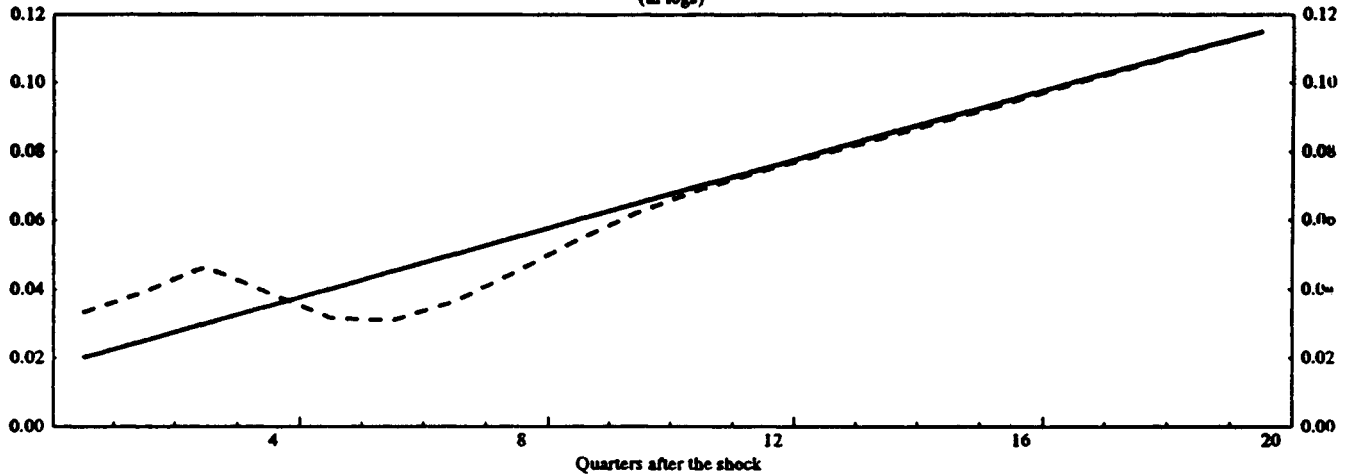


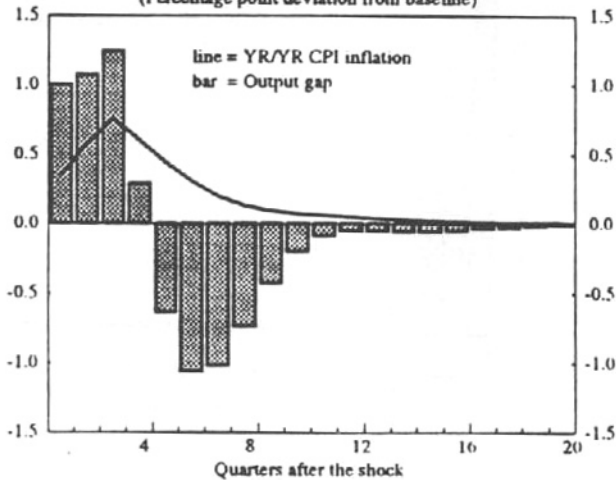
Chart VI-6
United States

**Asymmetric Model Responses to a Temporary 1% Positive Demand Shock:
Delayed Monetary Policy Response**

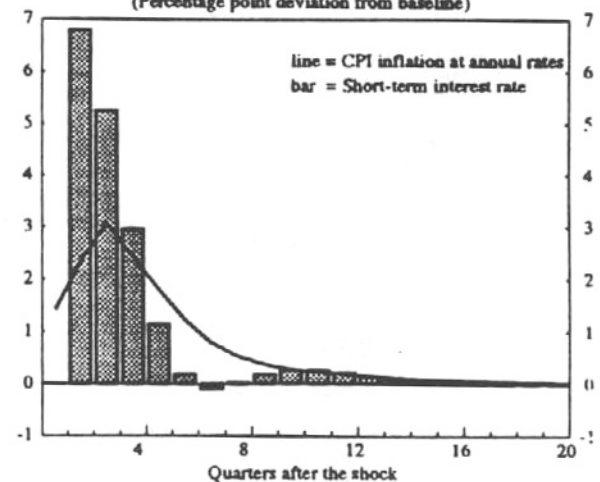
Real GDP and Potential GDP
(in logs)



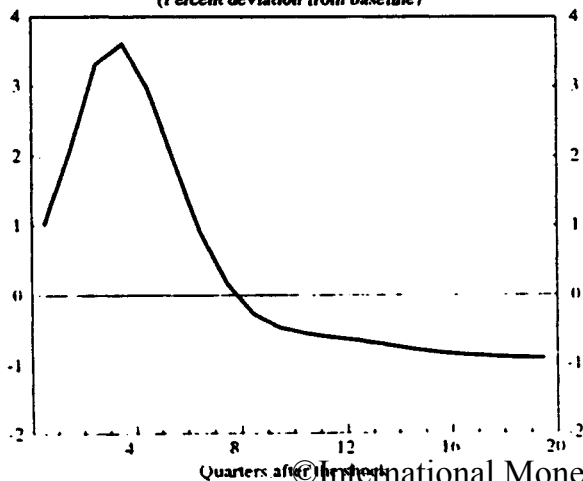
The Output Gap and CPI Inflation
(Percentage point deviation from baseline)



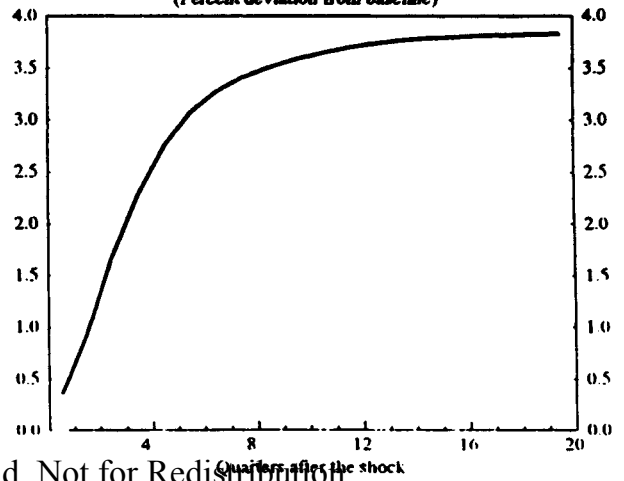
Short-term Interest Rate and Inflation
(Percentage point deviation from baseline)



Cumulative Effect on Real GDP
(Percent deviation from baseline)



Price level
(Percent deviation from baseline)



References

- Bryant, Ralph C., Peter Hooper, and Catherine L. Mann, Evaluating Policy Regimes: New Research in Empirical Macroeconomics (Washington: The Brookings Institution, 1993).
- Buiter, Willem, and Marcus Miller, "Costs and Benefits of an Anti-inflationary Policy: Questions and Issues." In Inflation and Unemployment: Theory, Experience and Policy, ed. by V. Argy, and J. Neville (London: George Allen and Unwin), pp. 11-38.
- Calvo, Guillermo A., "Staggered Prices in a Utility-Maximizing Framework," Journal of Monetary Economics, Vol. 12 (September 1983), pp. 383-98.
- Chadha, Bankim, Paul R. Masson, and Guy Meredith, "Models of Inflation and the Costs of Disinflation," IMF Staff Papers, Vol. 39, No. 2 (Washington: International Monetary Fund, June 1992), pp. 395-431.
- Clark, Peter, Douglas Laxton, and David Rose, "Some Evidence on Asymmetries in the US Output-Inflation Process," forthcoming IMF Working Paper (1995a).
- Clark, Peter, Douglas Laxton, and David Rose, "Capacity Constraints, Inflation and the Transmission Mechanism: Forward-Looking Versus Myopic Policy Rules," unpublished mimeo (1995b).
- Cozier, Barry V., "On the Aggregate Implications of Optimal Price Adjustment," Working Paper No. 89-4 (Ottawa: Bank of Canada, 1989).
- Eichenbaum, Martin, "Real Business Cycle Theory: Wisdom or Whimsy?" Working paper no. 3432 (Cambridge: National Bureau for Economic Research (1990).
- Eisner, Robert, "A New View of the NAIRU," Northwestern University Working Paper (November 29, 1994).
- Gordon, Robert J., "Inflation and Unemployment: Where is the NAIRU," Paper presented to Board of Governors, Federal Reserve System Meeting of Academic Consultants (Washington: December 1, 1994).
- , "The Recent Acceleration of Inflation and Its Lessons for the Future," in Brookings Papers on Economic Activity (Chicago: University of Chicago, 1970).

- Harvey, A.C., and A. Jaeger, "Detrending, Stylized Facts and the Business Cycle," Journal of Applied Econometrics, Vol. 8 (1993), pp. 231-47.
- Hodrick, Robert, and Edward C. Prescott, "Postwar U.S. Business Cycles: An Empirical Investigation," Working Paper No. 451 (Pittsburgh: Carnegie Mellon University, November 1980).
- Laxton, Douglas, David Rose, and Robert Tetlow (1993a), "Problems in Identifying Non-Linear Phillips Curves: Some Further Consequences of Mismeasuring Potential Output," Working Paper No. 93-6 (Ottawa: Bank of Canada, June 1993).
- , ———, and ——— (1993c), "Monetary Policy, Uncertainty and the Presumption of Linearity," Technical Report No. 63 (Ottawa: Bank of Canada, August 1993).
- , Nicholas Ricketts, and ———, "Uncertainty, Learning and Policy Credibility," in Economic Behavior and Policy Choice Under Price Stability (Ottawa: Bank of Canada, August 1993).
- , Guy Meredith, and David Rose, "Asymmetric Effects of Economic Activity: Evidence and Policy Implications," IMF Working Paper WP/94/139 (Washington: International Monetary Fund, November 1994).
- Phillips, A.W., "The Relationship Between Unemployment and the Rate of Change of Money Wage Rates in the United Kingdom, 1861-1957," Economica, Vol. 25 (August 1958), pp. 283-300.
- Rotemberg, Julio, "The New Keynesian Microfoundations," in NBER Macroeconomics Annual 1987, O. J. Blanchard and S. Fischer, eds. (Cambridge, Massachusetts: The MIT Press), pp. 69-116.
- Sargent, T., "A Note On The 'Accelerationist' Controversy," Journal of Money, Credit and Banking (August 1971), pp. 721-24.
- Summers, Lawrence H., "Should Keynesian Economics Dispense with the Phillips Curve?" in Unemployment, Hysteresis and the Natural Rate Hypothesis, ed. by Rod Cross (New York: Blackwell, 1988), pp. 11-25.
- Taylor, John, "Aggregate Dynamics and Staggered Contracts," Journal of Political Economy, Vol. 88 (February 1980), pp. 1-23.
- Turner, David, "Speed Limit and Asymmetric Inflation Effects from the Output Gap in the Major Seven Economies," (forthcoming in OECD Economic Studies, 1995/1).

VII. Tax Overhaul Proposals: Replacing Income Tax
with Consumption Taxation 1/

The current session of the U.S. Congress has brought forward a number of proposals to overhaul the tax system. At present, the system raises most revenue from taxes on personal income and corporate profits, and the major reform proposals call for a shift to a consumption base and for drastic simplification of the tax code. Proposals by Senators Domenici and Nunn, Senator Specter, and Representative Armey would all eliminate the individual and corporate income taxes, and substitute new taxes on business and individuals. 2/ The Domenici-Nunn proposal would retain graduated tax rates so as to roughly maintain the tax burden across income groups; the Specter and Armey proposals would impose a single "flat" tax rate on a broader tax base and could have major distributional implications.

The arguments for simplifying the tax code relate to economic efficiency and growth. All the proposals would eliminate distortions in the current tax system by taxing all sources of income at the same rate, whereas under the current system, dividends are taxed twice (as corporate and personal income) while fringe benefits to employees are not taxed. In addition, by simplifying the tax code, the proposals are expected to save resources currently devoted to tax compliance and administration.

Proponents of consumption-based taxation argue that by exempting income saved from taxation, a shift to a consumption tax will raise the U.S. saving rate, thereby promoting investment and growth. Both theoretical and empirical studies, however, present mixed conclusions regarding the sensitivity of saving to changes in taxes that affect intertemporal rates of return. Advocates of a "flat tax" with a single rate claim that their proposals can achieve revenue neutrality while lowering marginal rates. The lower marginal rates will, they argue, lead workers to increase their labor supply, thereby increasing incomes and growth. This conclusion, too, is debatable.

This chapter outlines the major reform proposals and evaluates the arguments for reform. The distributional implications of each scheme are explored, using for comparison tax rates at which the reforms would be revenue neutral. The paper then examines the efficiency arguments for reform, including the proposition that consumption-based taxation will increase saving and growth. While the reform proposals strive for the simplest possible new tax code, in practice a reform could introduce new distortions and inequities unless special transitional provisions are included; these transitional issues are also discussed.

1/ Prepared by Elaine Buckberg.

2/ In addition, Senator Lugar has proposed to replace income taxation with a national sales tax. Representative Gephardt has promoted a separate flat tax proposal, and Congress has appointed Mr. Jack Kemp to chair a commission on tax reform.

1. The flat tax proposal

Representatives Armey and Specter have proposed a single-rate "flat" tax on businesses and individuals, based on the flat tax concept developed by Hall and Rabushka (1985). The flat tax would tax all income exactly once, and tax it at the source. The authors claim that by eliminating most tax deductions and credits and thereby broadening the tax base, revenue neutrality could be achieved with a constant marginal tax rate of either 19 percent (under the Armey proposal, which includes no deductions) or 20 percent (under the Specter proposal, which retains deductions for mortgage interest and charitable contributions). 1/ Progressivity would be achieved by allowing large standard deductions and personal exemptions. A family of four would not pay any tax on income below either \$25,500 (Specter) or \$34,700 (Armey); after that, the average tax rate would rise gradually with income (Table VII-1).

The flat tax would eliminate the current double-taxation of dividends and subject all labor and capital income to the same marginal tax rate. Corporate and noncorporate businesses would pay the flat business tax rate on value added defined as: 2/

Total revenue from sales
less material input costs
less wages, salaries, and pensions
less plant and equipment investment.

An unlimited loss-carryforward would apply to businesses that incur net losses. 3/ The business tax would apply only to operations within U.S. borders, so that foreign operations of U.S. companies would not be taxed. 4/ Several other differences from current tax law are significant. Full expensing of physical investment would replace multi-year depreciation schedules, and firms' financial receipts from holding stocks or bonds would not be taxable. Capital gains on business assets would be taxed, since the

1/ For mortgage debt up to \$100,000 and charitable contributions up to \$2,500.

2/ Currently, corporate profits are taxed at graduated rates and the profits of noncorporate businesses such as partnerships are taxed only when distributed as individual income.

3/ The Alternative Minimum Taxes (AMT) also would be repealed along with the Corporate and Personal Income Taxes. Currently, the AMT for corporations is designed to ensure that all corporations pay tax. A corporation's AMT liability is determined by recalculating taxable income, making adjustments and adding back certain tax preference items. The corporation then owes tax equal to 20 percent of the AMT base, if that liability exceeds its regular tax liability. An AMT also applies to individuals.

4/ Currently, the income from U.S. corporations' foreign activities is taxable, although tax due to the host country is deductible from the U.S. tax liability.

**Table VII-1. United States: Average Tax Rates
by Taxable Income under Proposed Flat Taxes**

Taxable Income (dollars)	Armey's 19 Percent Flat Tax	Specter's 20 Percent Flat Tax
24,500	--	--
34,700	5	6
45,000	9	9
55,000	10	11
65,000	12	12
75,000	13	13
100,000	14	15
150,000	16	17
200,000	17	18
400,000	18	19
1,000,000	19	20

Source: Fund staff estimates.

full sale price of the asset would be taxed on sale but only the purchase price would have been deducted at time of purchase.

The individual flat tax would apply only to labor income. Individuals' capital income would not be taxed, since it would already have been taxed once at the business level, thereby eliminating double taxation of distributed capital income. An individual or household would pay a flat rate tax on

Wage, salary, and pension income
less family allowances based on household size.

The individual flat tax is equivalent to a consumption tax since it taxes only labor income, which over a lifetime is equal to consumption. ^{1/}

Estimates made by U.S. Treasury's Office of Tax Analysis suggest that a flat tax would not be revenue neutral compared to the current individual and corporate income taxes at the rates suggested by its proponents. For example, a rate of 24.9 percent would be required to achieve revenue neutrality with the Army deductions. Modifying the proposal to retain the earned income tax credit would require raising the rate to 25.8 percent. Exempting certain nonbusiness organizations from the tax base, such as nonprofit institutions and state and local governments, would narrow the tax base and require still higher rates.

2. Saving-exempt income tax

Senators Nunn and Domenici have proposed converting the personal and business income tax system to a saving-exempt income tax (SEIT). ^{2/} The SEIT or Unlimited Savings Allowance (USA) tax system would be explicitly a consumption tax because the household tax base would be household income less new saving or investment, and the business tax base would be business cashflow less purchases, including all forms of investment. Like the flat tax proposals, the SEIT proposal would eliminate double taxation of dividend

^{1/} This assumes that all saving is ultimately converted to assets (no bequests or debt at death), and that the value of an asset is equal to the income stream it is expected to produce:

$$p_t = \sum_{i=1}^{\infty} \beta^i d_{t+i}$$

where p_t represents the asset's price at t , d_t represents the dividend paid at time t , and β is a discount factor. If individuals do not consume all their income and instead leave bequests, the bequest will be taxed when it is consumed ultimately by the beneficiary of the bequest.

^{2/} See Senate bill No. 722, April 25 congressional testimony of Senators Domenici and Nunn (Congressional Record) and Senator Pete V. Domenici (1994).

income and would tax all income--wages and salaries, interest, dividends, and capital gains--at the same rate. 1/

The personal SEIT would retain a multi-bracket structure so as to maintain roughly the progressivity of the current tax system; rates would be set so as to ensure that the tax burden paid by each quintile of the income distribution is unchanged. The business SEIT would be levied at a flat rate, but Medicare and Social Security taxes would be deductible against households' tax liability.

Business taxes would be levied at a flat rate on the business's value added, on a cashflow basis. The tax base would be

Total revenue from domestic sales
less purchases from other businesses
less purchases of imports.

A business would compute its tax liability as its tax base times the tax rate, then deduct its payments of Social Security and Medicare taxes; a refund would be received in the case of a negative tax liability. 2/

Like the flat tax proposals, the SEIT would allow full expensing of investment in lieu of depreciation and firms' financial receipts would be excluded from gross income. Unlike the flat tax, businesses could not deduct wage, salary or pension payments but, like the flat tax, employer-provided fringe benefits would be taxable at the business level as part of the gross income tax base. Nonprofit entities would not be subject to the business tax, and partnership income would be taxed only when withdrawn as salaries, dividends or bonuses. 3/

An advantage of the SEIT is that border-adjustments of the tax likely would be permissible under GATT (imports would be taxed at the same rate as the SEIT on importation and exports would be exempt from tax). 4/ Most other industrial countries and many developing countries use border-adjustable or territorial taxes and exempt exports from tax. Proponents of consumption-based taxes argue that switching to such a tax in the United States would level the playing field between domestic and imported goods in the U.S. market by equalizing the amount of tax paid, and would make U.S.

1/ Under the SEIT, capital income (interest and dividends) would be taxed at the individual level. Under the flat tax rate, capital income would be taxed at the business level.

2/ The Alternative Minimum Tax would be repealed.

3/ If a non-profit organization is engaged in a business activity unrelated to its tax-exempt status, it would be liable for taxes on the income from that activity under either the business cashflow tax or the Unrelated Business Income Tax (UBIT).

4/ GATT prohibits border adjustments for direct taxes like the corporate income tax or the FICA payroll tax.

exports more competitive in foreign markets by removing the tax from the export price.

The individual SEIT would be levied on an income base with adjustments for saving. Income would be defined as under current tax law to include earned income, pensions and transfer payments, business income, and investment income. Net saving would be fully deducted from income; funds withdrawn from saving and consumed would be included in taxable income. 1/ Taxable income would equal:

Wage, salary, pension and capital income
less net new saving
less family allowances based on household size
less personal exemptions
less mortgage interest, charitable contributions,
and exemptible education expenses.

Interest payments on all borrowing (mortgage and other) would be deductible; consumption financed by borrowing would be taxed in the year that the money is borrowed and therefore would affect net saving. 2/ Income from business activities would be taxed on a cashflow basis. Income from capital asset sales would be taxed only if not reinvested. The Nunn-Domenici plan would allow state and local tax payments, charitable donations, and extraordinary medical expenses to be deducted from income. 3/ Individuals also could credit payroll tax payments against their tax liability; the difference would be refundable.

A graduated rate structure and per-person exemptions are included in the Nunn-Domenici proposal to ensure progressivity. For a family of four filing jointly, the combined family allowance and personal exemptions would exclude \$17,600 from taxation. Additional itemized deductions would be permitted for mortgage interest paid, charitable contributions, and a new deduction for higher education expenses (up to \$2,000 per person per year); all other deductions, including the deduction for state and local income tax, would be eliminated.

Taxable income would then be taxed at three graduated rates. A married couple filing jointly would pay 19 percent on the first \$5,400 of their

1/ The following transactions would count as new saving: deposits to bank accounts; purchases of financial assets and equity; payment of life insurance premia; cash contributions to businesses; purchases of real assets, including homes and major home improvements; contributions to pension and profit-sharing plans; and loan repayments. Mortgage principal and interest payments would be deductible in the year those payments were made. Some form of verification would be required to assess the value of a household's qualifying assets.

2/ Taxpayers would not need to itemize their deductions to deduct interest payments under the SEIT.

3/ Medical expenses exceeding 7.5 percent of income would be deductible.

taxable income, 27 percent on income from \$5,400 to \$40,000, and 40 percent on income above \$40,000. The payroll tax credit would reduce the effective marginal rate on labor income up to \$60,000 per person by 7.65 percentage points (the employee share of the Social Security and Medicare payroll taxes). In addition, the Nunn-Domenici proposal would expand the earned income tax credit.

3. The equivalence between the flat tax and the consumption tax

A two-period example can be used to show the equivalence of the flat and SEIT (consumption) taxes. Assume individuals live for two periods. In period 1 they work, earning income w , of which they save s and consume the remainder ($w-s$). In period 2, they do not work or save but consume from their savings. There is only one asset in the economy, which yields a return r ; the discount rate is also equal to r . There are no endowments, only labor income, such that individuals have no assets in the beginning of period 1.

The tabulation below demonstrates that the net present value of taxes is equal whether the tax is levied when labor income is earned or when it is consumed.

Tax Revenue under Consumption-based and Flat Taxes

	<u>Wages</u>	<u>Consumption</u>	<u>Flat Tax Revenue</u>	<u>Consumption Tax Revenue</u>
Period 1	w	$w-s$	τw	$\tau(w-s)$
Period 2	--	$s(1+r)$	--	$\tau s(1+r)$
Present value of tax revenues			<u>τw</u>	<u>τw</u>

This suggests that the major difference between a flat tax (levied on labor income) and a consumption tax (levied on the difference between total income and saving) is the timing of households tax payments. The flat tax is levied when labor income is earned, and the consumption tax is levied when total income is consumed. However, this equivalence only holds if capital markets are perfect and the private and public rates of return are identical.

The two-period model also can demonstrate that either a flat tax or a SEIT creates an incentive to save relative to an income tax that applies to both capital and labor income. The tabulation below shows that, under a consumption tax, saving increases lifetime consumption more than it does under an income tax.

Consumption and Revenue
under Consumption and Income Taxes

	Wages	Consumption Tax		Income Tax	
		Consumption	Revenue	Consumption	Revenue
Period 1	w	w-s	$\tau(w-s)$	$(1-\tau)w-s$	τw
Period 2	--	$s(1+r)$	$\tau s(1+r)$	$s(1+r(1-\tau))$	$sr\tau$
Present value		<u>w</u>	<u>τw</u>	<u>$(1-\tau)w-(sr\tau/(1+r))$</u>	<u>$\tau w+(sr\tau/(1+r))$</u>

The tabulation also shows that an income tax yields more revenue than a consumption tax set at the same rate. Therefore, shifting to a consumption tax basis would require higher average tax rates or a broader base than the present income tax in order to achieve revenue neutrality.

4. Distributional implications of the tax proposals

Since, as demonstrated above, an important difference between the SEIT and the flat tax proposals is the timing of tax payments, their distributional effects will depend on whether individuals are net savers or borrowers. For example, households with high labor incomes relative to consumption (i.e., net savers) will tend to pay taxes under a consumption tax during such a high-saving year than under the flat tax. Over a lifetime, taxes paid under a flat tax will be higher for net savers (i.e., those that leave bequests) than under a consumption tax. Conversely, net borrowers would tend to pay more taxes over a lifetime under a consumption tax than a flat tax.

Since lower-income households would tend to have a higher level of debt relative to income, this might suggest that the consumption tax would tend to be more regressive than the flat tax. However, estimates suggest that the graduated marginal tax rates of the proposed SEIT would tend to preserve the progressivity of the current income tax system, while the proposed flat tax would reduce the progressivity of the tax system.

For example, the flat tax would tend to reduce significantly the after-tax incomes of families with incomes below \$20,000 owing to the repeal of the EITC. In addition, the proposed flat tax is regressive since the share of salaries, wages, and pensions in total income tends to fall for higher income households. ^{1/} Conversely, the Nunn-Domenici proposal would protect low-income households by expanding the refundable earned income tax credit for low-income working families. The three-bracket tax schedule is

^{1/} In 1991, wages, salaries, and pensions accounted for roughly 90 percent of adjusted gross income (AGI) for individuals with incomes between \$30,000 and \$70,000, but only 31 percent of AGI for those with incomes of \$1 million or higher. See Eisner (1995), p. 10.

designed to hold constant the burden of taxes on each quintile of the income distribution.

The tabulation below (see also Table VII-2) contains estimates of the distributional effect of the two proposals, prepared by the Office of Tax Analysis (OTA) of the Department of the Treasury on the assumption that the tax rates were set to ensure revenue neutrality. ^{1/} OTA (1994) estimates that under the flat tax, the tax burden would decrease only for those families with incomes above \$200,000 who typically receive a substantial portion of their income from capital. The tax burden would tend to increase for lower income households suggesting that the flat tax system would be substantially more regressive than the current income tax system. By contrast, the SEIT is estimated to improve the progressivity of the income tax system.

Estimated Change in Tax Burden

<u>Family income</u> (\$,000)	Percent Change <u>Relative to Current System</u>	
	<u>Flat</u>	<u>Consumption</u>
	<u>Tax</u>	<u>Tax</u>
0-10	48	-75
10-20	41	-9
20-30	17	-14
30-50	4	-5
50-75	5	--
75-100	8	--
100-200	5	3
over 200	-24	4

A study by the Congressional Budget Office (CBO) examined the sensitivity of this type of calculation to assumptions about the measurement of household saving and the distribution of the corporate income tax burden between labor and capital. In particular, the CBO examined the effect of these assumptions on the rate schedule required under a SEIT to maintain revenue neutrality and an unchanged distribution of the tax burden across income quintiles (see tabulation below).

For example, measuring saving as the difference between income and consumption (the residual approach) yields a more progressive distribution of saving than does measuring saving as the change in a family's net worth

^{1/} As noted above, OTA estimates that to achieve revenue neutrality, Armey's flat tax would need to be levied at a 24.9 percent rate; if the earned-income tax credit were retained, a 25.8 percent rate would be required.

Table VII-2. United States: Replace Current Individual and Corporate Income Taxes (including the EITC) with a Flat Rate Tax ^{1/}

(In billions of dollars; unless mentioned otherwise)

Family Economic Income Class 2/ (\$)	Change in After-Tax Income Under Proposal							Percentage Change In Total Federal Tax
	After-Tax Income Under Current Law	Repeal Income Tax	24.9 Percent Tax			Total Change	Percentage Change	
			on Wages Over Standard Deduction 3/	on Employer Fringes	on Business Cash Flow			
0-10	79.3	-1.2	-0.1	-0.9	-0.9	-3.1	-3.9	48.1
10-20	249.4	-1.6	-2.1	-2.8	-4.2	-10.6	-4.3	41.1
20-30	342.6	13.7	-10.9	-5.1	-7.1	-9.5	-2.8	17.3
30-50	728.8	61.8	-39.1	-11.6	-17.5	-6.4	-0.9	4.2
50-75	865.4	92.4	-68.0	-13.3	-20.5	-9.4	-1.1	4.6
75-100	680.2	86.5	-73.3	-9.6	-18.0	-14.4	-2.1	8.2
100-200	902.5	148.8	-110.9	-9.0	-40.8	-11.9	-1.3	4.9
200 & over	906.8	240.1	-86.3	-2.1	-86.1	65.6	7.2	-23.9
<u>Total</u>	<u>4,711.2</u>	<u>641.1</u>	<u>-391.7</u>	<u>-54.4</u>	<u>-195.0</u>	<u>--</u>	<u>--</u>	<u>--</u>

Source: Department of the Treasury, Office of Tax Analysis.

^{1/} Assumes a revenue-neutral rate of 24.9 percent on the basis of 1994 incomes.

^{2/} Family Economic Income (FEI) is a broad-based income concept. FEI is constructed by adding to adjusted gross income (AGI) unreported and under-reported income; IRA and Keogh deductions; nontaxable transfer payments, such as Social Security and AFDC; employer-provided fringe benefits; inside build-up on pensions, IRAs, Keoghs, and life insurance; tax-exempt interest; and imputed rent on owner-occupied housing. Capital gains are computed on an accrual basis, adjusted for inflation to the extent that reliable data allow. Inflationary losses of lenders are subtracted and those of borrowers are added. There is also an adjustment for accelerated depreciation of noncorporate businesses. FEI is shown on a family rather than on a tax-return basis. The economic incomes of all members of a family unit are added to arrive at the family's economic income used in the distributions.

^{3/} The standard deduction is \$24,700 (joint) or \$12,350 (single) plus \$5,000 for each dependent.

would be steeper if based on residual estimates of saving (see tabulation below). Assuming that the burden of corporate income tax falls entirely on capital income would yield a more progressive distribution of income and would require more steeply graduated tax rates than assuming that half the burden falls on labor income.

The most regressive combination of assumptions (net worth estimation of saving and corporate income taxes falling in part on labor), would require tax rates ranging from 14 to 36 percent. The most progressive assumptions (residual estimation of saving and corporate taxes falling wholly on capital income) would require tax rates ranging from 16 to 55 percent.

**Revenue-Neutral and Distributionally-Neutral Tax Rates
for the Prototype Saving-Exempt Individual Income Tax ^{1/}**

(In percent)

	Current Income Tax Rate	<u>Measure of Saving Used in Estimates</u>			
		<u>Full Burden of Business Tax on Capital</u>		<u>Burden Split Between Capital and Labor ^{2/}</u>	
		<u>Residual</u>	<u>Net Worth</u>	<u>Residual</u>	<u>Net Worth</u>
First bracket	15.0	16.0	13.0	16.0	14.0
Second bracket	28.0	38.0	28.0	38.0	28.0
Third bracket	31.0	49.0	38.5	49.0	36.0
Fourth bracket	36.0	55.0	41.0	49.0	36.0
Fifth bracket ^{3/}	39.6	55.0	41.0	49.0	36.0

5. Administrative and compliance gains from tax simplification

The cost of compliance with the current income tax system, as well as the cost incurred in reducing one's tax liability, has been estimated to be as high as \$50 billion annually. ^{4/} It has been argued that an important benefit of the flat tax and the SEIT would be that they would simplify the tax code, reducing the cost of compliance and the incentives for tax evasion. ^{5/} The two reform proposals would substantially simplify the business tax system since the business tax base would be calculated on a

^{1/} Source: Congressional Budget Office.

^{2/} Assuming half of the burden falls on labor income and half on capital income.

^{3/} Taxable income in excess of \$250,000 is taxed at a 39.6 percent rate under current law.

^{4/} Domenici (1994), p.284.

^{5/} Flat tax proponents argue that their system would be so simple that it would be possible to file business or individual tax returns on a postcard.

cashflow basis, which would eliminate the need to maintain a set of accrual accounts for tax purposes.

While these proposals have the potential for simplifying the tax system, the extent of simplification would depend crucially on withstanding pressures for introducing deductions or tax credits. Moreover, while the proposed reforms would have the potential for reducing tax evasion by ensuring that different sources of income are taxed at the same rate, the elimination of tax withholding (as suggested under the flat tax) could have the opposite effect. Finally, measures to ease the transition to the new taxes would undoubtedly add to their complexity (see section below).

6. Macroeconomic efficiency issues

It is argued that a consumption-based tax would promote economic efficiency and stimulate output growth by reducing distortions and promoting increased saving and labor supply. An important channel for stimulating saving and investment would be the impact of reform on interest rates. Hall and Rabushka (1995) point out that the current tax system creates a wedge between the return on loans and the cost of borrowing. In particular, the tax on interest income of lenders reduces the after-tax interest rate below the pre-tax rate. If this distortion was removed, the effect would be to shift the supply of credit outward, reducing the pre-tax interest rate and increasing the equilibrium amount of lending and investment. It is argued that the fall in pre-tax interest rates could be substantial since lending comes from corporations and high income individuals who face marginal tax rates of 31 to 40 percent. While gauging the likely effect on interest rates is difficult, Hall has pointed to the fact that municipal bonds yield roughly one-sixth less than comparably-rated taxable bonds as suggestive of the order of magnitude that could be expected.

Other features of a consumption tax also would work to increase investment. For example, the after-tax cost of capital would decline as a result of full expensing of capital purchases, as opposed to depreciation over the life of the asset, as under the current tax system. In addition, eliminating double taxation of dividend income would increase the rate of return to equity-financed capital, which in turn would increase investment demand. Eliminating double dividend taxation should also eliminate the preference for debt over equity financing and remove any bias toward lower-risk investments that can be debt-financed, thereby enhancing the efficient allocation of capital. ^{1/}

^{1/} However, the SEIT would introduce new distortions. The large gap between business and personal income tax rates (11 percent for business income, from 19 to 40 percent for personal income) may create an incentive for tax rate arbitrage so as to avoid taxation. For example, businesses may retain earnings rather than distributing them as dividends.

The effect of a tax reform on saving, investment, and aggregate output also will depend on the responsiveness of saving to changes in the interest rate. However, there is considerable controversy regarding the interest elasticity of saving; empirical estimates vary widely, and a number of studies suggest that it is relatively low. Nonetheless, studies of the effect of moving to a consumption tax that have relied on a relatively large interest elasticity of saving provide an upper bound of the welfare and output gains that might result. These studies suggest that improvements in welfare from tax reform may be 5-6 percent, and less if the transition costs are taken into account.

Summers (1981) provides relatively strong support for tax reform. Summers determines that replacing a total capital tax of 50 percent and labor tax of 20 percent with a consumption tax designed to generate equal revenue (27.5 percent of GDP) would yield a 75 percent increase in the capital-output ratio and a 54 to 66 percent reduction in the gross interest rate. This would correspond to an increase in steady-state output of between 12 and 18 percent and a welfare gain of 6 to 17 percent (depending on parameter values). Summers cautions, however, that higher steady state consumption is obtained by lowered consumption during the transition to steady state and by increasing the tax burden of those who are elderly when the reform occurs. Summers (1989) argues that convergence to steady state is rapid and that long-term gains outweigh transition costs.

Auerbach et al. (1983), using a 55-period overlapping-generations model, demonstrate that shifting from a proportional income tax to a proportional consumption tax (at a 39.5 percent rate) would raise welfare by about 6 percent in steady state. They also find that shifting from a progressive income tax to a progressive consumption tax, as under the Nunn-Domenici proposal, would yield a 5 percent improvement in welfare and increase the capital/output ratio from 3.04 to 4.38. ^{1/}

However, they note that much of the efficiency gain is due to the transition. A large share of the tax burden is shifted toward the existing assets and inelastic consumption of the elderly, which enables a lower overall tax rate and a lesser tax burden on the young. The increase in their disposable income encourages an increase in saving and investment. The welfare of those aged over 40 at the time of the conversion to the consumption tax would fall by about 1 percent, since the consumption/income ratios of these households would be relatively high.

Boskin (1978) estimated a total interest elasticity of saving (η) between 0.3 and 0.4 using aggregate time-series data for the United States. On the basis of an estimated elasticity of interest rates with respect to the capital income tax of 0.3, Boskin estimates that eliminating capital income taxation would increase the capital/labor ratio by about 15 to 20 percent. However, these estimates suggest that a shift to consumption

^{1/} Auerbach et al. note that lump sum payments could be used to offset the transitional welfare loss to the elderly of moving to a consumption tax.

taxation would increase the saving rate by only 5 to 6 percent. For example, suppose that the initial nominal interest rate was 10 percent and the income tax rate on capital 30 percent, such that the net interest rate equalled 7 percent. Let the post-reform gross interest rate equal 8 percent (all numbers based on Hall and Rabushka (1995)). For an interest elasticity of 0.4 and an initial saving rate of 4.1 (the actual 1994 rate as a share of disposable income), the saving rate would rise only to 4.3 percent.

7. The expected effect of tax reform on labor supply

A further channel through which a conversion of the income tax system to a consumption tax could increase welfare and output is by increasing the labor supply. Hausman (1981) and Hall and Rabushka (1995) have argued that shifting to a proportional tax would enable a reduction in the tax rate on labor income, thereby increasing labor supply, expanding output and consumption. Hausman concluded that existing taxes reduced labor supply by 8 percent on average and induced deadweight loss equal to 28.7 percent of revenue; a proportional tax, he estimated, would reduce average hours worked only one-seventh as much and cause deadweight loss of 7.1 percent of revenue. Moreover, if savings raised the capital/labor ratio, higher nominal wages would increase the incentive to work.

However, if one takes into consideration that the deductibility of state and local taxes will be eliminated under the flat tax proposal, marginal tax rates may rise for many taxpayers. For a family of four, the marginal federal tax rate will equal 25.8 percent on income over \$34,700 (using Army's deductions and OTA's revenue-neutral rate estimate), versus a 28 percent marginal rate under the current tax system. Combined with a state income tax rate of up to 9 percent (for the District of Columbia), the marginal tax rate could exceed 35 percent--just under the 36 percent bracket under the current tax system and above the first three brackets (which apply to incomes under \$117,950 for single filers and \$143,600 for married couples filing jointly). ^{1/}

8. Other macroeconomic issues

The reform proposals also may affect the economy by affecting trade patterns or the magnitude of business cycles. Both the flat tax and the SEIT could have weaker automatic stabilizer properties than the current income tax system. For example, cyclical fluctuations in revenue from a pure consumption tax or the SEIT would be relatively small because consumption varies less than income. Revenues from a flat tax likely could be highly correlated with the business cycle since the flat tax's base--business cashflow plus the wage bill--would vary with the cycle. However,

^{1/} If leisure is a superior good, the labor supply curve may be backward bending and higher net-of-tax wages would reduce labor supply. Evidence suggests that this is the case: historically, increases in real wages have reduced hours.

since business cashflow is defined using the fully expensed value of investment purchases, which also would be likely to decline in economic downturns, the cycle's effect on flat tax revenues is uncertain.

Although advocates of the SEIT argue that shifting to a VAT-equivalent, refundable tax will promote exports and reduce imports, this result depends on several assumptions. First, it assumes that corporate income taxes are passed on to export prices and that exporters will reduce prices if the tax on exports falls. Some evidence suggests that additional taxes are reflected in higher prices, but that tax cuts do not result in price cuts; in this case, shifting to a VAT will make imports more expensive, but will not make U.S. exports more competitive abroad. Moreover, a company producing both for export and domestic sale could possibly pass the corporate income tax burden entirely onto domestic sales in order to ensure export competitiveness.

If a shift to a VAT did raise exports and reduce imports, currency appreciation could result, offsetting any impact on the trade balance. Finally, the general equilibrium effects must be considered. If shifting to a VAT did shift the tax burden from exports to domestic sources of income, real incomes may fall, resulting in lower saving; wage increases would likely follow this reduction in real income, and the resulting increase in prices could offset the fall in export prices. ^{1/}

Treatment of foreign production and imports requires further attention under the flat tax proposal. The proposed flat tax would apply only to domestically located business operations, with no border adjustment for imports or exports. This rule would create an incentive for firms to avoid taxation by moving their operations overseas, thereby eliminating jobs and narrowing the tax base. If a corporation moved its production site to a country with a border-adjustable VAT, rather than a corporate income tax, the firm would pay no tax on its production for the U.S. market; if it produced in the United States, it would be taxed on its profits at the flat rate.

9. Transition issues

The introduction of a flat tax or SEIT would introduce a number of transition issues. One problem would be the treatment of existing assets, which had been purchased on the assumption of depreciation allowances (in the case of business assets) or mortgage interest deductibility (in the case of residential assets). An option would be to retain the tax preferences on existing assets, but this would add to the complexity of the tax system, and could create opportunities for evasion. An alternative would be to allow taxpayers to fully expense existing assets at the time of the tax reform. Hall (1995) estimates that to offset the revenue losses from allowing taxpayers to expense all unused depreciation allowances in a single year would require a 1.1 percent increase in the flat tax rate in that year.

^{1/} See Tait (1991) for a discussion.

The effect of eliminating the deductibility of mortgage interest would likely be to reduce the price of pre-existing homes. While pre-tax interest rates would likely fall, the net effect would also likely be to raise the overall cost of home ownership. Options for the treatment of existing mortgages include allowing partial deduction of existing mortgage interest and requiring that lenders continue to pay taxes on interest income, or to require lenders and borrowers to refinance mortgages and immediately treat the interest according to the new tax law. Note that home ownership would still be favorably treated under either a flat tax or SEIT, as neither would tax the imputed income stream from owner-occupied housing.

An important transitional issue for both the flat tax and the SEIT would be their effect on the lifetime tax burden on the elderly. This segment of the population would be affected adversely since their assets were accumulated using after tax income. Upon the introduction of the consumption tax, the value of these assets would likely fall (for the reasons discussed above). In addition, the future consumption that these assets were intended to finance would now be taxed.

To avoid taxing the principal of existing assets twice (it was previously taxed as earned income), Senator Domenici has proposed two approaches to reducing the burden on existing assets. One would be to value all assets at the time the reform went into effect, then allow individuals to exclude this date-of-enactment value from tax when the assets are sold. Alternatively, individuals could be allowed to deduct this date-of-enactment value from their taxes over the first few years following reform. Either proposal, however, would result in revenue loss, requiring higher tax rates and thereby reducing some of the additional saving the reform is intended to generate.

References

- Auerbach, Alan J., Lawrence H. Kotlikoff, and Jonathan Skinner, "The Efficiency Gains from Dynamic Tax Reform," International Economic Review, Vol. 24, No. 1 (1983), pp. 81-100.
- Bartolini, Leonardo, Assaf Razin, and Steve Symansky, "G-7 Fiscal Restructuring in the 1990s: Macroeconomic Effects," Economic Policy, 20 (1995, forthcoming).
- Blanchard, Olivier J., and Stanley Fischer, Lectures on Macroeconomics (Cambridge, Massachusetts: MIT Press, 1989).
- Boskin, Michael J., "Taxation, Saving, and the Rate of Interest," Journal of Political Economy, Vol. 86, No. 2 (1978), pp. S3-S27.
- Bosworth, Barry, Gary Burtless, and John Sabelhaus, "The Decline in Saving: Evidence from Household Surveys," Brookings Papers on Economic Activity (1991:1).
- Bradford, David H., "What are Consumption Taxes and Who Pays Them?" Tax Notes (April 18, 1988), pp. 383-391.
- Congressional Budget Office, Reducing the Deficit: Spending and Revenue Options (Washington: Government Printing Office, 1994).
- Davies, James, France St. Hilaire, and John Whalley, "Some Calculations of Lifetime Tax Incidence," American Economic Review, Vol. 74, No. 4 (1984), pp. 633-649.
- Domenici, Pete V., "The Unamerican Spirit of the Federal Income Tax," Harvard Journal on Legislation, Vol. 31 (1994), pp. 273-320.
- Eisner, Robert., "The Proposed Sales and Wages Tax: Fair, Flat or Foolish?" AEI conference paper: "The Flat Tax: An Alternative to the Current Income Tax" (January 27, 1995).
- Garrett, Beth, and Mark Weinberger, "A National Consumption Tax: Why, What and When." (mimeographed, Offices of Senators Boren and Danforth, 1994).
- Hakken, Jon, and Frank Sammartino, "Estimates for a Prototype Saving-Exempt Income Tax," (memorandum, Congressional Budget Office, March 1994).
- Hall, Robert E., and Alvin Rabushka, "The Flat Tax in 1995," (AEI conference paper: "The Flat Tax: An Alternative to the Current Income Tax," January 27, 1995).
- _____, The Flat Tax (Stanford: The Hoover Institution Press, 1985).

Hausman, Jerry A., "Labor Supply" in eds. Henry J. Aaron and Joseph A. Pechman, How Taxes Affect Economic Behavior (Washington: Brookings Institution, 1981).

Joint Committee on Taxation, Discussion of Issues Relating to "Flat" Tax Rate Proposals (April 3, 1995).

_____, Methodology and Issue in Measuring Changes in the Distribution of Tax Burdens (June 14, 1993).

Nunn, Samuel, Congressional testimony, January 10, 1995 as cited in Congressional Record, Vol. 141, No. 16.

Office of Tax Analysis, U.S. Department of the Treasury. "An Analysis of A Flat Rate Consumption Tax." (mimeographed, 1994).

Poterba, James M., "Lifetime Incidence and the Distributional Burden of Excise Taxes," American Economic Association Papers and Proceedings (1989), pp. 325-330.

Ramsey, Frank P., "A Mathematical Theory of Saving," Economic Journal 38, No. 152 (1928), 543-559. (Reprinted in Stiglitz, Joseph E., and Hirofumi Uzawa, eds. Readings in the Modern Theory of Economic Growth (Cambridge, Massachusetts: MIT Press, 1969).

Specter, Arlen, Congressional testimony, March 2, 1995 as cited in Congressional Record, Vol. 141, No. 39.

Summers, Lawrence H., "Capital Taxation and Accumulation in a Life-Cycle Growth Model," American Economic Review, Vol 4, No. 4. (1981), pp. 533-544.

_____, "Tax Policy and a Life Cycle Model." National Bureau of Economic Research Working Paper No. 302 (1989).

Tait, Alan A., ed. Value-Added Tax: Administrative and Policy Issues (Washington: International Monetary Fund, 1991).

_____. Value-Added Tax: International Practice and Problems (Washington: International Monetary Fund, 1988).

Weidenbaum, Murray, "The Saving-Exempt Income Tax (and the Companion Business Cash-Flow Tax)," Center for the Study of American Business, Policy Study No. 122 (July 1994).

VIII. Tax-Assisted Saving in the United States:
A Review and Assessment 1/

In the first half of the 1990s, U.S. gross national saving as a share of GDP averaged just under 12 percent, roughly 4 percentage points below the average level in the 1960s and 1970s. While most of the decline was the result of the deterioration in the federal fiscal position, an important factor was a drop in the personal saving rate. The personal saving rate fell during the 1980s from a peak of nearly 9 percent in 1981 to an average of about 4 1/2 percent in the first half of the 1990s, well below the average of the previous three decades (Chart VIII-1).

The deterioration of the personal saving rate during the 1980s coincided with a number of important changes to the U.S. tax treatment of retirement saving. Most notably, the 1986 tax reform sharply limited the tax deduction for contributions to Individual Retirement Accounts (IRAs), giving rise to concerns that these changes in tax legislation contributed to the weakness in personal saving. Partly in response to these concerns, a number of recent proposals have been made to increase the generosity of tax preferences for retirement saving as a way of boosting the saving rate.

This paper reviews the current and proposed tax treatment of retirement saving in the United States (Sections 1 and 2) and discusses the likely effect of tax preferences on household saving decisions, with reference to a number of recent studies of the issue (Sections 3 and 4). Finally, the hypothesis that U.S. saving incentives have affected recent saving behavior is tested using household survey data (Section 5).

1. U.S. tax assistance for saving

Tax preferences for retirement savings are principally offered through 401(k) plans and Individual Retirement Accounts. 401(k) plans are employer-sponsored retirement saving vehicles, permitted by the Revenue Act of 1978. Contributions to 401(k) plans can be deducted from taxable income and the return on contributions accrue on a tax-deferred basis. The limit on employee contributions was reduced from \$30,000 to \$7,000 as part of the Tax Reform Act of 1986 (the limit was indexed to inflation and reached \$9,240 in 1994). 2/ The features of 401(k) plans depend on the employer; often employers will "match" a percentage of employee contributions, and in some cases individuals may use 401(k) assets as collateral for consumer and other

1/ Prepared by Alun Thomas and Christopher Towe. The assistance of Arthur Kennickell of the Board of Governors of the Federal Reserve in providing the data set is gratefully acknowledged.

2/ The sum of employee and employer contributions to 401(k) and other defined contribution plans cannot exceed the lesser of 25 percent of salary or \$30,000. Tax rules increase the stringency of these limits for high-income individuals.

loans. 1/ Income tax is payable on amounts withdrawn; generally a 10 percent penalty also is assessed for withdrawals prior to age 59 1/2 (this penalty can be waived in the event of financial hardship).

Contributions to IRAs also are tax deductible, and income and interest earned on contributions are tax deferred. There are relatively few restrictions on IRA-eligible investments, which can include bank accounts, stocks, or bonds. The amount of contributions that can be deducted from taxable income is limited to \$2,000 (or total earnings, whichever is less). This limit is gradually reduced from \$2,000 to zero over the \$40,000 to \$50,000 income range for married individuals (\$25,000 to \$35,000 for unmarried individuals) who are covered by an employer pension plan. 2/ Taxes are payable upon withdrawal; withdrawals before age 59 1/2 are subject to an additional 10 percent penalty; funds must begin to be withdrawn at age 70 1/2. Individuals not eligible for the income tax deduction may still make contributions to an IRA and defer the tax payable on income earned on contributions. Individuals may finance their contributions to an IRA by borrowing and deduct the interest payments from ordinary income. Generally, only physical assets are IRA-ineligible.

Keogh plans and simplified employee plans (SEPs) are similar to IRAs except that they apply to self-employed individuals and have higher contribution limits.

Chart VIII-2 shows the recent evolution of IRA, 401(k), and Keogh contributions. IRA contributions increased sharply following the introduction of universal eligibility in 1982, rising from \$3 billion in 1980 to \$38 billion in 1985. However, with the Tax Reform Act of 1986, which eliminated the deductibility for higher income individuals, contributions declined to \$9 billion in 1991. By contrast, contributions to 401(k) plans have steadily increased, and appear not to have been affected by the Tax Reform Act of 1986.

2. Recent proposals for enhanced saving incentives

FY 1996 budget proposals by the Administration and the Congress contained a number of measures designed to promote private saving. The Administration called for: (i) a doubling of the income limit for the IRA deduction from \$40,000 to \$80,000 for families and \$50,000 for individuals; (ii) the indexation of the \$2,000 IRA deduction limit for inflation; (iii) penalty-free withdrawals from IRAs to fund post-secondary education, the purchase of a first home, unemployment relief, care of an elderly parent

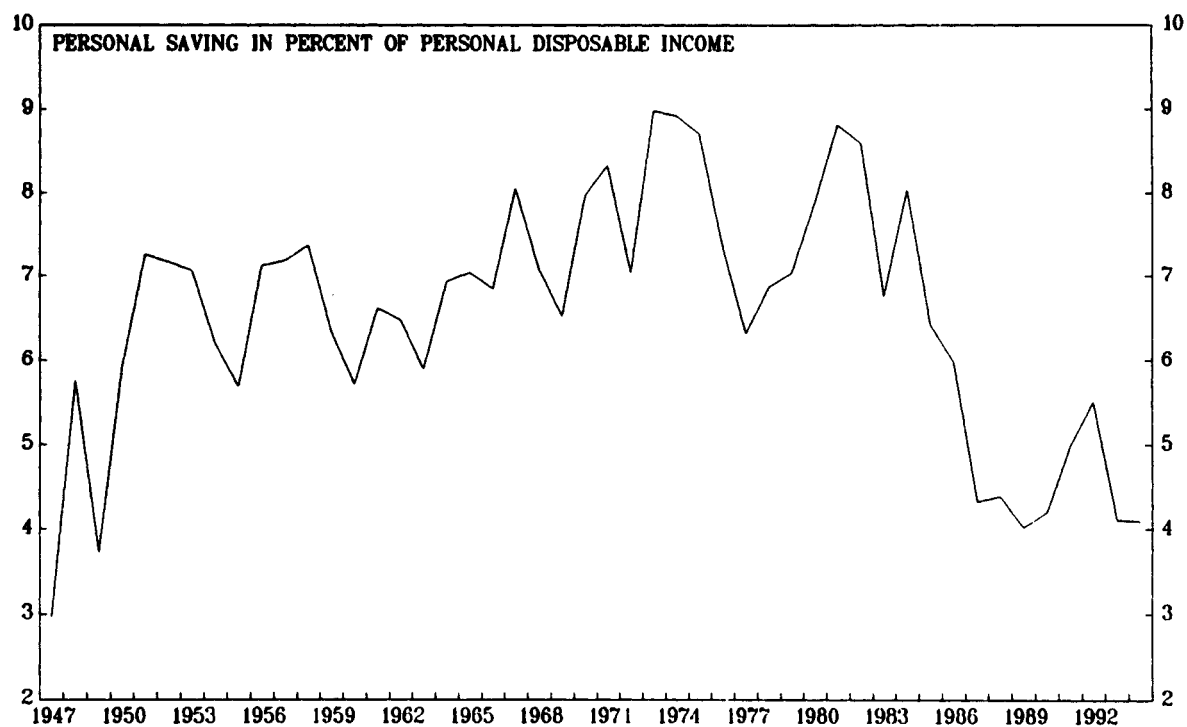
1/ 1991 survey data reported by the U.S. Department of Labor suggests that firms on average matched about 43 percent of employee contributions.

2/ IRAs were first introduced in 1974 (with a limit of \$1,500 or 15 percent of income) for employees without employer-sponsored pension plans. The Economic Recovery Act of 1981 removed restrictions on access to IRAs and raised the contribution limit to \$2,000. The current restrictions on IRA contributions were introduced in 1986.

- 100a -

CHART VIII-1

UNITED STATES
PRIVATE SAVING
(In percent)



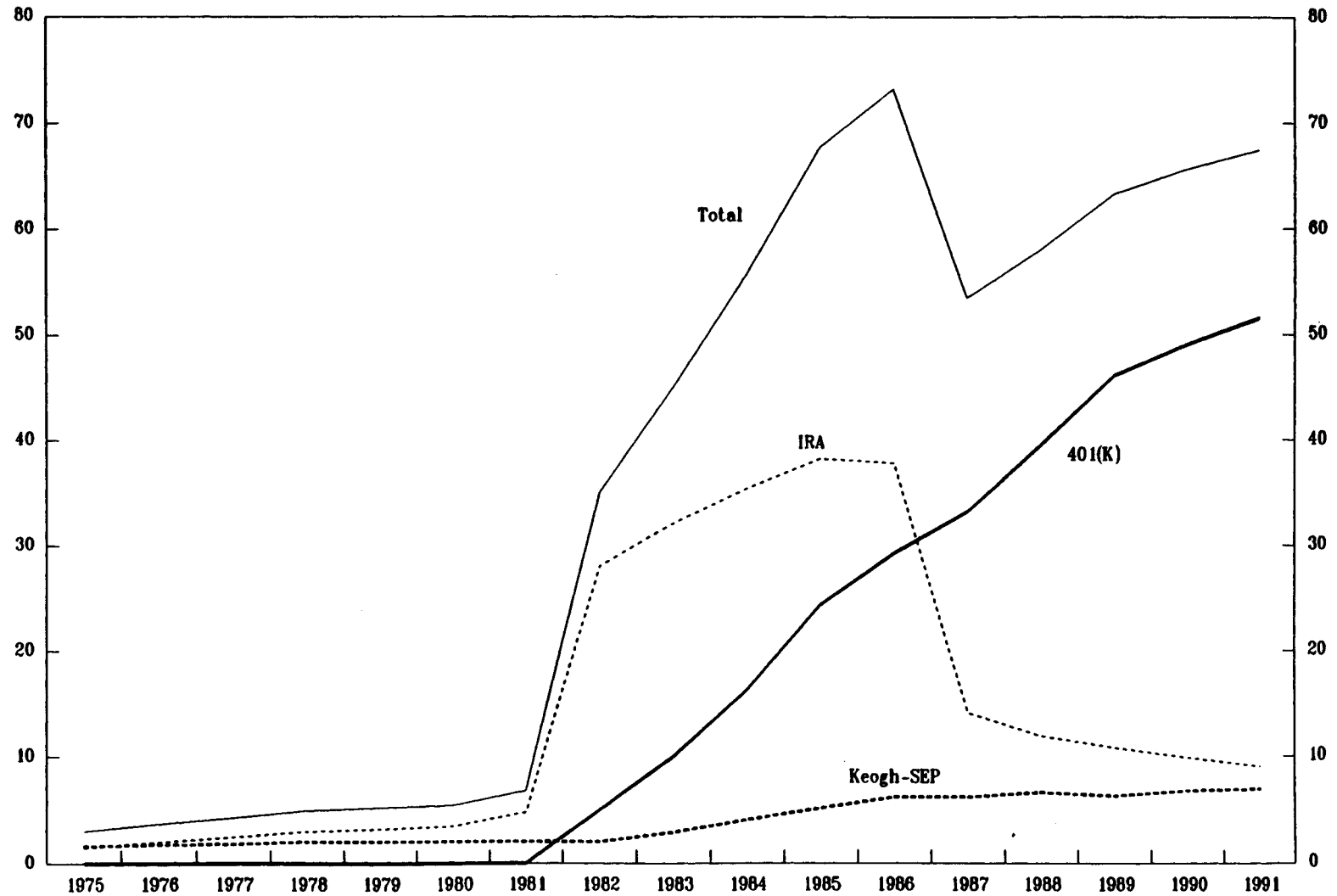
Source: Bureau of Economic Analysis, U.S. Department of Commerce, supplied by Haver Analytics.

CHART VIII-2

UNITED STATES

CONTRIBUTION TO TAX-ASSISTED SAVING PLANS

(Billions of dollars)



Sources: U.S. Internal Revenue Service; and U.S. Pension and Welfare Benefits Administration.

or grandparent, or medical expenses in excess of 7 1/2 percent of adjusted gross income; and (iv) the introduction of a "Special IRA". Contributions to the Special IRA would not be tax deductible at the time they were made, but would accrue income on a tax-free basis and could be withdrawn tax free after five years.

Similarly, the tax measures in the Congress' FY 1996 budget included the establishment of an American Dream Savings Account. These would permit annual nondeductible contributions of up to \$4,000 for a married couple (\$2,000 for an individual). The limit would be indexed for inflation, and contributions would earn income tax free. Distributions from the Accounts also would not be subject to income tax if made after five years or after the taxpayer had reached 59 1/2 years of age. In addition, tax-free withdrawals could be made to finance first-time home purchases, post-secondary education, medical expenses, and long-term care.

3. A simple analysis of saving incentives

The return to tax-assisted saving plans as compared to other taxable saving vehicles can be illustrated as follows. ^{1/} Assuming a constant nominal interest rate r , and a constant marginal tax rate τ , the value A at the end of T periods of one dollar of pretax income saved through a taxable saving vehicle is:

$$A = (1-\tau)e^{r(1-\tau)T}$$

Alternatively, the value of the pretax dollar invested in an IRA or 401(k) for households who can take advantage of the tax-deductible contribution is (assuming that the before-tax rates of return on taxable and IRA assets are the same, and that the tax rate on all forms of income are the same):

$$A_{IRA} = (1-\tau)e^{rT}$$

On an after-tax basis, the IRA accumulates income at the rate r while the taxable saving vehicle accumulates income at the rate $r(1-\tau)$.

It is important to note that the future value of the IRA investment is not affected by when the deduction is taken. For instance, if instead the taxpayer was unable to deduct the initial dollar invested but was not required to pay tax on the final value of the investment, the after-tax dollars withdrawn would be the same. Another factor that affects the analysis is the taxpayer's pre- and post-retirement tax rates. The assumption above is that the tax rate is the same. However, if post-retirement income is lower, the tax rate paid on IRA withdrawals likely will be lower than at pre-retirement. This would increase the relative return on IRAs.

^{1/} This presentation is based on Poterba et al (1993).

Finally, consider a nondeductible IRA (which would be essentially the same as the Administration's Special IRA and the Congress' American Dream Saving Account). In this case the taxpayer would invest only $(1-\tau)$ but would be able to invest it at the pretax rate of r . Upon withdrawal, tax would be payable on the interest earned on the investment (but not on the initial amount deposited). Thus the future value of a dollar saved would be:

$$A_{IRA'} = (1-\tau)e^{rT} - \tau[(1-\tau)e^{rT} - (1-\tau)] \\ = (1-\tau)[(1-\tau)e^{rT} + \tau]$$

For example, suppose that $\tau=0.3$ and $r=0.03$. Assuming that the individual invests the dollar for 20 and 40 years, alternatively, the value of one dollar invested in the alternative saving vehicles would be:

Future Value of Saving

<u>\$1 invested in:</u>	<u>For 20 Years</u>	<u>For 40 Years</u>
Taxable saving instrument (A)	\$1.07	\$1.62
IRA (A_{IRA})	\$1.27	\$2.32
Nondeductible IRA ($A_{IRA'}$)	\$1.10	\$1.84

The tabulation illustrates that the tax deductibility of saving (whether frontloaded or backloaded) strongly affects the return on saving. For example, over 20 years the return on the deductible IRA is roughly three times that for the nondeductible IRA. It also demonstrates that the return of the nondeductible IRA improves relative to the deductible IRA as the investment horizon lengthens. In other words, for shorter investment horizons, the existence of the initial tax deduction is relatively important. However, for longer horizons, the importance of the initial deduction begins to wane and the ability to invest at a tax-free rate of return increases. This suggests that younger savers would be more likely to contribute to IRAs in excess of \$2,000 (i.e., without deducting the full contribution) than older savers.

4. The effect of tax incentives on saving

While tax preferences can have a substantial effect on the return to saving, there is considerable controversy regarding the responsiveness of total saving to changes in the after tax rate of return. Consumption theory suggests that the effect is ambiguous because of the offsetting income and substitution effects. For example, increasing the return to saving works toward causing individuals to substitute saving for consumption. However, the effect on saving is offset by the fact that an increase in the rate of return increases the present value of individuals' current saving, which increases wealth and encourages an increase in consumption. This ambiguity has been reflected in much of the empirical literature on saving behavior,

in which the elasticity of saving to the after tax rate of return is often found to be small. 1/

The question of whether saving incentives raise private saving rests on whether individuals substitute other forms of saving or reduce consumption to finance contributions into tax-deferred plans. Research using macroeconomic data has generated mixed results. Carroll and Summers (1987) find that the substantial rise in the saving rate differential between Canada and the United States in the mid-1970s was the result of the liberalization of Canada's tax-deferred savings plan. Skinner and Feenberg (1990) question the effectiveness of IRAs in promoting saving, noting that their importance depends on the definition of saving that is used. 2/

Studies using microeconomic data also have produced conflicting results. Venti and Wise (1993) find that most households finance IRA contribution through a reduction in consumption, suggesting that IRAs promote total saving. 3/ Poterba, Venti, and Wise (1993) also present evidence suggesting that tax preferences have promoted private saving. Using data from the Survey of Income and Program Participation (SIPP), they find that total assets of 401(k)-eligible individuals were significantly higher than the assets of those who were not eligible, while non-IRA and non-401(k) assets were comparable across the two groups. They also found that after 1986, IRA contribution rates fell across all income groups and the decline in the IRA contribution rate was largely independent of 401(k) eligibility. Feenberg and Skinner (1989) find, using the IRS-Michigan tax panel, that IRA contributors increased their taxable financial assets by more than noncontributors over the period 1980-84. They conclude that IRAs have promoted an increase in personal saving.

Other authors have used the same data sets to argue that tax assistance for saving has had a limited effect on the size of aggregate saving. Gale and Scholz (1994) estimate a life-cycle model of saving using data from the Survey of Consumer Finances (SCF), and present simulation results that suggest that only 2 percent of an increase in the IRA contribution limit would result in an increase in total saving. The authors suggest that the weak response of private saving to IRA contribution limits results from the fact that most contributors are relatively wealthy and already have

1/ For example, in SM/94/223 (pp. 77-88) the (semi) interest elasticity of personal and corporate saving is estimated to be only 0.02--i.e., a 1 percentage point increase in the rate of interest would result in a 0.02 percent increase in aggregate private saving (national accounts definition). See also Friend and Hasbrouck (1983) for a discussion of the empirical behavior of saving.

2/ For example, if saving is defined to include purchases of durable goods.

3/ These results have been criticized for adopting a functional form that is not consistent with any underlying utility function and does not allow individual attributes such as age and asset holdings to have first-order effects on saving.

contributed the maximum amount to their IRAs. Burman, Cordes, and Ozanne (1990) report similar findings from the IRS-Michigan Tax Panel. Engen, Gale, and Scholz (1995) examine the effect of IRAs and 401(k) plans using data from the SIPP. They compare two groups: participants in 401(k) plans, and nonparticipants in 401(k) plans but who have IRAs. While they find that saving by 401(k) participants is somewhat higher, they conclude that the increase in private saving would be only slightly larger than the decline in public saving that the tax assistance causes.

Attanasio and Deleire (1994) examine the possibility that saving behavior differs for those households that just opened an IRA with those that already had IRA accounts. They find that IRA contributions are primarily funded through a reduction in the stock of other assets and that less than 20 percent of IRA contributions represent an addition to national saving. Papke, Petersen, and Poterba (1993) survey pension plan administrators, and conclude that 401(k)s tended to replace other pension saving plans.

5. Further evidence from household survey data

The issue of whether tax preferences affect saving behavior is examined below using data from the 1983 and 1989 Survey of Consumer Finances (SCF), which provides detailed information on assets, liabilities, and demographic characteristics of U.S. families. The approach adopted in this paper is different from those the studies cited above for two main reasons. First, the analysis below focuses on the panel component of the SCF--in other words, the same individuals are sampled in the 1983 and 1989 data. This avoids the problems of heterogeneity in comparing different cross-sections over time. ^{1/} Second, a proxy for the relative after-tax rate of return on tax-assisted saving plans is included in the empirical analysis below in order to directly test the effect of tax assistance for retirement saving.

The tabulation below illustrates some of the characteristics of the data set. For example, the IRA deduction limit appears not to have been a major factor in determining contributions. For example, over one third of those holding IRAs contributed \$2,000 or more--the maximum deductible amount. Moreover, the average of positive IRA contributions was over \$13,000 and roughly 60 percent of those who made positive contributions had incomes in excess of \$50,000--i.e., they could not deduct contribu-

^{1/} The SCF survey was conducted every three years from 1983 to 1992. Beginning in 1989 a cross-section survey was added to the panel survey that was conducted in 1983, 1986, and 1989. The survey is based on a dual-frame design. An area-probability sample is carried out to provide adequate population coverage of assets and liabilities and is supplemented with a list of names from the Income Division of the Internal Revenue Service to improve the precision of estimates of assets and liabilities held more narrowly by wealthy households.

tions. 1/ The number of IRA account holders rose from 502 to 635 over the 1983-89 period. The average net retirement from IRAs was just under \$14,000, slightly larger than the average contribution. A smaller number of survey respondents participated in 401(k) plans. Interestingly, though, the proportion of contributors to withdrawers was roughly the same as for IRAs, and the relative size of withdrawals and contributions also was roughly the same.

**Characteristics of Contributors to IRAs
and to Other Tax-Assisted Saving Plans 2/**

	<u>IRAs</u>	<u>Other Tax-Assisted Saving Plans</u>
<u>Total sample</u>	<u>1,445</u>	<u>1,445</u>
Number of positive balances	635	297
Of which: Contributing \geq \$2,000	246	...
Income > \$50,000	188	...
Income > \$100,000	136	...
Number of positive contributions	512	301
(Average contribution)	\$13,286	\$4,493
Of which: Income > \$50,000	309	...
Number of negative contributions	179	165
(Average withdrawal)	\$13,934	\$4,455
Of which: Income > \$50,000	113	...

a. An analysis of tax-assisted saving

In this section two hypotheses are examined: (i) whether the tax treatment of pension saving affects the distribution of saving between tax-assisted and other assets and (ii) whether the tax treatment of pension saving affects the total amount of saving. The methodology is to estimate equations explaining saving as function of variables usually thought to affect private saving behavior, and to test whether a proxy for the tax advantage of IRAs and 401(k)s is a significant determinant of saving behavior.

1/ The average contributions were estimated by comparing asset stocks in 1983 and 1989 and subtracting an estimate of net investment income, so the figures are subject to a degree of uncertainty.

2/ Data for 1981 except for contribution data, which are based on estimates of average contributions during the 1983-89 period.

The variables included in the saving equations are those suggested by standard life-cycle models of consumption and saving. In particular, the saving demand equation for asset i is specified as follows:

$$s^i = S^i(\text{age}, \text{age}^2, \text{wealth}, \text{income}, r, \text{dummy variables})$$

It would be expected that households' willingness to save initially rises with age in order to build assets sufficient to fund post-retirement consumption. Similarly, saving would be expected to decline following retirement, and possibly turn negative, as households fund consumption with a lower level of income. In order to account for this possibility, age is included in the regression equations as a quadratic. Similarly, standard life-cycle considerations would suggest that increases in income and wealth would tend to increase saving.

However, it is less clear how the choice between tax-assisted and other forms of saving would be affected by changes in these variables. For example, the discussion in the previous section suggested that the advantage of being able to defer taxes increases with time. Therefore, it might be expected that the young would be more interested in utilizing tax-assisted saving vehicles. Conversely, however, the young might be more concerned about the penalties associated with withdrawing funds from IRAs and 401(k)s. Similarly, while an increase in income and wealth would tend to increase total saving, the effect on the distribution between saving vehicles is not clear. 1/ One possibility is that higher income households would be less concerned about maintaining saving in relatively liquid assets, and so would be more inclined to take advantage of IRAs and 401(k)s.

The variable r measures the household's marginal tax rate. The marginal tax rate is assumed to serve as a proxy for the relative yield of tax-assisted pension saving versus saving in other instruments on the assumption that their before-tax rates of return are equal. This variable was constructed by calculating an estimate of taxable income (by subtracting personal deductions and interest payments from household income) and then using the 1989 and 1983 tax tables to infer the appropriate tax rate (see the Appendix for details). 2/

A number of dummy variables also were included. A dummy variable was included for households whose income exceeded \$50,000 and that participated in an employee retirement plan. This was intended to account for the fact

1/ Note that in this case wealth is defined as the sum of net financial assets (including housing equity) and so is not intended to serve as a proxy for permanent income.

2/ The tax rate was calculated using the individual income tax formulas for 1983 and 1989, and assumed that the household takes advantage of mortgage interest, other interest, dependency and standard deductions; deductions for state and local taxes, moving expenses, and unreimbursed employee expenses were ignored, as were the effect of state and local income taxes.

that households with income in excess of this amount are unable to utilize the IRA deduction. Since the tax advantage of contributions to IRAs is less for these higher income households (holding the marginal tax rate constant), the dummy variable would be expected to affect saving in IRAs and 401(k)s negatively.

Dummy variables for the number of persons in the household and the number of children not at home were included to serve as a proxy for educational and other household expenses. A dummy variable measuring the level of educational attainment proxied for the degree of financial sophistication. Finally, a dummy variable for participation in a defined benefit pension plan also was included; households with a defined benefit plan could be expected to be less concerned with taking advantage of other forms of pension saving.

Table VIII-1 contains the results of an OLS regressions explaining the level of tax-assisted pension saving--IRAs and 401(k)s--and saving in the form of liquid assets. 1/ Two sets of results are reported. In the first set the full sample was used, in the second set individuals with nonpension savings or dissavings of more than \$100,000 were excluded to control for the fact that the survey oversamples high income individuals (this is the approach taken by Gale and Scholz (1994)).

The results indicate that both pension saving and saving in the form of liquid assets tend to rise with wealth. However, only pension saving appeared to be a positive function of income; liquid asset accumulation was not significantly related to income. The coefficients for the age variables were significantly different from zero in only the unrestricted pension saving equation. In all cases, however, the point estimates of the coefficients accorded with the expected life cycle profile. Saving tends to increase until late middle-age, and then tends to fall. For example, in the unrestricted equations saving rises with age until age 54 for pension assets and age 61 for liquid assets. 2/ In the restricted equations--i.e., excluding wealthy households--the estimated age at which saving was maximized was later: age 61 for tax-assisted saving and age 75 for liquid

1/ Liquid assets are defined as the sum of checking and saving account assets, mutual funds, stocks, bonds and the cash value of life insurance minus loans and credit card debt. The survey only provides data on asset stocks and therefore it is necessary to impute saving flows by making some assumptions about average contributions. This paper follows the approach adopted by Gale and Scholz (1994) and assumes that both contributions and withdrawals are assumed to be equal in each year. See the Appendix for details.

2/ To see this note that the effect of age in the unrestricted tax-assisted saving equation is $3,362 \text{ age} - 31 \text{ age}^2$ (i.e., using the estimated coefficients). Thus, the effect of age is maximized when $\text{age} = 3,362/2(31) = 54$.

Table VIII-1. United States: Saving Equations 1/

Independent Variable	Dependent Variable			
	Tax-Assisted Saving		Saving of Liquid Assets	
	(1)	(2)	(3)	(4)
Wealth	3.96 (4.01)	8.24 (6.34)	27.50 (9.55)	2.50 (4.19)
Income	7.19 (2.28)	7.94 (2.08)	-11.65 (1.03)	-0.84 (0.49)
Age	3,362.50 (2.27)	1,426.87 (1.27)	5,140.22 (1.48)	-232.89 (0.76)
Age squared	-31.08 (2.32)	-11.72 (1.13)	-42.15 (1.41)	1.55 (0.59)
Net equity	-6.95 (1.35)	-6.54 (1.11)	-77.39 (3.98)	-6.30 (2.45)
Children not at home	-890.68 (0.57)	-1,583.27 (1.26)	-17,523.80 (3.28)	-143.48 (0.26)
Marginal tax rate	6.56 (0.12)	-284.98 (1.01)	-1,199.54 (1.01)	20.06 (0.19)
Income threshold dummy	13,527.10 (1.77)	17,077.48 (3.11)	32,265.10 (1.27)	2,148.86 (0.94)
Pension dummy	1,776.28 (0.27)	6,411.89 (1.37)	12,914.20 (0.67)	535.75 (0.32)
R ²	0.07	0.14	0.09	0.02
Obs	815	729	1,162	1,066

1/ T-statistics in parentheses; constant term is not reported. The wealth and income variables were defined in thousands of dollars, and the marginal tax rate was defined as a percentage. Columns 1 and 2 exclude households without IRA and 401(k) assets. Columns 2 and 4 are equations that exclude households whose estimated liquid asset accumulation or decumulation was greater than \$100,000.

assets. The number of children away from home was negatively related to liquid asset saving in the unrestricted equation, possibly indicating the effect of post-secondary education expenses on saving.

The results did not appear to suggest that tax considerations had a significant effect on saving behavior; the coefficients on the proxies for the tax advantage of IRAs and 401(k)s were generally insignificantly different from zero. ^{1/} The one exception was the coefficient for the income threshold dummy in the equations for tax-assisted pension saving. This coefficient was large and positive, indicating that high income households tended to increase their IRA and 401(k) contributions. The positive effect of the threshold dummy was unexpected. Since households above the threshold would not be able to take advantage of the IRA deduction, they would be expected to save less in the form of tax-assisted saving vehicles.

Similar regressions were estimated using the saving rate as a dependent variable; the results are presented in Table VIII-2. In this case, the sample was restricted to those with positive IRA and 401(k) balances, so as to avoid biasing the results toward rejecting the hypothesis that tax considerations were important. The results were similar to those reported in Table VIII-1, in that wealth and income (entered in logs) were significant determinants of the saving rates, while the age variables appeared to be significant only in the case of the tax-assisted saving rate. The log of wealth entered positively in the equation for the tax-assisted saving rate and negatively in the equation for the liquid-asset saving rate, and the estimated coefficients were almost exactly offsetting. This suggested that as wealth increases, savers substitute tax-assisted saving for other forms of saving, suggesting perhaps that households with higher wealth are less concerned with the illiquidity of tax-assisted saving vehicles.

Conversely, the estimated equations suggested that the tax-assisted saving rate declined with an increase in income, while the liquid asset rate rose with income. The fact that the sum of the coefficients was greater than zero accorded with the prior belief that high-income households tend to save a higher proportion of income. However, it was not clear why the tax-assisted saving rate would be negatively related to income, unless the proxies for the tax advantage--the marginal tax rate and the threshold dummy--were misspecified. This conjecture was refuted by the fact that neither the marginal tax rate nor the threshold dummy were significant determinants of the saving rate.

An important drawback to the above analysis is that tax variables--the marginal tax rate and the threshold dummy--may not accurately describe the relative return on IRAs and 401(k)s. In order to address this issue, an

^{1/} While the possibility of collinearity between the income variable and the marginal tax rate was a concern, the correlation between these two variables was found to be relatively low (0.21).

Table VIII-2. United States: Saving Rate Equations ^{1/}

Independent Variable	Dependent Variable		
	Tax-Assisted Saving	Saving of Liquid Assets	
Log of wealth	0.068 (4.12)	-0.094 (2.19)	-0.024 (0.62)
Log of income	-0.059 (2.87)	0.169 (3.17)	0.121 (2.68)
Age	0.017 (1.69)	-0.009 (0.34)	0.008 (0.35)
Age squared	-0.00017 (1.91)	-- (0.63)	-- (0.14)
Log of net equity	-0.010 (1.92)	-0.005 (0.37)	-0.016 (1.27)
Children not at home	-0.019 (1.78)	-0.013 (0.49)	-0.030 (1.21)
Marginal tax rate	0.164 (0.56)	0.454 (0.60)	-- (--)
Income threshold dummy	0.002 (0.03)	-0.069 (0.51)	-- (--)
Pension dummy	0.082 (1.82)	0.273 (2.35)	0.321 (4.10)
Tax-assisted saving rate	-- (--)	-- (--)	-1.016 (11.97)
R ²	0.04	0.03	0.18
Obs	800	800	800

^{1/} T-statistics in parentheses; constant term is not reported.

alternate specification of the saving rate equations was considered. In particular, the hypothesis that tax-assisted saving acted as a substitute for other forms of saving was tested directly by estimating the following equation:

$$S^{lqa} = g^{lqa}(\text{age}, \text{age}^2, \text{wealth}, \text{income}, S^{taa}, \text{dummy variables})$$

In this case, the saving rate for liquid assets (S^{lqa}) is a function of age, income and wealth. However, it is also assumed to be a function of the saving rate for tax-assisted assets (S^{taa}) rather than the proxies for the relative return on those assets. In this way, the effect of changes in the relative return on tax-assisted saving is tested directly. If the tax advantage of IRAs/401(k)s increases and results in an increase in S^{taa} , the coefficient on this variable in the S^{lqa} equation will indicate the extent to which total saving rises. If the coefficient is minus one, the offset is complete. A coefficient that is negative but less than one in absolute value would suggest that the offset is less than full and total saving rises in response to an increase in tax preferences. ^{1/}

The results of estimating this alternate specification for the saving rate for liquid assets are reported in the third column of Table VIII-2. The results are consistent with the previous regressions in that, given a level of the tax-assisted saving rate, an increase in wealth has no effect on the liquid-asset saving rate, while an increase in income would increase the rate. The age variables do not appear as significant determinants of the saving rate, while (somewhat curiously) the existence of a defined benefit pension plan tends to increase the saving rate. Most notably, the pension saving rate is a significant variable explaining the liquid asset rate, and the coefficient is insignificant from negative unity.

In sum, these results would seem to support the results reported by Gale and Scholz (1994) and Engen, Gale, and Scholz (1995) who argue that the tax treatment of IRAs and 401(k)s had a limited effects on total saving. In order to address the issue of substitutability among saving vehicles more directly, the determinants of asset shares in 1989 are examined in the sections below.

^{1/} This can be expressed more formally as follows. Suppose that the demand for saving in the form of liquid assets and tax-assisted assets is a function of the marginal tax rate τ and other variables X (i.e., income, wealth, age, etc.). Then the demand functions are $S^{lqa} = -\alpha\tau + \beta X$ and $S^{taa} = \gamma\tau + \lambda X$, respectively. Solving the S^{taa} equation for τ , and substituting it into the equation explaining S^{lqa} yields $S^{lqa} = -\alpha/\gamma S^{taa} + (\beta - \lambda/\gamma)X$. If the estimated coefficient on S^{taa} is minus one, then $\alpha = \gamma$ and the effect of a change in τ on total saving is zero. If the estimated coefficient is greater than minus one, then $\alpha < \gamma$, and the effect of an increase in τ is to increase saving. Note, that this substitution may result in a simultaneity bias if saving is measured with an error.

b. An analysis of 1989 asset shares

The ratios of tax-assisted pension assets, nonpension liquid assets, and net equity in housing to total net wealth were calculated and related to the variables that were used as explanatory variables in the analysis of saving presented in the previous section. The equations explaining the liquid asset and net housing equity shares were estimated using OLS. However, since a number of households did not hold tax-assisted pension assets in 1989 this equation was estimated using both OLS and TOBIT. ^{1/}

The results are presented in Table VIII-3. They indicate that the share of wealth invested in tax-assisted pension assets tends to decline with an increase in wealth, suggesting a lesser need to tie assets up in relatively illiquid saving.

The effect of taxes on the pension-asset share is as expected. In the equation estimated using TOBIT, an increase in the marginal tax rate tends to cause an increase in the share of tax-assisted assets, while the effect of income in excess of the IRA threshold is to reduce the share. The tax variables are less significant in the OLS estimate of the equation for the tax-assisted asset share.

The marginal tax rate also is not a significant determinant of the liquid asset ratio, but appears to be negatively related to the net housing equity ratio. Indeed, in the housing equity equation the coefficient is roughly the same size (in absolute value) as the coefficient in the pension saving equation. This suggests that the tax preference causes households to substitute away from investment in housing equity toward tax-assisted pension assets, perhaps by increasing their mortgage debt (thereby lowering their net equity) in order to take advantage of the tax-deductibility of mortgage interest.

6. Conclusion

Concern about the decline in the U.S. private saving rate in recent years has contributed to calls for increased tax incentives for saving. Most recently, both the Administration and the Congress have proposed an expansion of the IRA system. However, there is limited evidence that suggests that existing tax incentives have had a large effect on household saving. Also, the econometric studies that support the view that household saving has been increased also suggest that the increase has been relatively small and barely larger than the reduction in public saving that would result. This issue was reconsidered above using household survey data.

^{1/} TOBIT provides a maximum likelihood estimate of a regression equation when the dependent variable is truncated at zero. The estimator assumes that the desired level of the dependent variable is unobserved when its actual value is zero.

Table VIII-3. United States: 1989 Asset Share Equations 1/

Independent Variable	Dependent Variable			
	<u>Tax-Assisted Assets</u>		Liquid Assets	Housing Equity
	TOBIT	OLS		
Wealth	-0.012 (2.13)	-0.008 (2.34)	0.029 (4.43)	-0.021 (3.65)
83 pension dummy	0.343 (9.83)	-- --	-- --	-- --
Age	0.030 (3.11)	0.008 (1.63)	-0.010 (1.00)	0.002 (0.18)
Age squared	-0.0003 (3.85)	-0.00008 (1.95)	0.0001 (1.53)	-0.0000 (0.59)
Income	0.027 (1.16)	0.012 (0.86)	0.638 (0.22)	-0.019 (0.76)
Income threshold dummy	-0.209 (3.99)	-0.045 (1.32)	0.058 (0.88)	-0.013 (0.22)
Household size	-0.021 (1.63)	-0.012 (1.55)	-0.039 (2.63)	0.051 (3.91)
Children not at home	-- (0.01)	0.002 (0.29)	-0.020 (1.94)	0.018 (2.03)
Education grade	0.027 (4.29)	0.011 (3.12)	-0.0001 (0.10)	-0.010 (1.73)
Pension dummy	0.333 (7.71)	0.138 (5.12)	-0.099 (1.91)	-0.039 (0.85)
Marginal tax rate	0.783 (2.91)	0.278 (1.65)	0.382 (1.18)	-0.659 (2.32)
R ²	...	0.07	0.07	0.07
Obs	1346	1346	1346	1346

1/ T-statistics in parentheses; estimate of constant term not reported. Tax-assisted asset equation was estimated using TOBIT and OLS; other equations estimated using OLS. Sample was restricted to those with nonzero income and wealth in 1983. Wealth and income were expressed in million of dollars.

The results suggest that the tax advantages of IRA and 401(k)s have not significantly increased household saving and that reductions in liquid savings have fully offset any increase in tax-assisted saving. Examination of the determinants of the distribution of wealth between tax-assisted and other assets suggest, however, that tax considerations have affected the allocation of household portfolios. In particular, households have tended to bolster their tax-assisted pension assets at the expense of net housing equity.

A number of caveats should be noted, however. First, the analysis of saving flows and rates relied on estimates of household saving calculated by comparing the change in asset stocks and assuming constant contribution rates and interest rates over the 1983-89 period. Also, it was implicitly assumed that the tax regime was unchanged over the period. These assumptions clearly did not hold, which introduces some uncertainty regarding the results. Second, the evidence that U.S. tax assistance for pension saving has not had a significant effect on saving behavior may be partly a reflection of the relatively modest scope of these programs. The IRA and 401(k) contribution limits are relatively low. If these limits are binding on most households that have discretionary funds available for saving, it would be difficult to discern whether the tax advantage has had a large effect. By the same token, these results do not provide an indication of the likely effect of the more fundamental reforms of the tax system that are being contemplated by the Congress.

References

- Attanasio, Orazio P., and Thomas C. DeLeire, "IRA's and Household Saving Revisited: Some New Evidence," NBER Working Paper No. 4900 (October 1994).
- Burman, Leonard, Joseph Cordes, and Larry Ozanne, "IRAs and National Saving," National Tax Journal, Vol. 43 No. 3 (September 1990), pp. 259-83.
- Carroll, Chris, and Lawrence H. Summers, "Why Have Private Saving Rates in the United States and Canada Diverged?" Journal of Monetary Economics, Vol. 20, No. 2 (September 1987), pp. 249-79.
- Engen, Eric M., William G. Gale, and John Karl Scholz, "Do Saving Incentives Work?" Brookings Papers on Economic Activity 1: 1995, pp. 85-151.
- Feenberg, Daniel, and Jonathan Skinner, "Sources of IRA Savings, in Lawrence H. Summers (ed.) Tax Policy and the Economy (Cambridge: MIT Press, 1989).
- Friend, Irwin, and Joel Hasbrouck, "Saving and After-Tax Rates of Return," Review of Economics and Statistics, Vol. 65, No. 4 (November 1983), pp. 537-543.
- Gale, William G., and John Karl Scholz, "IRAs and Household Saving," American Economic Review, (December 1994), pp. 1233-60.
- Gravelle, Jane G., "Individual Retirement Accounts (IRAs) and Related Proposals, CRS Report for Congress No. 95-420 (March 1995).
- Papke, Leslie E., Mitchell Petersen, and James M. Poterba, "Did 401(k) Plans Replace Other Employer Provided Pensions?," NBER Working Paper No. 4501 (October 1993).
- Poterba, James M., Steven F. Venti, and David A. Wise "Do 401(k) Contributions Crowd out Other Personal Saving?," NBER Working Paper No. 4391 (June 1993).
- Skinner, Jonathan, and Daniel Feenberg, "The Impact of the 1986 Tax Reform on Personal Saving," in J. Slemrod (ed.) Do Taxes Matter? The Impact of the Tax Reform Act of 1986, (Cambridge: MIT Press, 1990), pp. 50-79.
- United States, Internal Revenue Service, Individual Income Tax Returns, various issues (Washington: U.S. Government Printing Office, 1993 and 1989).

Venti, Steven F., and David A. Wise, "The Saving Effect of Tax-Deferred Retirement Accounts: Evidence from SIPP," in B. Douglas Bernheim and John B. Shoven (eds.) National Saving and Economic Performance, (Chicago: University of Chicago Press, 1991).

_____, "The Wealth of Cohorts and the Changing Assets of Older Americans," NBER Working Paper No. 4600 (1993).

Data

Calculation of saving data

The Survey of Consumer Finances reports asset and liability totals for various categories. However, saving flows are not reported. In order to infer an average level of annual saving the following relationship between assets and contributions is used:

$$A_{x89} - A_{x83}(1+r_x)^6 = C_{x84}(1+r_x)^5 + C_{x85}(1+r_x)^4 + \dots C_{x89}$$

where A_{x89} is the asset balance in 1989 and C_{x88} is the contribution to the asset balance in 1988. Solving for the average contribution C , assuming that contributions are equal in every year we find:

$$C = [A_{x89} - A_{x83}(1+r_x)^6] / [(1+r_x)^5 + (1+r_x)^4 + \dots 1]$$

The rates of return on used to calculate contributions to various assets are the same as those used by Gale and Scholz (1994).

Calculation of marginal tax rates

The marginal tax rates were calculated by comparing households' taxable income against the tax rate schedules for 1983 and 1989, respectively. 1/ Taxable income was proxied by household adjusted gross income (as reported in the survey) less deductions for interest payments and personal exemptions. For the purpose of determining the filing status of survey respondents (and which tax rate schedule to use), those who reported only a single resident were treated as "single taxpayers," unmarried taxpayers who reported more than one household resident were treated as "unmarried heads of households," and married household respondents were treated as "married filing joint returns."

In 1989, interest deductions were assumed to equal interest paid on reported mortgage debt plus 20 percent of interest on reported credit card and other debt. 2/ As survey data was only available on the amount of debt outstanding, rather than on interest payments, the interest rates on mortgage and credit card debt was assumed to be 12 percent and 16 percent, respectively. Personal exemptions in 1989 were based on filing status, and the same criteria described above were used.

1/ The source was Individual Income Tax Returns 1983 and Individual Income Tax Returns 1989, published by Department of the Treasury, Internal Revenue Service.

2/ In 1989, only 20 percent of nonmortgage debt was deductible.

The same procedure was used to calculate the deductions in 1983. However, account was taken of the fact that in 1983 the full amount of mortgage, credit card, and other debt was deductible, and that personal exemptions were not dependent on taxpayers' filing status.

IX. International Trade and Investment Policies 1/

This chapter reviews developments in U.S. international trade and investment policies since July 1994. 2/ The nine sections review selected aspects of: (1) the Uruguay Round agreement; (2) the North American Free Trade Agreement and the Free Trade Area of the Americas; (3) the Asia-Pacific Economic Cooperation Forum; (4) other international agreements and the resolution of trade disputes; (5) import policies and measures; (6) developments under Section 301 and Special 301 (including the U.S.-Japan auto dispute); (7) trade preferences for developing countries; (8) foreign investment policies; and (9) other measures and issues.

1. The Uruguay Round Agreement

The Uruguay Round Agreement was completed and signed in Marrakesh on April 15, 1994. Ratification by the U.S. Congress occurred on December 1 and the agreement was signed by the President on December 8, 1994. Consequently, the United States became a founding member of the new World Trade Organization (WTO) on January 1, 1995. Before the agreement was put to a vote in the Congress, however, the Administration agreed to establish a commission of five federal judges to monitor all WTO dispute-settlement reports that rule against the United States. The U.S. panel is to determine whether in such cases the WTO might have exceeded its authority or acted beyond the scope of the Uruguay Round. Under this agreement, the United States could initiate proceedings to withdraw from the WTO if the commission of judges issued three affirmative decisions in any five-year period. 3/ Under the Uruguay Round Agreement any member of the WTO has the right to withdraw upon six-months notice.

The following subsections briefly review the results of the Uruguay Round for the United States, focusing largely on the agreements in agriculture, and textiles and clothing. Because of the highly distortionary effects of U.S. agriculture policy and quantitative import restrictions maintained under the Multifibre Arrangement (MFA), the United States' own liberalization in these sectors will produce the greater share of U.S. gains from the Round. Indeed, a recent computable general equilibrium study decomposed the effects of the Round and found that 99 percent of the quantifiable gains from the Round for the United States were attributable to the agreements on agriculture and textiles and clothing. 4/ For the world as a whole, 82 percent of the quantifiable gains were attributable to reforms in these two sectors.

1/ Prepared by Michael Leidy.

2/ For earlier actions, see Background Papers, Chapter IX, (SM/94/223).

3/ The Congress would need to enact, and the President sign, a joint resolution disapproving of continued U.S. participation in the WTO.

4/ See Harrison, Rutherford, and Tarr (1995, p. 15).

a. Estimated effects of the Uruguay Round on the United States

A number of computable general equilibrium (CGE) models have examined the effects of the Uruguay Round for the United States, and estimates of the increase in real GDP range from 0.05 percent to 1.4 percent. 1/ The simulations showing the strongest effects tend to be those that assume the existence of domestic economies of scale and/or dynamic growth effects. These studies typically incorporate only the readily quantifiable results of the Round (e.g., most favored nation (MFN) tariff cuts, subsidies cuts, and the phased elimination of the MFA), and so are widely believed to understate the full benefits. They do not capture, for example, the effects of strengthened rules or the prospective value of the agreement on trade in services.

A notable exception in this regard is a recent CGE simulation by Brown, Deardorff, and Stern (1995), which attempted to incorporate liberalization of services trade in a simulation of the effects of the Round. The simulations suggested that the services agreement would yield more than 2 1/2 times the increase in real income from the liberalization of trade in industrial products. This result, while noteworthy, should be viewed with more than the usual caution. As the authors point out, what was modeled was not the actual result of the services agreement, but the implications of hypothetical liberalization in services equivalent to that achieved in goods. In this sense, their results reflect the promise of the services agreement as a stepping stone to future liberalization, rather than the results of the services agreement extant. 2/

1/ The low result is from Halland and Tollefsen (1994) and the high result is due to Francois, McDonald, and Nordstrom (1994). Francois, McDonald, and Nordstrom (1995) summarizes the results of a variety of CGE models of the Uruguay Round.

2/ Despite the importance of the General Agreement on Trade in Services (GATS) as an initial step to bringing services trade under multilateral disciplines, the GATS is principally a "standstill" agreement; i.e., an agreement not to impose more restrictive measures in the future. Hoekman (1995), for example, has concluded that no liberalization of services trade was actually accomplished under the Round. Schott (1994, p.100) concedes that most of the country schedules of commitments in services are standstills, but points out that in a "very limited number of service sectors" there was an effective rollback of current barriers.

b. MFN tariff cuts and bindings

In the area of market access commitments in goods, U.S. tariff bindings ^{1/} across all products are to be cut--phased in five equal yearly installments--by about 40 percent from 6.8 percent to 4 percent on a simple average basis. On a trade-weighted basis, bound tariffs will be cut from 4.9 percent to 3.4 percent on industrial products and from 14.9 percent to 14 percent on agricultural products. ^{2/} With the January 1, 1995 implementation of the Uruguay Round in the United States, 100 percent of tariff lines on industrial products were bound--99 percent of tariff lines were bound prior to Uruguay Round implementation--and the percentage of MFN tariff lines on these products that enter duty free increased from 10 percent to 40 percent. ^{3/}

c. Textiles and clothing

The phased elimination (over ten years) of the MFA and the integration of trade in textiles and clothing (T&C) into the multilateral trading system is among the most significant achievements of the Uruguay Round for the United States. This assessment reflects the relatively high cost to U.S. consumers of the system of import restraints under the MFA. In a wide range of simulations, with varying elasticity assumptions and alternate simulations assuming either constant and increasing returns to scale, Harrison, Rutherford, and Tarr (1995) decomposed the real-income effects of the Round into those resulting from the agreements on agriculture, T&C, and market access in the manufacturing sectors. The T&C agreement was found to be responsible for between 30 percent and 86 percent of the gains from the Round for the United States. Their base model simulation shows the T&C agreement contributing \$7.4 billion (1992 dollars) to U.S. real GDP; 77 percent of the full effect of the Round. ^{4/}

The phased liberalization of T&C will proceed on two fronts. First, as discussed further below, countries must declare in four successive tranches those products it chooses to "integrate" into the General Agreement on

^{1/} A tariff binding is an obligation in the GATT/WTO not to raise tariff rates on specific products above a specified level. If a country wishes to breach a tariff binding, it must enter into discussions with other WTO members to find suitable compensation, typically in the form of offsetting tariff reductions on other products. Such bindings help to enhance the sustainability of tariff liberalization.

^{2/} Reported in Brown, Deardorff, and Stern (1995), based on data from the GATT Integrated Data Base which was compiled by the World Bank.

^{3/} Reported in Schott (1994, p. 64).

^{4/} The simulation showing about 30 percent of U.S. gains coming from the textiles and clothing agreement comes from the "steady-state variant" of the model. This attempts to capture the dynamic effects on the equilibrium capital stock in response to an increase in the marginal product of capital due to a more efficient allocation of resources.

Tariffs and Trade (GATT) (1994). 1/ This means either existing quotas are eliminated, or an eligible T&C product for which no quota had been imposed is declared to be integrated. The products selected for integration in each stage are determined by the importing country, subject to the inclusion of items from several broad categories, and may include items that had not been subject to MFA quotas. At the completion of the transition period in the tenth year, all remaining textile and apparel items (49 percent of the total) must be integrated into the GATT/WTO.

The second front on which T&C liberalization will proceed is through a formula for increasing quota growth rates for those products not yet integrated. Growth rates for major supplying countries are to be increased by 16 percent in 1995, by an additional 25 percent after the third year and by a further 27 percent at the beginning of the eighth year. 2/ For example, if the quota growth rate for certain cotton shirts specified in an existing MFA bilateral agreement had been 5 percent, implementation of the Round would require that this quota growth rate be increased to 5.8 percent this year, to 7.25 percent after three years, and to 9.2 percent beginning in the eighth year. In the tenth year, the quota must be lifted. Also during the implementation period, U.S. *ad valorem* tariffs on T&C imports will decline from 17.2 percent to 15.2 percent on a trade-weighted basis.

Despite the clear importance of the T&C agreement once fully implemented, the competitive environment in the U.S. market for T&C is not likely to change appreciably before the eighth year of implementation (2002). The agreement is structured in a way that permits a substantial delay before quota restrictions are eliminated on the more sensitive, and currently most restricted, T&C imports. Only 33 percent by volume of 1990 imports of T&C must be integrated into the GATT/WTO system during the first two phases (1995-2001) of implementation, and candidates for integration include a large number of items that were not previously under quota. This implies that "integration" in the earlier tranches will typically include products not previously protected under MFA quotas. Indeed, the integration of 49 percent of T&C imports by volume is delayed until the tenth year of implementation (January 1, 2005). Moreover, a U.S. Statement of Administrative Action specifically required that implementation proceed so that integration of the most sensitive products be delayed until the end of the ten-year period. 3/

The upshot is that the T&C agreement stands to significantly improve resource allocation in the United States once fully implemented in ten years. However, it appears that substantive liberalization in T&C will only

1/ Integration implies that full GATT/WTO disciplines will be observed for these products. Once a product is integrated, a WTO member may not impose or maintain import quotas, except under certain GATT/WTO procedures such as emergency protection under Article XIX.

2/ Small producer nations and least developed countries receive somewhat greater increases in quota growth rates.

3/ Federal Register, vol. 60 no. 83, May 1, 1995 (p. 21075).

take place at the end of this period. Indeed, in May 1995 the first quota on imports of a textile product from a former Soviet Republic was imposed on Ukrainian woolen coats. The heavy back-loading of liberalization in the T&C agreement suggests the risk that, when the time comes to take the final and most difficult step, political pressure from the most sensitive T&C sectors for continued protection may result in some form of accommodation, whether through safeguards actions under Article XIX of GATT (1994), antidumping (AD) or countervail actions, or some other measures.

d. The agreement on agriculture

The integration of the agricultural sector into the multilateral trading system will bring some reductions in domestic supports and export subsidies, the replacement of virtually all quantitative restrictions with tariffs, the binding of all agricultural tariffs, and a phased reduction in these tariffs over a six-year (for industrial countries) implementation period. Domestic support for agricultural production must be reduced by 20 percent from a 1986-88 base period and export subsidies must be reduced by 36 percent in terms of budgetary outlays (21 percent in volume) for each product over the six-year implementation period from a 1986-90 base. The agreement also calls on WTO members to begin negotiations toward further liberalization in agriculture in the last year of implementation.

It is noteworthy that, because the base represents a period of particularly high levels of U.S. domestic support for agriculture, the mandated cuts in domestic support will require no reduction from current levels in the United States (USDA, 1994, p. 2). Obligations in the area of "domestic support" for agriculture are set out in Article VI of the Uruguay Round Agreement on Agriculture.

In the simulations by Harrison, Rutherford, and Tarr (1995), the agreement on agriculture contributed from 13.5 percent to 23 percent of the gains to the United States from the Uruguay Round. When the gains from the agriculture liberalization are decomposed into the various elements of the agriculture agreement (tariffication and phased tariff cuts, reductions in export subsidies, and in domestic support), the authors find that by far the greatest effect for the United States comes from the reduction in production subsidies. The overall increase in real GDP attributable to the full agreement on agriculture in their base model is \$2.2 billion (1992 dollars), or 23 percent of the full effect of the Round.

2. The North American Free Trade Agreement (NAFTA)
and the Free Trade Area of the Americas (FTAA)

During the December 1994 Summit of the Americas held in Miami, a commitment was made to achieve a "Free Trade Area of the Americas" by 2005. This process is expected initially to build on existing regional trade arrangements in the Western Hemisphere through accessions. The action plan released at the Summit envisages an agreement that is comprehensive in scope, covering *inter alia*, tariffs, services trade, investment, government

procurement, subsidies and countervailing duties (CVDs), AD, competition policy, and intellectual property protection.

A Summit of the Americas Trade Ministerial was held in Denver on June 30, 1995. There it was agreed to begin immediately a work program to prepare for the initiation of negotiations for the Free Trade Area of the Americas. The 34 participating nations agreed to ensure that the FTAA will: (i) be fully consistent with the provisions of the WTO; (ii) be balanced and comprehensive in scope, covering among others, all areas included in the Summit of the Americas action plan (see above); (iii) not raise barriers to non-FTAA countries; and (iv) represent a single undertaking 1/ (analogous to the Uruguay Round Agreement). 2/

In order to begin preparations for negotiations, seven working groups were established on: market access; customs procedures and rules of origin; investment; standards and technical barriers to trade; sanitary and phytosanitary measures; subsidies, AD and CVDs; and a working group on "smaller economies." Each working group is called upon to identify and examine existing trade-related measures in these areas, with a view to identifying possible approaches to negotiations. It was also announced that working groups would be established at a March 1996 Trade Ministerial to be held in Colombia in the areas of government procurement, intellectual property rights, services, and competition policies. The Joint Declaration also emphasized the parties' commitment to transparency in the FTAA process.

Regarding the expansion of NAFTA, formal negotiations on Chile's accession to NAFTA were initiated in Toronto on June 7, 1995. At end-June 1995, Congress continued to debate fast-track negotiating authority for the President, which ultimately will be necessary to successfully complete the accession negotiations.

The U.S.-Canada dispute over grain trade continued into 1994. Under the Canada-U.S. Free Trade Agreement (CUSFTA), a Chapter 18 dispute-settlement panel was requested by the United States in May 1992 to contest the Canadian interpretation of "other costs" under Article 701.3 on agricultural subsidies. This dispute involved the pricing practices of the Canadian Wheat Board on durum wheat destined for the United States. A panel decision was reached in February 1993, but the underlying dispute that initiated the panel request continued. The United States had considered since September 1993 whether to seek quotas on Canadian wheat imports under Section 22 of the Agricultural Adjustment Act, 3/ and on January 18, 1994 the President directed the U.S. International Trade Commission (USITC) to investigate

1/ A "joint undertaking" implies that signatories accept the entirety of the negotiated agreement; i.e., they may not choose to accept only selected pieces of the agreement but must take-or-leave it as a whole.

2/ The details presented here follow the Final Joint Declaration, Summit of the Americas Trade Ministerial, Denver, June 30, 1995.

3/ Under Section 22, the Secretary of Agriculture can recommend quotas if imports are materially interfering with a U.S. agricultural program.

whether wheat, wheat flour, and semolina were materially interfering with a U.S. agricultural support program. It was alleged that imports of Canadian wheat have caused the U.S. Department of Agriculture to incur increased outlays in deficiency payments to U.S. farmers. The USITC recommended to the President on July 15, 1994 that import measures be taken under Section 22. In connection with the wheat dispute, the United States also notified GATT Contracting Parties on April 22, 1994 of its intention to impose higher tariffs or tariff-rate quotas on grains (principally wheat and barely) from Canada unless a negotiated solution could be reached in 90 days. 1/ In the event, an agreement was reached on August 1, 1994 that established a tariff-rate quota for certain wheat imports. 2/ On October 13, 1994 the President issued the proclamation implementing the agreed tariff-rate quotas retroactive to September 12, 1994. These measures are scheduled to expire on September 12, 1995.

On April 6, 1994 the United States requested the formation of an extraordinary challenge committee under Article 1904.13 of the NAFTA, in which it challenged certain aspects of an earlier panel ruling on Canadian subsidies of softwood lumber. On August 3, 1994 the Extraordinary Challenge Committee rejected the U.S. appeal and on August 23, 1994 the U.S. Department of Commerce ordered an end to the collection of CVDs on imports of Canadian softwood lumber.

The first request for the formation of a dispute settlement panel under Chapter 19 (AD and countervail disputes) of NAFTA occurred on September 26, 1994. The panel was formed after a petition from U.S. importers and Mexican exporters of leather wearing apparel. The complaint challenges the results of a 1992 administrative review of a countervailing duty (CVD) on leather wearing apparel from Mexico by the U.S. Department of Commerce. The Department of Commerce's bid to have the case dismissed on jurisdictional grounds was rejected by the panel on April 11, 1995. The panel's decision is due August 7, 1995.

Another NAFTA dispute settlement panel under Chapter 19 held hearings on April 20, 1995 in Mexico City. That panel, which is comprised of three Mexican and two U.S. experts, was formed when U.S. steel firms alleged that Mexico's commerce agency acted contrary to Mexican law when on August 2, 1994 it imposed AD duties of 38.21 percent on imports of galvanized steel sheet from the United States. 3/

1/ As a result of the notification, under Article 28 of GATT, following a 90-day period in which a negotiated settlement could be reached, the U.S. may unilaterally withdraw or modify one or more of its tariff bindings.

2/ Under the terms of the agreement, there was no change in U.S. tariffs on durum wheat imports of less than 300,000 tons. The United States imposed a tariff of \$23/ton on imports of Canadian durum wheat between 300,000 and 450,000 tons; a tariff of \$50/ton, intended to be prohibitive, was charged on imports of durum wheat over 450,000 tons and on imports of non-durum wheat over 1,050,000 tons.

3/ A final ruling was expected on July 13, 1995.

On April 26, 1995 the Office of the U.S. Trade Representative (USTR) requested consultations under the dispute-settlement mechanism of NAFTA, claiming that Mexico had failed to provide national treatment to United Parcel Service, Federal Express, and Airborne Freight, and other express delivery companies. U.S. express-delivery companies allege that they have been denied licenses to operate large trucks in Mexico. 1/

In line with an agreement reached in December 1993, tripartite working groups are reviewing the rules governing AD, subsidies, and CVDs within the NAFTA with a view to making recommendations for revised NAFTA rules by end-1995. While the groups were constituted in December 1993 at the initiative of Canada, activities were suspended during most of 1994 in order to await the results of the Uruguay Round. In early May 1995, the group met in Washington to review the results of the Round and to examine the lessons learned from two prominent regional trading arrangements that have eliminated the application of AD and CVD on a regional basis. 2/ In these discussions, Canada is seeking greater discipline in the use of AD, while the United States has expressed an interest in restraining the use of subsidies but is strongly opposed to new restraints on the application of AD duties.

3. Asia-Pacific Economic Cooperation Forum (APEC)

Participation in APEC by the United States is intended to enhance the prospects for commerce through initiatives to moderate barriers to trade and investment. 3/ A notable consensus was reached at the APEC Leaders Meeting in Bogor, Indonesia on November 15, 1994 when the "Declaration of Common Resolve" was issued. The Declaration set a goal for APEC to achieve "free and open trade and investment" by 2010 for industrial member countries and by no later than 2020 for developing member countries. APEC Ministers are to produce an action plan before November 1995 when the next Leaders Meeting will be held in Osaka. The Osaka meeting is hoped to produce greater specificity in moving toward the free-trade goals of the Bogor Declaration.

It has been reported frequently that the Bogor initiative was intended to lead to an APEC free trade agreement. However, it has also been

1/ The outcome of consultations could not be ascertained by the time this note was completed.

2/ The Australia-New Zealand Closer Economic Relations Trade Agreement (1983) contains provisions for replacing AD with competition laws in bilateral trade. More recently, the European Union (EU) and European Free Trade Area (EFTA) members agreed to no longer apply AD actions against each other, instead applying the EU's competition rules to EFTA countries in intraregional trade.

3/ The 18-member APEC includes Australia, Brunei, Canada, Chile, China, Hong Kong, Indonesia, Japan, Malaysia, Mexico, New Zealand, Papua New Guinea, the Philippines, the Republic of Korea, Singapore, Taiwan Province of China, Thailand, and the United States.

suggested instead that it points to broad support for "open regionalism," which implies a cooperative approach to unilateral liberalization on an MFN basis within APEC. The Declaration and subsequent official statements are broad enough to accommodate either goal.

4. Other international agreements and the resolution of trade disputes

With the accession of Austria, Finland, and Sweden to the EU on January 1, 1995 and the consequent adoption of the EU's trade regime, MFN tariffs in these countries were raised in some cases beyond bound levels under the GATT/WTO. In line with GATT/WTO rules, U.S. negotiations with the EU on compensation (typically in the form of other tariff cuts) resulted in a six-month interim agreement announced on January 4, 1995, which expired on June 30. Negotiations for a permanent agreement were continuing through end-June 1995.

An investigation was initiated on February 16, 1995 to review telecommunications trade practices in the Republic of Korea. 1/ At issue was a decision by the Korean Government to classify recently upgraded U.S. digital switching equipment as a new product, thereby requiring it to undergo a two-year period of testing before being certified and eligible for government procurement. On March 27, 1995 the dispute was resolved when it was agreed that the new switch could be certified in time to submit bids for the 1995 round of procurement by Korea Telecom. The parties also agreed to establish an experts group to develop criteria for determining when approval is not necessary and to discuss mutual recognition of equipment approval.

a. Agreements reached under the U.S.-Japan Framework talks

After disagreements could not be resolved in the context of the Framework negotiations, Japan was identified under Title VII (government procurement) of the 1988 Trade Act (part of the Section 301 family of U.S. trade laws) on July 31, 1994. 2/ The identification of Japan triggered a 60-day consultation period (establishing a September 31, 1994 deadline), at the end of which, if no agreement was reached, the United States could impose sanctions. Japan indicated it would terminate negotiations under the Framework talks in the area of government procurement if sanctions were imposed. In the event, an agreement was announced on October 1, 1994 and sanctions were averted. The agreement covered

1/ The investigation proceeded under Section 1377 of the 1988 Trade Act which requires the USTR to review by March 31 of each year the operation and effectiveness of U.S. telecommunications trade agreements.

2/ See Background Papers, Chapter IX, (SM/93/183) for a brief review of the elements of the July 1993 Framework Agreement.

government procurement procedures in medical 1/ and telecommunications 2/ equipment, both "priority sectors" under the Framework talks. 3/

Also at end-September 1994, bilateral agreements were reached under the Framework talks in the areas of flat glass and insurance. The agreement on insurance, signed on October 11, 1994, generally commits Japan to enhance the transparency of its regulatory system, to introduce some specific liberalization measures, and to strengthen its antitrust enforcement. A final agreement was reached on December 12, 1994 to improve foreign access to the Japanese flat glass market. Under the agreement, Japanese glass distributors publicly stated their intention to diversify their sources and to avoid discrimination. Japanese glass manufacturers issued a statement supporting diversification in their previously exclusive distribution networks. There is to be a direct role for Japan's Ministry of Trade and Industry (MITI) in collecting data and insuring diversification. The Government of Japan also intends to promote increased competition in procurement of glass for construction projects. 4/

The Framework working group on intellectual property protection concluded two agreements in 1994. The first agreement, concluded on

1/ The agreement on medical equipment procurement requires (i) the use of open and transparent procurement procedures for all procurement above a certain threshold; (ii) procurement officials are to be directed specifically to consider foreign medical technology and services; (iii) procurement decisions are to be made on the basis of "overall greatest value," instead of the current minimum price system; (iv) public hospitals in Japan are to be required to make available public information about their purchases regardless of value; and (v) the agreement also includes comprehensive complaint mechanisms and procedures for dealing with unfair bids.

2/ In telecommunications, the Japanese Government agreed (i) to provide more detailed information earlier in the process for each year's procurement needs; (ii) suppliers will be invited to comment on all aspects of the planned purchases (before the request for proposals is finalized); (iii) on technical specifications, the Government will look first to international standards, when available, then give full consideration to *de facto* international standards; (iv) the Government of Japan will institute "overall best-value" bid evaluation (to ensure contracts are awarded to the best-value bid, not simply the least-cost bid); and (v) the Government of Japan will reduce the number of sole-source contracts (which according to U.S. officials have, in the past, tended to go to Japanese firms).

3/ On May 23, 1994 the United States and Japan agreed to seek improvements in market access in four "priority sectors" (autos and auto parts, insurance, government procurement of telecommunications equipment, and government procurement of medical supplies)

4/ Deputy USTR, Charlene Barshefsky, was quoted as saying that the flat glass agreement was "the first concrete example of an attack" on Japan's keiretsu system (International Trade Reporter, December 14, 1994, Vol. 11, No. 49, p. 1931).

January 20, 1994, established the right to file patent applications in English and to correct translation errors after patent issuance. The agreement also lengthened the U.S. patent term from 17 to 20 years. The second agreement, signed on August 16, 1994, revised a number of specific practices of the Japanese Patent Office (JPO) and the U.S. Patent and Trademark Office (PTO), such as establishing an accelerated patent examination procedure in the JPO and requiring the PTO to publish pending patent applications 18 months after filing beginning in 1996.

b. Dispute settlement activity under GATT/WTO 1/

A GATT dispute-settlement panel was established on January 25, 1994 following concerns expressed by Brazil, Canada, and others over U.S. legislation signed August 10, 1993 which *inter alia* established 75 percent local tobacco content for the manufacture of cigarettes. 2/ Complaints also pointed to internal taxes and charges in the form of a "budget-deficit assessment"; a no-net cost assessment on imported flue-cured tobacco identical to that assessed on like domestic tobacco; a requirement that inspection fees for imported tobacco be comparable to those for domestic tobacco. The GATT panel report of August 12, 1994 found both the local content requirement 3/ and the budget-deficit assessment 4/ to be incon-

1/ This section covers selected developments in U.S.-related dispute settlement activity within the GATT/WTO forum. Dispute settlement under GATT auspices occurred either under Articles XXII (Consultation) and XXIII (Nullification and Impairment) of the General Agreement, or under the separate dispute-settlement procedures of the Tokyo Round Codes. Those disputes brought under Articles XXII and XXIII, when they are "adopted," are adopted by the Contracting Parties. Those brought under the Tokyo Round Agreements are adopted by the relevant Tokyo Round Committee. These separate forums were integrated into a new dispute-settlement system with the implementation of the Uruguay Round Agreement on January 1, 1995.

2/ Section 1105 of the U.S. Omnibus Budget Reconciliation Act of 1993 is alleged to be inconsistent with Article III:1 (National Treatment on Internal Taxation and Regulation) of GATT. Consultations between the United States and Brazil, also on behalf of Canada, Chile, Colombia, El Salvador, Guatemala, Thailand, Venezuela, and Zimbabwe, preceded the formation of the GATT panel. The EU (which also held consultations with the United States on this matter) and New Zealand supported the request for a panel and expressed interest in making a third-party submission to the panel.

3/ The Panel found that this was an internal quantitative regulation inconsistent with Article III:5. Under Article III:5, GATT Contracting Parties may not establish or maintain any internal quantitative regulation relating to the mixture, processing or use of products in specified amounts or proportions which require that the product be supplied from domestic sources.

4/ The Panel found that the 1993 budget deficit assessment was an internal tax contrary to GATT Article III:2. Article III:2 states that imported products shall not be subject to internal taxes or other charges in excess of those applied to like domestic products.

sistent with GATT rules. The Panel Report was adopted by the GATT Council on October 4, 1994 and Uruguay Round implementing legislation in the United States ultimately corrected the two contrary measures.

On September 30, 1994 a GATT panel report was issued concerning the EU's 1993 complaint against certain U.S. taxes and regulations in the domestic market for automobiles. The panel ruled that the U.S. luxury tax on certain autos and the "gas guzzler tax" were not contrary to GATT obligations. 1/ The panel did find, however, that certain aspects of the Corporate Average Fuel Economy (CAFE) regulation were inconsistent with GATT Article III:4. 2/ Under the pre-WTO procedures, the EU blocked adoption of the report, possibly reflecting dissatisfaction with the panel's ruling on the U.S. luxury and "gas guzzler" taxes. 3/

Another GATT panel was formed on October 4, 1994 when Venezuela challenged certain U.S. standards for reformulated and conventional gasoline. Venezuela subsequently withdrew its complaint in the GATT and requested consultations in the World Trade Organization (WTO). 4/ After a period of consultations failed to resolve the dispute, it was announced on April 10, 1995 that a WTO panel would be formed. The complaint alleges that U.S. Environmental Protection Agency rules on reformulated gasoline treat imports less favorably than domestically sourced gasoline.

5. Import policies and measures

The Office of the USTR released its annual Title VII review of foreign-government procurement practices on April 29, 1995. 5/ No new countries

1/ Neither one was found inconsistent with GATT Article III:2 (imports are not to be the subject of internal taxes higher than those applied to like domestic products).

2/ Article III:4 requires that imports be accorded treatment no less favorable than that given to like domestic products in respect of all laws, regulations, and requirements affecting their internal sale.

3/ Pre-WTO rules allowed any GATT Contracting Party to block the adoption of a panel report. Under WTO procedures, a panel report is adopted automatically unless there is a consensus of members opposing adoption.

4/ A request for consultations is the first formal step toward the formation of a panel in the WTO's integrated dispute-settlement system.

5/ Title VII of the 1988 Omnibus Trade and Competitiveness Act requires the USTR to submit a yearly report to Congress identifying countries that: (i) are signatories to the GATT Government Procurement Code and are in violation of their obligations; and (ii) signatories and non-signatories to the Code that show a significant and persistent pattern or practice of discrimination in government procurement against the United States with identifiable harm to U.S. businesses, in cases where there are also significant purchases by the U.S. Government of products or services from that country. In those cases involving areas not covered by the Code, following a period of consultations the President is authorized to impose sanctions.

were identified under the statutory criteria. However, the USTR announced that sanctions imposed under Title VII against the EU in May 1993 would remain in place and that these sanctions would be extended to Austria, Finland, and Sweden as a result of their recent admission to the EU. 1/ The 1995 Title VII decision also indicated that the implementation of the Memorandum of Understanding (MOU) reached with Germany in 1993 would come under enhanced scrutiny. 2/

The USTR raised a number of other issues in its 1995 Title VII review. The USTR considered a number of areas warranting special attention. Cited as a matter of "concern" were certain discriminatory practices in four countries in the area of information technology. 3/ The USTR also cited more generally the problems of "corruption" and nontransparency in foreign government procurement practices and announced the Administration's intent to "push initiatives" to improve these practices.

During 1994, the U.S. Department of Commerce and the USITC reviewed 41 AD and 6 CVD petitions. This level of activity was virtually unchanged from the previous year. 4/ In 1994, 17 new AD duties (not including suspension agreements) 5/ and one new CVD were imposed. This was substantially fewer than the previous year owing to the unusually high number of new duties in 1993 related to the end of the system of steel

1/ Greece, Portugal, and Spain were excluded from the original Title VII sanctions, and Germany was excluded following a bilateral agreement with the United States. The U.S. sanctions exclude companies in targeted EU states from bidding on certain U.S. government procurement contracts (and contracts tendered by federally owned electrical utilities) for both goods and services.

2/ When the U.S.-EU dispute over the EC Utilities Directive was resolved in April 1993, no agreement was reached with respect to telecommunications procurement and U.S. sanctions were imposed on May 28, 1993. It was announced on June 10, 1993 that the United States had reached a bilateral agreement (the MOU) in which Germany agreed not to adopt discriminatory telecommunications practices in return for excluding Germany from U.S. sanctions.

3/ Australia was cited for alleged discriminatory practices in information technology; Brazil for discriminatory practices in the computer, software, telecommunications, and digital electronics sectors; China for nontransparent procurement practices--although progress over the last year was also noted; and Japan for discriminatory practices in the supercomputer and computer sectors.

4/ In 1993, 42 AD and 3 CVD petitions were reviewed.

5/ Suspension agreements or "price undertakings" occur when exporters subject to an AD investigation agree to cease exports to the United States within six months, or to revise their prices upward so as to eliminate the alleged dumping margin. The AD investigation is renewed if exporters violate the agreement.

voluntary export restraint agreements (VERs) that occurred in 1992. 1/ In 1995, 7 AD and 1 CVD petitions had been filed and 11 new AD duties imposed by May 15.

There were no petitions for emergency protection filed under Section 201 of the 1974 Trade Act in 1994. 2/

6. Developments under Section 301 and special 301 3/

On October 3, 1994 the USTR issued its first "super 301" report to Congress under the executive order that reinstated super 301 in 1994. 4/ No "priority foreign country practices" were identified, but under the "early warning" provisions it was noted that Japan's practices regarding wood and paper imports may warrant identification in the future.

The USTR released its annual special 301 decision on April 29, 1995, announcing that no countries would be designated at that time as "priority foreign country." 5/ However, it was also stressed that designation as a priority foreign country could be made any time the facts warrant. Seven individual countries and the EU were placed on the "priority watch list," with five countries--Brazil, Greece, Japan, Saudi Arabia, and Turkey--subject to out-of-cycle reviews later in the year. 6/ The "watch list"

1/ With the expiration of the system of steel VERs at end-March 1992, there was a surge in petitions for both AD and CVDs. In most cases, final rulings on granting duties were reached during 1993.

2/ Section 201 of the 1974 Trade Act implements Article XIX (the Safeguards Clause) of the GATT/WTO. It allows emergency protection, on a nondiscriminatory (MFN) basis, to a domestic industry found to be seriously injured by imports.

3/ Section 301 of the Trade Act of 1974, as amended, may be applied to enforce U.S. rights under bilateral and multilateral trade agreements, and to respond to unreasonable, unjustifiable, or discriminatory foreign government practices that burden or restrict U.S. commerce. Under the "special 301" provision of the 1988 Trade Act, the USTR must identify those countries that deny adequate and effective protection of intellectual property rights, or deny fair and equitable market access for persons that rely on intellectual property protection.

4/ The President reinstated by executive order the "super 301" provision of the 1988 Trade Act on March 3, 1994. The original super 301 had expired in 1990. The reinstated super 301 procedure grants discretion to the USTR that was not available under the original version. It also contains an "early warning" provision intended to encourage negotiations before a country is designated as a priority foreign country and a Section 301 investigation begins.

5/ Identification as a "priority foreign country" requires the initiation of a Section 301 investigation within 30 days unless the USTR determines that certain special circumstances prevail.

6/ The priority watch list for 1995 includes Brazil, the EU, Greece, India, Japan, Korea, Saudi Arabia, and Turkey.

includes 24 countries with four--Argentina, Indonesia, South Africa, and the United Arab Emirates--subject to out-of-cycle reviews. 1/

Seven Section 301 investigations were initiated from June 1994 through July 3, 1995. These included investigations related to China's intellectual property protection, the EU's restrictions on banana trade, a related investigation of Costa Rica's and Colombia's banana export regimes, Japan's practices in the after-market for auto parts, Korea's treatment of meat imports, Canada's eviction of the U.S.-owned Country Music Television service, and Japan's practices in the market for photographic film and paper.

a. China

On June 30, 1994 China was designated as a priority foreign country and a special 301 investigation was initiated. After negotiations failed to resolve the differences, on February 4, 1995 the United States announced punitive tariffs set at 100 percent on \$1.08 billion of Chinese imports, to be implemented at end-February. In the event, on February 25, 1995 an agreement was reached addressing U.S. concerns on intellectual property protection in China, sanctions were averted and China was removed from the list of priority foreign countries.

b. U.S.-Japan auto dispute

On October 1, 1994 the USTR launched a Section 301 investigation of Japanese practices in the "aftermarket" for auto replacement parts (autos and auto parts are a priority sector in the Framework talks). Fact-finding and further consultation with Japan under Section 301 were to conclude no later than October 1, 1995. The United States focused on three areas of market access in Japan: automobile dealerships; the aftermarket for auto parts; and the market for original equipment auto parts. The United States contended that a number of business practices and regulations discriminated against foreign suppliers in these three areas. On May 10, 1995 the United States notified the WTO of its intent to invoke the organization's dispute-settlement mechanism in "approximately" 45 days. At the same time, the United States assessed under Section 301 that Japanese policies and

1/ Placement on the "priority watch list" or the "watch list" signals that problems exist regarding the protection or enforcement of intellectual property rights or market access for persons relying on intellectual property rights protection.

practices were "unreasonable" and "discriminatory." 1/ A list of 13 Japanese luxury vehicles was presented on May 16 by the USTR as candidates for 100 percent punitive tariffs if the dispute was not resolved by June 28, 1995. 2/

The Japanese Government responded by requesting "urgent" consultations with the United States under the auspices of the WTO, a preliminary step in the formation of a dispute-settlement panel. 3/ By early June, the EU and Australia had also asked to participate in these WTO consultations. In public statements, the United States took the position that Section 301 was designed to address issues not covered by the WTO--in this case, alleged acts, practices and regulatory policies that set up barriers to trade in the auto sector. 4/ Other observers emphasized that regardless of whether Japanese policies and practices in the auto sector fall inside or outside the WTO's jurisdiction, any attempt to redress grievances unilaterally by raising tariffs above bound levels or raising tariffs in a discriminatory fashion is specifically prohibited.

An agreement was reached on June 28, 1995 and sanctions were averted. Under the agreement Japan would undertake some deregulation of its auto

1/ Under Chapter 1 of Title III of the Trade Act of 1974, as amended (Sections 301 through 310), if the USTR finds a foreign practice to be "unjustifiable" and it also burdens or restricts U.S. commerce, all appropriate and feasible action must be taken to eliminate that practice. However, if the USTR determines that a practice is "unreasonable" or "discriminatory," the USTR has discretion over whether to take action.

2/ The United States began withholding liquidation of entries on the targeted Japanese vehicles from May 20, 1995 as the threatened tariffs, if imposed, were to be applied retroactively to that date. This implies that U.S. importers of targeted Japanese luxury autos were faced with a contingent liability from May 20 until a decision on sanctions was reached.

3/ Because Japan's request for consultations was made on an "urgent" basis (pursuant to paragraph 8, Article 4 of the Uruguay Round Understanding on Dispute Settlement), this required the parties to enter into discussions within 10 days from the date of the request. If the consultations failed to settle the dispute within 20 days from the request, the complaining party may have requested the establishment of a panel. Also, in cases of urgency, if a panel had been formed, a decision would have been required within three months, rather than six months as in standard cases. (See Article 12.7 of the Uruguay Round Agreement on Dispute Settlement.)

4/ See, for example, the comments attributed to Mr. Jeffrey Garten, Undersecretary of Commerce for International Trade, reported in the International Trade Reporter, Vol. 12, No. 22, p. 921, May 31, 1995. Also see the discussion in Inside U.S. Trade, Vol. 13(23), June 23, 1995, p. 3.

repair and inspection system. 1/ The Japanese Ministry of International Trade and Industry would also send letters to Japanese dealers confirming their legal right to sell foreign autos. The Japanese Government and each major Japanese auto manufacturer would appoint a "contact person" who will address dealers' questions and concerns about their right to sell foreign cars. 2/ U.S. officials also announced voluntary plans by the five major Japanese auto manufacturers to increase their auto production in the United States from 2.1 million to 2.65 million units by 1989 and, as a result of these plans, the USTR estimated the purchase of U.S. auto parts would increase by \$6.75 billion by 1998. The USTR also announced that the five major Japanese auto manufacturers planned to purchase \$6 billion in foreign parts by 1998 to be used in the production of autos in Japan.

Japanese officials emphasized, however, that U.S. estimates related to voluntary plans of Japanese auto companies were not shared by their Government and were not part of the agreement. Other elements of the agreement included a commitment by the Japanese Government to increase support for the Japan Free Trade Commission (which oversees the administration of antitrust laws) and to take into account a number of U.S. government suggestions regarding the more effective enforcement of Japan's antimonopoly law, and objective criteria to monitor progress over the life of the agreement. 3/

c. The banana dispute

On October 17, 1994 the USTR initiated a Section 301 investigation of EU practices in the importation of bananas, alleging that EU practices discriminated against U.S. marketing and distribution companies (the petition came from Chiquita Brands International and the Hawaii Banana Industry Association). A preliminary finding was announced by the USTR

1/ Under Japanese regulations, any repair to "critical parts" had to be performed by certified garages, which the United States alleged were likely to have ties to Japanese auto manufacturers. The Government of Japan agreed (i) to engage in a one-year review of the critical parts list with the goal of deregulating any parts that are not central to health and safety concerns; (ii) to deregulate struts, shocks, power steering, and trailer hitches immediately; (iii) to a petition procedure to request that a critical part be removed from the list; and (iv) to issue regulations within about one year to establish a "specialized certified garage" system in which a garage may be authorized to repair any combination of vehicle systems on the critical parts list (e.g., mufflers, brakes). The Government of Japan also agreed to reduce the required number of government approved mechanics from three to two for "designated" garages, and from two to one for "certified" garages.

2/ The Japanese Government would also conduct a survey to determine how many and which Japanese dealers were interested in selling foreign vehicles and would use the results of that survey to facilitate joint dealerships.

3/ Both governments will review periodically a detailed set of quantitative and qualitative criteria to assess implementation of the agreement.

on January 9, 1995 stating that EU practices were adversely affecting U.S. economic interests. By mid-June 1995, no resolution to the dispute had been reached and talks were continuing.

In a related case, on January 9, 1995 the USTR initiated a Section 301 investigation of the practices of Colombia and Costa Rica in the exportation of bananas to the EU. The investigation centered on a framework agreement negotiated between the EU, Colombia, Costa Rica, Nicaragua, and Venezuela which authorizes the exporting governments to issue export licenses. Such licenses are required, in addition to EU import licenses, in order to gain access to the European market, and Chiquita Brands International (who petitioned the USTR for a Section 301 investigation) argued that the export licensing system was discriminatory. Discussions were continuing at mid-June 1995.

d. Korea

Following a petition from several U.S. meat industry associations on September 30, 1994, the USTR initiated a Section 301 investigation of Korean practices in respect of the importation of certain agricultural products on November 22, 1994. The petition alleged that Korea restricted the importation of U.S. pork and beef products related to shelf-life requirements in violation of a number of bilateral agreements. In late April 1995, the United States announced that it intended to invoke the WTO's dispute-settlement proceedings unless Korea published a modified food code by April 30. In the event, no agreement was reached and the United States formally notified the WTO in early May 1995 it was seeking consultations--consultations precede the formation of a dispute panel under WTO rules--with Korea over its system of shelf-life requirements.

e. Canada

The USTR announced on February 6, 1995 that a Section 301 investigation was being initiated to consider the decision of the Canadian Radio-Television Telecommunications Commission (CRTC) to end the distribution rights of a U.S. firm, Country Music Television (CMT). CMT had been operating in Canada since 1984. Canadian officials maintain that the broad exemption for cultural industries included in the NAFTA cover the CRTC's decision. The USTR announced in mid-June 1995 that it was preparing a list of possible trade sanctions that could be imposed if a June 21 deadline was not met.

In the event, on June 21, 1995 the USTR announced a tentative agreement in which the Nashville-based Country Music Television and the Canadian New Country Network would form a single Canadian country music network. The parties expected to conclude the details of the arrangement in 45 days, which would then require the approval of the Canadian Government. The USTR expressed the hope that the eventual implementation of the agreement would provide a basis for terminating the Section 301 investigation.

f. U.S.-Japan film dispute

On May 18, 1995 the Eastman Kodak company petitioned for a Section 301 investigation against Japan charging anticompetitive practices in the market for photographic film and paper. The USTR announced on July 3, 1995 that Kodak's petition had been accepted and a Section 301 investigation was initiated. The USTR must rule in the next 12 months.

7. Trade preferences for developing countries

At the beginning of 1995, Russia and the Baltic countries received preferential access to the U.S. market under the Generalized System of Preferences (GSP) program. Among the other countries of the former Soviet Union receiving GSP treatment at the beginning of 1995 were Armenia, Belarus, Kazakhstan, Kyrgyzstan, the Ukraine, and Uzbekistan. Among these, Armenia, Belarus, Kazakhstan, the Ukraine, and Uzbekistan were designated as GSP beneficiaries by the President in 1994. Romania and South Africa were also designated as GSP beneficiaries in 1994 and on March 24, 1995 the United States announced that preferential market access under the GSP program was being extended to the West Bank and Gaza Strip.

The countries of Central Europe are granted GSP treatment under the U.S. Trade Enhancement Initiative for Central Europe. In late 1994, the USTR began investigating the effects on U.S. interests of preferential tariffs accorded to the EU under the EU Association Agreements with the countries of Central Europe. If the review eventually concludes that this preferential access for the EU has, or is likely to have, an adverse effect on U.S. commerce, the USTR will initiate bilateral consultations intended to eliminate the preferences accorded the EU. If these preferences are not eliminated, GSP status may be withdrawn or suspended.

The USTR reported that no annual GSP review of labor practices and intellectual property rights protection was conducted this year. The results of a few ongoing investigations were not available at end-June 1995.

8. Foreign investment

Foreign acquisitions, mergers, and takeovers in the United States are reviewed under the "Exon-Florio provision" of the Defense Production Act. If upon a full investigation by the Committee on Foreign Investment in the United States (CFIUS), the President determines such action would threaten national security, the President may block that action. From June 1994 to end-May 1995, 81 transactions were subject to a 30-day review and no transactions were subject to the more comprehensive 45-day investigation. During this same period, the President did not prohibit any transactions on the basis of CFIUS investigations.

9. Other measures and issues

After the Coordinating Committee on Multilateral Export Controls (COCOM) was formally disbanded at end-March 1994, agreement was reached to

work toward completing negotiations on establishing a new multilateral export-control regime focusing on the non-proliferation of weapons. Talks for a replacement regime continued into 1995 and were ongoing at end-May. At that time there was a consensus that the basic parameters for a successor regime had been agreed. Since the dismantling of COCOM, exports of strategically sensitive products have been administered at the national level.

On April 30, 1995 President Clinton announced that most trade and investment with Iran would be embargoed for national security reasons. An executive order was signed by the President on May 9, 1995 detailing these restrictions, which include prohibitions on: (i) all exports to Iran except those for humanitarian purposes; (ii) all imports from Iran except Iranian-origin publications and materials imported for news publications or news broadcast dissemination; (iii) most re-exports to Iran; and (iv) certain financial transactions. Certain bank transactions will be allowed to continue. These restrictions became effective on June 6, 1995.

From July 1994, through June 20, 1995 there were no new notifications by the United States under IMF's Executive Board Decision No. 144-(52/51). 1/

1/ Executive Board Decision No. 144-(52/51) provides for a special procedure as an exception to Rule H-1 in the case of exchange restrictions imposed for the preservation of national or international security.

References

- Brown, Drusilla, Alan Deardorff, and Robert Stern, (1995), "Computational Analysis of Goods and Services Liberalization in the Uruguay Round," paper presented at The Uruguay Round and the Developing Countries, Washington: The World Bank, January 26-27.
- Francois, Joseph, Bradley McDonald, and Hakan Nordstrom, (1994), "The Uruguay Round: A Global General Equilibrium Assessment," Centre for Economic Policy Research (CEPR) Discussion Paper (forthcoming).
- _____, "Assessing the Uruguay Round," paper presented at The Uruguay Round and the Developing Countries, Washington: The World Bank, January 26-27.
- Halland, Jan, and T.C. Tollefsen, (1994), "The Uruguay Round and Trade in Manufactures and Services: General Equilibrium Simulations of Production, Trade, and Welfare Effects of Liberalization," Centre for Economic Policy Research (CEPR) Discussion Paper 1008.
- Harrison, Glen, Thomas Rutherford, and David Tarr, (1995), "Quantifying the Uruguay Round," paper presented at The Uruguay Round and the Developing Countries, Washington: The World Bank, January 26-27.
- Hoekman, Bernard, (1995), "Tentative First Steps: An Assessment of the Uruguay Round Agreement on Services," paper presented at The Uruguay Round and the Developing Countries, Washington: The World Bank, January 26-27.
- Schott, Jeffrey, (1994), The Uruguay Round: An Assessment, Institute for International Economics, Washington.
- U.S. Department of Agriculture (USDA), (1994), "Effects of the Uruguay Round Agreement on U.S. Agricultural Commodities," Office of Economics, Economic Research Service, March.

X. Official Development Assistance 1/

The U.S. budget for bilateral development assistance is channeled primarily through the Agency for International Development (USAID), the Economic Support Fund (ESF), multilateral development banks (MDB), and Public Law 480 food aid (Table X-1). The USAID provides financial support, mainly in the form of grants, with a focus on promoting projects related to agricultural development, population control, primary education, health, and the environment. The ESF contributes financial assistance to countries believed to be at a security risk; a large share of these funds is received by Israel and Egypt. Most of the contributions to MDBs are directed to the World Bank's International Development Association (IDA) which provides concessional lending to the poorest nations, mainly in Africa and South Asia. Food aid is administered under Public Law 480--Title 1 provides concessional loans for the purchase of U.S. agricultural commodities, Title 2 provides food aid to government and private organizations, and Title 3 provides food aid conditional on policy reforms.

In FY 1995, foreign assistance outlays on a budgetary basis are estimated to have increased by \$0.35 billion but as a share of GDP declined to 0.13 percent, continuing the downward trend in the share of outlays since the 1960s (Tables X-1 and X-2). 2/ The increase in outlays was principally for the New Independent States (NIS) as well as for the MDBs.

The Administration proposed an increase of \$0.3 billion (to \$9.5 billion) in foreign assistance outlays in FY 1996, which would maintain outlays roughly unchanged as a share of GDP. More than half of the increase was allocated to support the MDBs, including \$416 million aimed at reducing the outstanding level of U.S. arrears to the MDBs by about a half. On July 11, 1995 the House of Representatives voted to cut the Administration's budget request by about 20 percent. Nearly all categories of aid were reduced, but the largest reductions were in the areas of multilateral assistance programs and aid to the NIS. The House's appropriations bill would result in a sharp increase in U.S. arrears to the MDBs. Notably, the House bill reduced funding for IDA to \$575 million, leaving \$1.06 billion in unfunded commitments, and denied the Administration's request for \$25 million for the Fund's ESAF. 3/ The Senate is expected to vote on this legislation in the coming week.

1/ Prepared by William Lee.

2/ U.S. ODA (defined on an OECD Development Assistance Committee-basis) spending fell from over 1/2 percent of GDP in the early 1960s to about 1/4 percent of GDP in the 1970s, and to roughly 0.2 percent in the late 1980s.

3/ These cuts to IDA funding reflect a majority opinion in the House that poor nations benefit more from economic development through private investment flows rather than through direct assistance from multilateral institutions.

Table X-1. United States: Overseas Development Assistance on a Budget Basis

(In billions of dollars)

	Fiscal Years					
	1990	1991	1992	1993	1994 ^{1/}	1995 ^{2/}
Outlays for foreign assistance						
Agency for International Development	2.40	2.61	2.94	3.23	3.10	3.12
Assistance for New Independent States of the former Soviet Union	--	--	--	0.05	0.82	0.87
Economic Support Fund	3.72	4.32	2.94	3.23	2.85	2.72
Multilateral development banks	1.43	1.26	1.45	1.16	1.35	1.67
International organizations	0.27	0.26	0.27	0.38	0.37	0.38
PL 480 food aid	0.98	0.75	1.35	1.44	1.70	1.37
Enterprise for the Americas Initiative						
debt forgiveness ^{3/}	--	--	--	0.08	0.01	0.01
Refugee assistance	0.54	0.55	0.67	0.67	0.69	0.70
Peace Corps	0.11	0.18	0.20	0.21	0.22	0.23
Credit liquidating accounts ^{4/}	--	--	-0.48	-1.01	-0.57	-0.51
Offsetting receipts	-0.48	-0.53	-0.49	-0.94	-0.71	-0.62
Other	--	--	0.03	--	0.03	--
Total	8.97	9.40	8.87	8.52	9.66	9.94
(in percent of GDP)	0.16	0.17	0.15	0.14	0.15	0.14
Budget authority for foreign assistance						
Agency for International Development	2.62	3.30	3.24	3.41	3.09	3.23
Assistance for New Independent States of the former Soviet Union	--	--	--	1.02	1.46	0.90
Economic Support Fund	3.96	4.04	3.23	2.68	2.10	2.43
Multilateral development banks	1.47	1.63	1.52	1.58	1.45	2.00
International organizations	0.27	0.28	0.28	0.32	0.36	0.40
PL 480 food aid	0.98	1.00	1.49	1.52	1.47	1.25
Enterprise for the Americas Initiative						
debt forgiveness ^{3/}	--	--	--	0.09	0.01	0.01
Refugee assistance	0.51	0.66	0.67	0.67	0.72	0.88
Peace Corps	0.17	0.19	0.20	0.22	0.22	0.23
Credit liquidating accounts ^{4/}	--	--	-0.48	-1.01	-0.57	-0.51
Offsetting receipts	-0.48	-0.53	-0.49	-0.94	-0.71	-0.62
Other	--	--	0.03	--	0.03	--
Total	9.50	10.58	9.67	9.55	9.82	10.00
(in percent of GDP)	0.17	0.19	0.16	0.15	0.15	0.14

Source: U.S. Agency for International Development.

^{1/} FY 1994 figures are estimates.

^{2/} Notwithstanding the Administration's request under a new budget account structure in FY 1995, the data are presented in the old format under which it is likely to be appropriated in FY 1995.

^{3/} Credit reform principles implemented in FY 1992 required budget authority and outlays for the subsidy component of debt relief.

^{4/} The FY 1994 budget reclassified the receipt of repayments of certain development loans as credit liquidating accounts from FY 1992.

Table X-2. United States: Net Disbursements of Overseas Development Assistance ^{1/}

(In millions of dollars)

	1989	1990	1991	1992	1993
<u>Bilateral</u>	<u>6,827</u>	<u>8,367</u>	<u>9,396</u>	<u>7,859</u>	<u>7,005</u>
Europe	-29	-44	240	-40	172
Africa	1,855	3,529	4,077	3,003	2,505
Of which: Egypt	905	2,346 ^{2/}	2,964 ^{3/}	1,662 ^{4/}	939
Latin America	1,221	1,343	1,407	790	742
Of which: El Salvador	311	247	...	230	207
Bolivia	69	84	86	133	81
Middle East	1,284	1,413	1,648	1,996	1,359
Of which: Israel	1,152	1,296	1,261	1,900	1,262
South Asia	567	458	422	331	325
Far East	221	283	239	219	287
Of which: The Philippines	193	249	224	229	270
Asia unspecified	36	35	52	56	31
Oceania	178	74	39	23	181
Worldwide unspecified	1,493	1,276	1,272	1,481	1,403
<u>Multilateral</u>	<u>849</u>	<u>3,028</u>	<u>1,875</u>	<u>3,850</u>	<u>2,716</u>
<u>Total</u>	<u>7,676</u>	<u>11,395</u>	<u>11,271</u>	<u>11,709</u>	<u>9,721</u>
(in percent of GDP)	0.15	0.21	0.20	0.19	0.15
<u>Memorandum item</u>					
Least-developed countries	761	985	912	1,005	1,268

Source: "Memorandum of the United States to the Development Assistance Community: Aid Review for 1993-1994", U.S. Agency for International Development, (July 1994).

^{1/} On an OECD Development Assistance Committee (DAC) calendar year basis. Note that flows to Central and Eastern European countries and to the former Soviet Union are not included. As of 1993, the OECD DAC no longer included forgiveness of foreign military debt.

^{2/} Includes forgiveness of \$1.2 billion of military debt.

^{3/} Includes forgiveness of \$1.85 billion of military debt.

^{4/} Includes forgiveness of \$895 million of military debt.

Table 1. United States: Historical Economic Indicators

	<u>Averages</u>			1989	1990	1991	1992	1993	1994
	1960s	1970s	1980s						
<u>(Annual percentage change, unless otherwise noted)</u>									
<u>Economic activity and prices</u>									
Real GDP	4.1	2.8	2.5	2.5	1.2	-0.6	2.3	3.1	4.1
Real net exports 1/	-1.0	1.1	-1.7	0.6	0.4	0.7	-0.3	-0.8	-0.7
Real final domestic demand	4.1	2.7	2.6	1.7	1.3	-1.2	2.5	3.7	4.1
Of which:									
Consumer spending	4.2	3.3	2.8	1.9	1.5	-0.4	2.8	3.3	3.5
Nonresidential fixed investment	6.0	4.2	1.9	1.7	1.2	-5.7	2.0	12.5	13.7
Labor force	1.7	2.7	1.7	1.8	0.8	0.4	1.3	0.8	2.3
Employment	1.9	2.4	1.7	2.0	0.5	-0.9	0.6	1.5	3.1
Unemployment rate (percent of labor force)	4.8	6.2	7.3	5.3	5.5	6.7	7.4	6.8	6.1
Labor productivity 2/	2.4	1.3	0.8	-0.9	0.4	1.5	2.7	1.3	1.9
Total factor productivity 2/	1.9	1.0	--	-0.6	-0.5	-0.9	1.1	0.7	...
Capital stock 3/	4.4	3.8	2.8	2.4	2.1	1.2	1.0	2.1	3.3
GDP deflator	2.7	7.0	5.2	4.6	4.3	3.8	2.8	2.2	2.1
Fixed weight deflator for GDP	...	...	...	4.5	4.5	4.0	3.2	3.0	2.7
Consumer price index	2.3	7.1	5.5	4.8	5.4	4.2	3.0	3.0	2.6
<u>(In percent of GDP or NNP)</u>									
<u>Balance of payments</u>									
Current account	0.5	--	-1.9	-2.0	-1.7	-0.1	-1.1	-1.6	-2.2
Trade balance	0.7	-0.5	-2.3	-2.2	-2.0	-1.3	-1.6	-2.1	-2.5
Invisibles balance	-0.1	0.5	0.4	0.2	0.3	1.2	0.5	0.5	0.2
Real net exports 4/	-0.6	-0.7	-1.7	-1.5	-1.1	-0.4	-0.6	-1.4	-2.1
<u>Saving and investment</u>									
National saving	16.6	17.0	15.4	14.1	13.0	13.1	12.0	12.4	13.7
General government balance	-0.1	-1.0	-2.5	-1.5	-2.5	-3.2	-4.3	-3.4	-2.0
Of which: Federal	-0.2	-1.7	-3.6	-2.3	-2.9	-3.5	-4.7	-3.8	-2.4
Gross private saving	16.7	17.9	17.9	15.6	15.5	16.4	16.3	15.8	15.6
Personal	4.7	5.5	4.7	2.9	3.1	3.7	4.1	3.0	3.0
Business	12.0	12.4	13.2	12.7	12.5	12.7	12.2	12.8	12.6
Gross private investment	15.8	17.0	17.0	15.8	14.6	13.0	13.1	13.9	15.3
Net national saving	8.8	7.9	4.3	3.4	2.4	2.4	1.2	2.1	3.4
Net private investment	7.9	7.9	6.1	5.4	4.2	2.3	2.4	3.8	5.3
<u>(In percent)</u>									
<u>Monetary</u>									
Growth rate of M2 5/	7.0	9.6	8.0	4.0	5.3	3.2	2.1	1.3	1.9
Three-month Treasury bill interest rate 6/	4.0	6.3	8.8	8.1	7.5	5.4	3.4	3.0	4.2
Ten-year government note interest rate 6/	4.7	7.5	10.6	8.5	8.6	7.9	7.0	5.9	7.1

Sources: U.S. Department of Commerce; and Board of Governors of the Federal Reserve System (supplied by Haver Analytics).

- ^{1/} Contribution to GDP growth.
- ^{2/} Private nonfarm business sector.
- ^{3/} Business sector.
- ^{4/} On a national accounts basis.
- ^{5/} Year-over-year.
- ^{6/} Yearly average.

Table 2. United States: Prices, Productivity, and Costs

(Percent changes)

	Averages							
	1961-70	1971-80	1981-90	1991	1992	1993	1994	1995 1/
<u>Implicit price deflators</u>								
(seasonally adjusted) 2/								
GDP	3.2	7.6	4.5	2.7	2.7	1.3	1.3	2.2
Personal consumption expenditures	2.8	7.4	4.7	3.4	3.9	2.2	1.9	2.2
Private residential fixed investment	2.7	9.4	3.7	-2.1	3.9	2.7	4.3	1.9
Private nonresidential fixed investment	2.7	8.6	2.5	-1.8	-1.9	-1.9	-3.0	-1.5
Structure	3.4	9.8	2.9	-2.4	3.2	3.1	5.4	2.6
Producer's durable equipment	2.1	7.7	2.3	-1.5	-3.4	-2.8	-5.1	-2.4
<u>Producer price indices</u>								
(nonseasonally adjusted) 3/								
Finished goods	1.7	8.7	2.9	-3.9	-1.9	-3.8	1.0	2.1
Finished goods less food & energy	1.7	8.7	2.9	-3.9	-1.9	-3.8	1.0	2.9
Consumer goods	1.5	8.9	2.8	-5.8	-1.9	-3.9	1.0	1.8
Consumer goods less food & energy	...	...	3.7	3.6	2.6	3.5	2.6	3.0
Capital equipment	2.3	8.1	3.4	0.9	--	--	2.7	2.4
Intermediate goods	1.5	10.1	2.2	-3.1	-2.1	-4.0	2.0	6.6
Crude goods	1.3	11.5	0.9	-21.6	-10.1	-13.2	18.3	5.2
Foodstuffs and feedstuffs	1.1	9.8	-0.2	1.2	23.2	22.8	15.3	-2.5
Other	...	14.3	1.6	-32.1	-27.8	-33.4	19.3	10.5
<u>Consumer price indices, all urban consumers</u>								
(nonseasonally adjusted) 3/								
All items	2.9	8.0	4.5	0.9	-0.8	--	--	3.2
All items less food & energy	3.2	7.3	5.0	--	-0.8	--	-2.3	3.6
Food	2.6	8.7	4.0	4.5	3.5	7.0	13.1	1.8
Energy	1.4	12.9	2.2	1.2	-6.7	-14.0	-10.8	2.1
Durable commodities	1.8	6.7	2.8	2.1	1.0	2.0	3.9	2.4
Services	4.1	8.5	5.7	4.1	1.6	3.0	--	4.3
Medical care	5.4	8.8	8.1	6.1	2.5	1.8	3.9	4.4
<u>Nonfarm business sector</u>								
(seasonally adjusted) 2/								
Output per hour	2.4	1.2	0.8	2.2	3.9	4.2	4.5	2.7
Output	3.9	3.1	2.6	1.2	6.0	8.2	7.7	4.8
Hours	1.4	1.9	1.7	-0.7	2.4	3.3	3.5	1.9
Hourly compensation	5.4	8.8	4.9	5.0	4.5	1.5	3.7	4.5
Real compensation per hours	2.4	0.8	0.3	1.9	1.1	-1.5	1.5	1.1
Unit labor costs	2.9	7.6	4.0	3.1	0.9	-2.6	-0.3	1.4
Unit nonlabor payments	3.0	7.4	4.7	0.5	14.3	7.2	2.3	1.2
Implicit price deflator	2.9	7.5	4.2	2.1	5.0	0.8	0.5	1.7

Sources: Bureau of Economic Analysis, U.S. Department of Commerce; and Bureau of Labor Statistics, U.S. Department of Labor (supplied by Haver Analytics).

^{1/} For monthly data, December 1994 to June 1995 at an annual rate; for quarterly data, fourth quarter 1994 to first quarter 1995.

^{2/} Four-quarter percentage change.

^{3/} 12-month percentage change.

Table 3. United States: Bank Reserves, Monetary Aggregates, and Interest Rates

	Bank Reserves	M1	M2	Federal Funds	Interest Rates		
					3-Month Treasury Bills	10-Year Treasury Note	30-Year Treasury Bonds
	(Percent change, annual rate) 1/			----- (Percent) 2/-----			
1992 - I	25.6	16.5	3.9	3.98	4.04	7.54	7.97
- II	14.8	11.2	0.2	3.76	3.66	7.26	7.84
- III	9.3	10.7	1.1	3.22	2.91	6.42	7.34
- IV	25.4	16.0	2.6	2.92	3.22	6.77	7.44
1993 - I	9.8	7.9	-1.0	3.07	2.95	5.98	6.82
- II	10.6	11.2	2.2	3.04	3.07	5.96	6.81
- III	12.4	11.8	2.8	3.09	2.95	5.36	6.00
- IV	14.0	9.7	2.7	2.96	3.06	5.77	6.25
1994 - I	3.3	5.5	1.8	3.34	3.50	6.48	6.91
- II	-3.1	2.7	1.7	4.25	4.14	7.10	7.40
- III	-1.9	2.4	0.9	4.73	4.62	7.46	7.71
- IV	-3.3	-1.2	-0.3	5.45	5.60	7.81	7.87
1995 - I	-3.7	--	1.6	5.98	5.73	7.20	7.45
- II	-8.0	0.9	4.2	6.00	5.47	6.17	6.57

Source: Board of Governors of the Federal Reserve System (supplied by Haver Analytics).

1/ From preceding period, at annual rate. Monthly data are averages of daily figures; quarterly data are averages of monthly figures.

2/ Quarterly figures are for the last month of the quarter.

Table 4. United States: General Government Receipts and Expenditures,
National Income Accounts Basis

	1987	1988	1989	1990	1991	1992	1993	1994
(In billions of dollars)								
Receipts	1,405.2	1,492.4	1,622.6	1,709.1	1,759.0	1,849.1	1,970.6	2,124.6
Personal tax and nontax receipts	512.5	527.7	593.3	623.3	623.7	648.6	686.4	742.1
Corporate profits tax accruals	127.1	137.0	141.3	138.7	131.1	139.7	173.2	202.5
Indirect business tax and nontax accruals	365.0	385.3	414.7	444.0	478.3	504.4	525.3	554.0
Contributions for social insurance ^{1/}	400.7	442.3	473.2	503.1	525.9	556.4	585.6	626.0
Expenditures	1,516.9	1,590.7	1,700.1	1,847.5	1,944.9	2,106.9	2,185.6	2,257.5
Purchases of goods and services	881.5	918.7	975.2	1,047.4	1,097.4	1,125.3	1,148.4	1,175.3
Compensation of employees	478.7	511.7	548.8	592.8	630.5	661.2	686.6	712.6
Other	402.8	407.0	426.3	454.7	466.9	464.1	461.7	462.7
Transfer payments (net)	531.8	566.2	615.1	679.5	721.4	854.4	908.4	955.8
To persons	521.3	555.9	603.8	666.3	749.2	837.9	892.6	939.9
To rest of the world	10.4	10.4	11.3	13.2	-27.8	16.5	15.7	15.9
Net interest paid	95.4	101.8	112.4	125.2	135.5	133.7	130.2	136.7
Less: dividends received by government	5.9	6.9	8.1	9.0	9.5	10.1	10.4	10.9
Subsidies less current surplus of government enterprises	14.1	10.9	5.4	4.5	-0.1	3.5	9.0	0.7
Less: wage accruals less disbursements	--	--	--	0.1	-0.1	--	--	--
Surplus or deficit (-)	-111.7	-98.3	-77.5	-138.4	-185.9	-257.8	-215.0	-132.9
Social insurance funds	81.9	109.9	124.5	123.6	110.9	99.5	100.3	118.7
Other funds	-193.6	-208.2	-202.1	-262.1	-296.8	-357.4	-315.3	-251.6
(In percent of GDP)								
Receipts	31.0	30.5	30.9	30.8	30.7	30.7	31.1	31.5
Personal tax and nontax receipts	11.3	10.8	11.3	11.2	10.9	10.8	10.8	11.0
Corporate profits tax accruals	2.8	2.8	2.7	2.5	2.3	2.3	2.7	3.0
Indirect business tax and nontax accruals	8.0	7.9	7.9	8.0	8.4	8.4	8.3	8.2
Contributions for social insurance ^{1/}	8.8	9.0	9.0	9.1	9.2	9.2	9.2	9.3
Expenditures	33.4	32.5	32.4	33.3	34.0	35.0	34.5	33.5
Purchases	19.4	18.7	18.6	18.9	19.2	18.7	18.1	17.4
Compensation of employees	10.5	10.4	10.5	10.7	11.0	11.0	10.8	10.6
Other	8.9	8.3	8.1	8.2	8.2	7.7	7.3	6.9
Transfer payments	11.7	11.6	11.7	12.3	12.6	14.2	14.3	14.2
To persons	11.5	11.3	11.5	12.0	13.1	13.9	14.1	13.9
To rest of the world	0.2	0.2	0.2	0.2	-0.5	0.3	0.2	0.2
Net interest paid	2.1	2.1	2.1	2.3	2.4	2.2	2.1	2.0
Less: dividends received by government	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2
Subsidies less current surplus of government enterprises	0.3	0.2	0.1	0.1	-0.0	0.1	0.1	0.0
Less: Wage accruals less disbursements	--	--	--	0.0	-0.0	--	--	--
Surplus or deficit (-)	-2.5	-2.0	-1.5	-2.5	-3.2	-4.3	-3.4	-2.0
Social insurance funds	1.8	2.2	2.4	2.2	1.9	1.7	1.6	1.8
Other funds	-4.3	-4.2	-3.8	-4.7	-5.2	-5.9	-5.0	-3.7

Source: Bureau of Economic Analysis, U.S. Department of Commerce (supplied by Haver Analytics).

^{1/} Social insurance includes federal social security as well as other government unemployment and retirement programs.

Table 5. United States: Federal Government Transactions,
National Income Accounts Basis

	1987	1988	1989	1990	1991	1992	1993	1994
(In billions of dollars)								
Receipts	913.8	972.3	1,059.3	1,111.4	1,128.7	1,178.3	1,265.7	1,379.0
Personal tax and nontax receipts	400.6	410.1	461.9	484.3	475.8	489.5	520.3	565.6
Corporate profits tax accruals	103.2	111.0	117.1	116.4	108.1	115.6	143.0	167.1
Indirect business tax and nontax accruals	58.4	60.9	61.9	65.8	79.9	81.3	84.6	91.2
Contributions for social insurance ^{1/}	351.5	390.4	418.5	444.8	465.0	491.9	517.8	555.1
Expenditures	1,065.6	1,109.0	1,181.6	1,274.9	1,331.6	1,460.9	1,507.0	1,538.1
Purchases of goods and services	384.9	387.0	401.6	426.5	445.8	449.0	443.6	437.3
National defense	292.1	295.6	299.9	314.0	322.8	314.2	302.7	292.3
Nondefense	92.9	91.4	101.7	112.5	123.1	134.8	140.9	145.0
Transfer payments (net)	412.2	436.3	471.5	514.1	522.2	625.3	658.0	682.5
To foreigners	10.4	10.4	11.3	13.2	-27.8	16.5	15.7	15.9
To persons	401.8	425.9	460.2	500.9	550.0	608.8	642.2	666.6
Of which: unemployment benefits	14.6	13.6	14.5	19.2	26.9	39.6	34.6	23.7
Grants-in-aid to state and local governments	102.8	111.3	118.2	132.3	153.3	172.2	186.1	197.6
Net interest paid	136.6	146.0	164.8	176.5	187.8	186.8	183.6	191.5
Subsidies less current surplus of government enterprises	29.1	28.4	25.5	25.6	22.4	27.6	35.7	29.2
Less: wage accruals less disbursements	--	--	--	0.1	-0.1	--	--	--
Surplus or deficit (-)	-151.8	-136.6	-122.3	-163.5	-202.9	-282.7	-241.4	-159.1
Social insurance funds ^{1/}	27.0	53.2	62.2	62.9	47.5	33.2	34.0	53.1
Other funds	-178.9	-189.8	-184.6	-226.5	-250.3	-315.8	-275.4	-212.2
(In percent of GDP)								
Receipts	20.1	19.8	20.2	20.0	19.7	19.6	20.0	20.5
Personal tax and nontax receipts	8.8	8.4	8.8	8.7	8.3	8.1	8.2	8.4
Corporate profits tax accruals	2.3	2.3	2.2	2.1	1.9	1.9	2.3	2.5
Indirect business tax and nontax accruals	1.3	1.2	1.2	1.2	1.4	1.4	1.3	1.4
Contributions for social insurance ^{1/}	7.7	8.0	8.0	8.0	8.1	8.2	8.2	8.2
Expenditures	23.5	22.6	22.5	23.0	23.3	24.3	23.8	22.8
Purchases of goods and services	8.5	7.9	7.6	7.7	7.8	7.5	7.0	6.5
National defense	6.4	6.0	5.7	5.7	5.6	5.2	4.8	4.3
Nondefense	2.0	1.9	1.9	2.0	2.2	2.2	2.2	2.2
Transfer payments	9.1	8.9	9.0	9.3	9.1	10.4	10.4	10.1
To foreigners	0.2	0.2	0.2	0.2	-0.5	0.3	0.2	0.2
To persons	8.9	8.7	8.8	9.0	9.6	10.1	10.1	9.9
Of which: unemployment benefits	0.3	0.3	0.3	0.3	0.5	0.7	0.5	0.4
Grants-in-aid to state and local governments	2.3	2.3	2.3	2.4	2.7	2.9	2.9	2.9
Net interest paid	3.0	3.0	3.1	3.2	3.3	3.1	2.9	2.8
Subsidies less current surplus of government enterprises	0.6	0.6	0.5	0.5	0.4	0.5	0.6	0.4
Less: wage accruals less disbursements	--	--	--	0.0	-0.0	--	--	--
Surplus or deficit (-)	-3.3	-2.8	-2.3	-2.9	-3.5	-4.7	-3.8	-2.4
Social insurance funds ^{1/}	0.6	1.1	1.2	1.1	0.8	0.6	0.5	0.8
Other funds	-3.9	-3.9	-3.5	-4.1	-4.4	-5.2	-4.3	-3.1

Source: Bureau of Economic Analysis, U.S. Department of Commerce (supplied by Haver Analytics).

^{1/} Social insurance includes federal social security as well as other government unemployment and retirement programs.

Table 6. United States: State and Local Government Transactions,
National Income Accounts Basis

	1987	1988	1989	1990	1991	1992	1993	1994
(In billions of dollars)								
Receipts	594.3	631.3	681.5	730.0	783.6	842.9	891.0	943.2
Personal tax and nontax receipts	111.8	117.6	131.4	138.9	147.9	159.1	166.1	176.5
Corporate profits tax accruals	23.9	26.0	24.2	22.3	23.0	24.2	30.3	35.4
Indirect business tax and nontax accruals	306.5	324.5	352.8	378.2	398.4	423.1	440.7	462.9
Contributions for social insurance ^{1/}	49.2	51.9	54.8	58.3	61.0	64.5	67.8	70.9
Federal grants-in-aid	102.8	111.3	118.2	132.3	153.3	172.2	186.1	197.6
Expenditures	554.2	593.0	636.7	704.9	766.6	818.1	864.7	917.0
Purchases of goods and services	496.6	531.7	573.6	620.9	651.6	676.3	704.7	738.0
Transfer payments to persons	119.6	130.0	143.6	165.4	199.2	229.0	250.4	273.3
Net interest paid	-41.2	-44.2	-52.3	-51.3	-52.3	-53.1	-53.4	-54.8
Subsidies less current surplus of government enterprises	-14.9	-17.5	-20.1	-21.1	-22.5	-24.0	-26.7	-28.6
Less: wage accruals less disbursements	--	--	--	--	--	--	--	--
Less: dividends received	5.9	6.9	8.1	9.0	9.5	10.1	10.4	10.9
Surplus or deficit (-)	40.1	38.4	44.8	25.1	17.0	24.8	26.3	26.2
Social insurance funds ^{1/}	54.8	56.8	62.3	60.7	63.4	66.4	66.3	65.6
Other funds	-14.7	-18.4	-17.5	-35.6	-46.5	-41.6	-40.0	-39.3
(In percent of GDP)								
Receipts	13.1	12.9	13.0	13.2	13.7	14.0	14.0	14.0
Personal tax and nontax receipts	2.5	2.4	2.5	2.5	2.6	2.6	2.6	2.6
Corporate profits tax accruals	0.5	0.5	0.5	0.4	0.4	0.4	0.5	0.5
Indirect business tax and nontax accruals	6.8	6.6	6.7	6.8	7.0	7.0	6.9	6.9
Contributions for social insurance ^{1/}	1.1	1.1	1.0	1.1	1.1	1.1	1.1	1.1
Federal grants-in-aid	2.3	2.3	2.3	2.4	2.7	2.9	2.9	2.9
Expenditures	12.2	12.1	12.1	12.7	13.4	13.6	13.6	13.6
Purchases of goods and services	10.9	10.9	10.9	11.2	11.4	11.2	11.1	11.0
Transfer payments to persons	2.6	2.7	2.7	3.0	3.5	3.8	3.9	4.1
Net interest paid	-0.9	-0.9	-1.0	-0.9	-0.9	-0.9	-0.8	-0.8
Subsidies less current surplus of government enterprises	-0.3	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4
Less: wage accruals less disbursements	--	--	--	--	--	--	--	--
Less: dividends received	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2
Surplus or deficit (-)	0.9	0.8	0.9	0.5	0.3	0.4	0.4	0.4
Social insurance funds ^{1/}	1.2	1.2	1.2	1.1	1.1	1.1	1.0	1.0
Other funds	-0.3	-0.4	-0.3	-0.6	-0.8	-0.7	-0.6	-0.6

Source: Bureau of Economic Analysis, U.S. Department of Commerce (supplied by Haver Analytics).

^{1/} Social insurance includes federal social security as well as other government unemployment and retirement programs.

Table 7. United States: Balance of Payments
(In billions of dollars, unless otherwise indicated)

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995 ^{1/}
Current account	-151.2	-167.1	-128.2	-102.8	-91.7	-6.9	-67.9	-99.9	-151.2	-162.0
(Percent of GDP)	-3.5	-3.7	-2.6	-2.0	-1.7	-0.1	-1.1	-1.6	-2.2	-2.3
Goods and services	-138.8	-152.0	-114.8	-90.3	-78.8	-28.5	-40.4	-74.8	-106.2	-120.1
Merchandise trade	-145.1	-159.6	-127.0	-115.2	-109.0	-74.1	-96.1	-132.6	-166.1	-180.2
(Percent of GDP)	-3.4	-3.5	-2.6	-2.2	-2.0	-1.3	-1.6	-2.1	-2.5	-2.6
Exports	223.3	250.2	320.2	362.1	389.3	416.9	440.4	456.8	502.5	552.2
Imports	-368.4	-409.8	-447.2	-477.4	-498.3	-491.0	-536.5	-589.4	-668.6	-732.4
Services	6.3	7.6	12.1	24.9	30.2	45.6	55.7	57.8	59.9	60.1
Investment income	11.8	7.9	11.6	13.7	20.7	14.8	4.5	9.0	-9.3	-10.8
Unilateral transfers	-24.2	-23.1	-25.0	-26.1	-33.7	6.7	-32.0	-34.1	-35.8	-31.1
 Private capital, net	 87.4	 116.0	 102.1	 65.3	 17.8	 20.8	 41.9	 -6.5	 121.1	 20.4
Direct investment, net	18.5	31.0	41.8	30.9	18.0	-5.2	-31.1	-31.5	0.1	-34.5
U.S. direct investment abroad	-17.1	-27.2	-15.4	-36.8	-29.9	-31.3	-41.0	-72.6	-49.4	-73.6
Foreign direct investment in the United States	35.6	58.2	57.3	67.7	47.9	26.1	9.9	41.1	49.5	39.1
Securities	70.5	29.2	38.7	46.3	-29.7	9.2	21.6	-37.9	42.6	158.2
U.S. net purchases of foreign securities	-4.3	-5.3	-7.8	-22.1	-28.8	-44.7	-45.1	-141.8	-49.8	-23.1
Foreign purchases of U.S. securities	74.8	34.5	46.6	68.4	-0.9	54.0	66.7	103.9	92.4	181.3
Net inflows reported by U.S. banking offices	16.8	44.4	9.8	-6.4	12.2	8.8	37.8	50.8	115.3	-103.3
Other	-18.4	11.3	11.7	-5.6	17.3	8.0	13.6	12.1	-36.9	--
 Official capital, net	 33.9	 55.5	 38.9	 -15.5	 34.0	 25.9	 43.1	 70.4	 44.4	 64.1
U.S. official reserves	0.3	9.1	-3.9	-25.3	-2.2	5.8	3.9	-1.4	5.3	-21.3
Foreign official assets in the United States	35.6	45.4	39.8	8.5	33.9	17.2	40.9	72.1	39.4	85.3
Other U.S. government assets	-2.0	1.0	3.0	1.3	2.3	2.9	-1.7	-0.3	-0.3	0.1
 Statistical discrepancy	 29.9	 -4.4	 -12.7	 53.1	 39.9	 -39.7	 -17.1	 36.0	 -14.3	 77.5

Source: Bureau of Economic Analysis, U.S. Department of Commerce (supplied by Haver Analytics).

^{1/} First quarter, seasonally adjusted at an annual rate.

Table 8. United States: Merchandise Trade Balance

(In billions of dollars unless otherwise indicated)

	1989	1990	1991	1992	1993	1994	1995 ^{1/}
Trade balance	-115	-109	-74	-96	-133	-166	-180
In percent of GDP	2.2	2.0	1.3	1.6	2.1	2.5	2.6
Exports	362	389	417	440	457	503	552
Growth in value	13.1	7.5	7.1	5.6	3.7	10.0	9.9
Growth in volume	10.9	7.5	7.6	7.8	5.8	10.3	8.8
Imports	477	498	491	537	589	669	732
Growth in value	6.7	4.4	-1.5	9.3	9.9	13.4	9.6
Growth in volume	3.9	1.9	0.7	11.1	12.9	14.0	7.9

Source: Bureau of Economic Analysis, U.S. Department of Commerce (supplied by Haver Analytics); and staff estimates.

^{1/} First quarter, seasonally adjusted at an annual rate.

Table 9. United States: Merchandise Export Developments

(In percent)

	1989	1990	1991	1992	1993	1994		
						Contri- bution	Growth	Share
<u>(Contribution to growth of merchandise exports by commodity)</u>								
Food, feed, and beverages	8.7	-8.5	2.4	19.4	2.2	2.9	3.3	8.4
Industrial supplies	23.6	21.2	15.6	-1.7	13.8	21.2	8.7	24.2
Capital goods	48.8	50.5	49.8	38.6	37.3	50.8	12.7	40.9
Automotive vehicles and parts	3.7	5.7	12.8	29.8	32.7	11.4	9.9	11.5
Consumer goods (nonfood)	22.9	22.9	11.5	23.4	19.6	11.7	9.7	11.9
Other	-7.8	8.2	7.9	-9.5	-5.6	2.1	6.3	3.2
Total	100.0	100.0	100.0	100.0	100.0	100.0	10.0	100.0
Export growth	13.1	7.5	7.1	5.6	3.7	10.0	...	...
<u>(Contribution to growth of merchandise exports by region)</u>								
Western Europe	29.6	48.8	19.5	-10.1	-18.9	9.3	3.7	23.4
Canada	16.8	8.9	8.7	23.5	57.9	30.9	13.6	23.3
Japan	16.5	14.8	-2.1	-1.4	-1.1	11.6	11.0	10.5
Eastern Europe	4.2	-4.5	1.8	3.4	3.3	-1.9	-13.5	1.1
Other Western Hemisphere	12.8	20.5	32.2	52.0	16.6	31.2	17.7	18.7
Other Asia and Africa	20.1	11.4	39.9	32.7	42.2	18.9	8.0	23.0
Total	100.0	100.0	100.0	100.0	100.0	100.0	10.0	100.0
Export growth	13.1	7.5	7.1	5.6	3.7	10.0	...	...

Source: Bureau of Economic Analysis, U.S. Department of Commerce (supplied by DRI).

Table 10. United States: Merchandise Import Developments

(In percent)

						1994		
	1989	1990	1991	1992	1993	Contri- bution	Growth	Share
<u>(Contribution to growth of merchandise imports by commodity)</u>								
Food, feed, and beverages	0.5	7.5	2.4	2.5	0.5	3.9	11.1	4.6
Industrial supplies	41.2	46.3	160.9	17.5	22.4	15.7	8.2	24.7
Capital goods	34.0	17.1	-61.8	29.6	34.2	40.5	21.0	27.6
Automotive vehicles and parts	-1.9	5.2	36.6	13.3	20.1	20.0	15.5	17.7
Consumer goods (nonfood)	23.3	8.8	-36.0	32.0	21.4	15.5	9.2	21.9
Other	2.9	15.0	-2.2	5.1	1.5	4.3	16.9	3.6
Total	100.0	100.0	100.0	100.0	100.0	100.0	13.4	100.0
Import growth	6.7	4.4	-1.5	9.3	9.9	13.4	...	...
<u>(Contribution to growth of merchandise imports by region)</u>								
Western Europe	-0.7	33.2	100.5	20.6	17.9	15.1	9.9	20.0
Canada	17.8	15.5	0.9	17.0	23.3	22.5	15.7	19.7
Japan	12.5	-15.5	-26.0	11.2	18.4	15.0	11.1	17.9
Eastern Europe	-0.3	1.0	6.5	0.4	2.9	2.9	65.4	0.9
Other Western Hemisphere	20.3	33.6	18.9	13.4	11.2	16.9	17.8	13.3
Other Asia and Africa	50.4	32.2	-0.8	37.4	26.2	27.6	13.2	28.2
Total	100.0	100.0	100.0	100.0	100.0	100.0	13.4	100.0
Import growth	6.7	4.4	-1.5	9.3	9.9	13.4	...	...

Source: Bureau of Economic Analysis, U.S. Department of Commerce (supplied by DRI).

Table 11. United States: Services Account Developments

(In billions of dollars)

	1989	1990	1991	1992	1993	1994	1995 ^{1/}
Services receipts, net (In percent of GDP)	25 (0.5)	30 (0.5)	46 (0.8)	56 (0.9)	58 (0.9)	60 (0.9)	60 (0.9)
Military	-7	-8	-6	-3	--	2	3
Receipts	9	10	11	11	13	12	12
Payments	15	18	16	14	12	10	-10
Travel	3	6	13	15	17	17	16
Receipts	36	43	48	54	58	60	60
Payments	33	37	35	39	41	44	-44
Passenger fares	2	5	6	6	5	5	5
Receipts	11	15	16	17	17	17	18
Payments	8	11	10	11	11	13	-13
Other transportation	-0	-1	-1	-1	-3	-2	-3
Receipts	21	22	22	23	24	26	27
Payments	21	23	23	23	27	28	-31
Royalties and license fees	11	14	14	15	16	17	18
Receipts	14	17	18	20	21	22	24
Payments	3	3	4	5	5	6	-6
Other private services	17	17	21	24	23	23	23
Receipts	36	40	47	51	55	59	60
Payments	20	23	26	27	32	36	-37
Government services	-1	-1	-1	-1	-1	-2	-2
Receipts	1	1	1	1	1	1	1
Payments	2	2	2	2	2	3	-3

Source: Bureau of Economic Analysis, U.S. Department of Commerce (supplied by Haver Analytics).

^{1/} First quarter, seasonally adjusted annual rate.

Table 12. United States: Investment Income Account

(In billions of dollars)

	1989	1990	1991	1992	1993	1994	1995 ^{1/}
Investment income, net (In percent of GDP)	14 (0.3)	21 (0.4)	15 (0.3)	5 (0.1)	9 (0.1)	-9 (-0.1)	-11 (--)
Portfolio investment income	-35	-35	-41	-43	-47	-54	-66
Private	-2	-5	-7	-10	-11	-11	-13
Receipts	91	91	77	57	53	66	82
Payments	94	96	84	67	63	77	95
Government	-33	-31	34	-33	-36	-43	-52
Receipts	6	11	8	7	5	4	5
Payments	38	41	42	40	42	47	57
Direct investment income	49	56	55	48	56	45	55
Receipts	55	59	52	50	62	68	84
Payments	7	3	-3	2	5	23	29

Source: Bureau of Economic Analysis, U.S. Department of Commerce (supplied by Haver Analytics).

^{1/} First quarter at a seasonally adjusted annual rate.

Table 13. United States: Regional Contributions to Growth of Imports and Exports ^{1/}
(In percent)

	1989	1990	1991	1992	1993	1994		
						Contri- bution	Growth	Share
<u>Imports of goods and services</u>								
Western Europe	4.7	42.0	128.1	20.3	21.7	16.0	8.0	23.8
Canada	16.6	10.4	-7.9	16.1	21.4	21.3	15.1	17.9
Japan	11.8	-4.4	-46.7	9.6	18.3	14.5	10.6	16.8
Eastern Europe	-0.1	1.2	3.7	1.1	2.7	3.0	53.1	1.0
Other Western Hemisphere	21.7	24.9	9.1	13.4	11.8	17.4	15.7	14.1
Other Asia and Africa	45.3	25.8	13.7	39.5	24.1	27.7	13.1	26.4
Total	100.0	100.0	100.0	100.0	100.0	100.0	12.2	100.0
Import growth	6.3	6.2	-1.1	8.0	9.4	12.2	...	...
<u>Exports of goods and services</u>								
Western Europe	32.3	41.6	23.4	12.3	-4.7	11.9	3.7	26.9
Canada	16.8	10.2	10.1	15.0	35.4	23.9	11.1	19.4
Japan	18.1	14.5	5.0	2.2	5.3	14.6	10.9	12.0
Eastern Europe	3.5	-1.9	1.5	2.4	4.2	-0.9	-5.9	1.1
Other Western Hemisphere	12.7	19.1	25.9	37.6	21.0	29.5	15.3	18.0
Other Asia and Africa	16.6	16.4	34.0	30.5	38.8	21.0	8.1	22.6
Total	100.0	100.0	100.0	100.0	100.0	100.0	8.8	100.0
Export growth	13.7	9.7	8.1	6.3	4.5	8.8	...	...

Source: Bureau of Economic Analysis, U.S. Department of Commerce (supplied by DRI).

^{1/} Goods and services excluding military flows.

Table 14. United States: Contribution to Growth of Service Flows by Type of Service
(In percent)

	1989	1990	1991	1992	1993	1994		
						Contri- bution	Growth	Share
Imports								
Military	-7.2	14.7	-184.8	-78.7	-18.2	-21.8	-15.8	7.4
Travel	32.0	26.1	-334.3	113.9	18.7	32.2	7.0	31.4
Passenger fares	12.7	15.1	-85.0	18.4	7.7	15.6	12.2	9.1
Other transportation	27.5	18.2	-17.1	5.0	34.0	20.5	6.8	20.4
Royalties and license fees	-1.4	4.0	154.9	28.3	-1.4	9.1	16.5	4.1
Other private services	37.5	21.6	533.8	7.3	58.9	40.8	11.3	25.6
Government services	-1.2	0.3	32.6	5.7	0.3	3.7	13.9	1.9
Total	100.0	100.0	100.0	100.0	100.0	100.0	6.8	100.0
Import Growth	4.2	14.8	0.5	2.8	7.6	6.8	...	...
Exports								
Military	-4.2	6.7	6.0	-0.7	16.3	-2.1	-1.8	6.2
Travel	40.2	33.3	33.7	44.2	32.1	23.1	4.4	30.4
Passenger fares	10.0	22.8	3.5	8.4	-3.2	7.9	5.2	8.8
Other transportation	6.4	7.0	2.5	2.7	11.4	19.1	8.7	13.1
Royalties and license fees	12.0	13.8	9.2	13.6	6.4	16.4	8.7	11.3
Other private services	36.1	16.0	45.0	30.6	36.7	35.8	7.1	29.7
Government services	-0.5	0.4	0.1	1.3	0.3	-0.2	-2.0	0.4
Total	100.0	100.0	100.0	100.0	100.0	100.0	5.8	100.0
Export Growth	15.3	16.1	10.9	8.2	6.3	5.8	...	...

Source: Bureau of Economic Analysis, U.S. Department of Commerce (supplied by Haver Analytics).

Table 15. United States: Sources and Uses of Funds--Gross Basis ^{1/}

(In percent of nominal GDP)

	Average										
	1960s	1970s	1980s	1987	1988	1989	1990	1991	1992	1993	1994
Sources of funds											
Gross private saving	16.7	17.9	17.9	16.1	16.4	15.6	15.5	16.4	16.3	15.8	15.6
Personal	4.7	5.5	4.7	3.1	3.2	2.9	3.1	3.7	4.1	3.0	3.0
Business	12.0	12.4	13.2	13.0	13.2	12.7	12.5	12.7	12.2	12.8	12.6
State and local surplus	--	0.8	1.1	0.9	0.8	0.9	0.5	0.3	0.4	0.4	0.4
Net foreign saving	-0.6	-0.2	1.7	3.4	2.4	1.7	1.4	-0.1	0.9	1.5	2.1
Total	16.1	18.5	20.6	20.4	19.6	18.2	17.4	16.5	17.6	17.7	18.1
Uses of funds											
Gross private investment	15.8	17.0	17.0	16.5	16.2	15.8	14.6	13.0	13.1	13.9	15.3
Residential	4.8	5.1	4.5	5.0	4.7	4.4	3.9	3.3	3.7	3.9	4.2
Nonresidential	10.0	11.2	12.1	11.0	11.1	10.8	10.6	9.7	9.3	9.7	10.4
Inventories	1.0	0.8	0.4	0.6	0.3	0.6	0.1	--	0.1	0.2	0.8
Federal government deficit	0.2	1.7	3.6	3.3	2.8	2.3	2.9	3.5	4.7	3.8	2.4
Total	16.0	18.7	20.6	19.8	19.0	18.2	17.5	16.6	17.8	17.7	17.7
Memorandum item											
Gross national saving ^{2/}	16.5	17.0	15.4	13.6	14.4	14.1	13.0	13.1	12.0	12.4	13.7

Source: Bureau of Economic Analysis, U.S. Department of Commerce (supplied by Haver Analytics).

^{1/} For savings and investment, the National Income and Product Accounts (NIPA) include an unallocated discrepancy. Government balances are on an NIPA basis.^{2/} Gross private saving plus the general government balance.

Table 16. United States: Sources and Uses of Funds--Net Basis 1/
(In percent of NNP)

	Average										
	1960s	1970s	1980s	1987	1988	1989	1990	1991	1992	1993	1994
Sources of funds	<u>8.2</u>	<u>9.5</u>	<u>10.2</u>	<u>10.5</u>	<u>9.7</u>	<u>8.0</u>	<u>7.3</u>	<u>6.2</u>	<u>7.5</u>	<u>8.0</u>	<u>8.4</u>
Net private saving	8.9	8.9	7.2	5.7	6.1	5.1	5.2	6.1	6.0	5.9	5.6
Personal	5.1	6.1	5.3	3.5	3.6	3.2	3.4	4.1	4.6	3.4	3.4
Business	3.9	2.8	1.8	2.1	2.6	1.9	1.8	1.9	1.4	2.5	2.2
State and local surplus	--	0.9	1.2	1.0	0.9	1.0	0.5	0.3	0.5	0.5	0.4
Net foreign saving	-0.7	-0.3	1.9	3.8	2.7	1.9	1.6	-0.2	1.1	1.6	2.4
Uses of funds	<u>8.1</u>	<u>9.8</u>	<u>10.1</u>	<u>9.9</u>	<u>9.1</u>	<u>8.0</u>	<u>7.4</u>	<u>6.3</u>	<u>7.7</u>	<u>8.0</u>	<u>7.9</u>
Net private investment	7.9	7.9	6.1	6.1	5.9	5.4	4.2	2.3	2.4	3.8	5.3
Fixed investment	6.8	7.1	5.7	5.5	5.6	4.7	4.0	2.3	2.4	3.5	4.4
Inventories	1.0	0.8	0.5	0.6	0.4	0.7	0.1	--	0.1	0.3	0.9
Federal government deficit	0.2	1.9	4.0	3.8	3.1	2.6	3.3	4.0	5.3	4.3	2.6
Memorandum items											
National saving, net 2/	8.7	7.9	4.3	2.9	3.9	3.4	2.4	2.4	1.2	2.1	3.4
National saving, gross 3/	16.5	17.0	15.4	13.6	14.4	14.1	13.0	13.1	12.0	12.4	13.7

Source: Bureau of Economic Analysis, U.S. Department of Commerce (supplied by Haver Analytics).

1/ For savings and investment, the National Income and Product Accounts (NIPA) include an unallocated discrepancy.

2/ Net private saving plus the general government balance.

3/ Gross private saving plus the general government balance in percent of GDP.