PRINCETON STUDIES IN INTERNATIONAL FINANCE
No. 65, October 1989

THE EMERGENCE AND PERSISTENCE OF THE U.S. EXTERNAL IMBALANCE, 1980-87

PETER HOOPER
AND
CATHERINE L. MANN

INTERNATIONAL FINANCE SECTION
DEPARTMENT OF ECONOMICS
PRINCETON UNIVERSITY
PRINCETON, NEW JERSEY

PRINCETON STUDIES IN INTERNATIONAL FINANCE

PRINCETON STUDIES IN INTERNATIONAL FINANCE are published by the International Finance Section of the Department of economics of Princeton University. While the Section sponsors the Studies, the authors are free to develop their topics as they wish. The Section welcomes the submission of manuscripts for publication in this and its other series. See the Notice to Contributors at the back of this Study.

The authors of this Study, Peter Hooper and Catherine L. Mann, are, respectively, Assistant Director and Economist in the Division of International Finance, Board of Governors of the Federal Reserve System. During part of the time that this study was written, Peter Hooper was a guest scholar at The Brookings Institution and Catherine Mann was on a Ford Foundation fellowship at the National Bureau of Economic Research and a member of the staff of the World Bank. The authors have written and published widely in the fields of international trade and finance.

PETER B. KENEN, *Director*
International Finance Section

PRINCETON STUDIES IN INTERNATIONAL FINANCE
No. 65, October 1989

THE EMERGENCE AND PERSISTENCE OF THE U.S. EXTERNAL IMBALANCE, 1980-87

PETER HOOPER
AND
CATHERINE L. MANN

INTERNATIONAL FINANCE SECTION
DEPARTMENT OF ECONOMICS
PRINCETON UNIVERSITY
PRINCETON, NEW JERSEY

Library of Congress Cataloging-in-Publication Data

Hooper, Peter, 1947-
The emergence and persistence of the U.S. external imbalance, 1980/87 / Peter Hooper and Catherine L. Mann.
p. cm.—(Princeton studies in international finance ; no. 65)
Includes bibliographical references.
ISBN 0-88165-237-7
1. Balance of payments—United States. 2. Balance of trade—United States. I. Mann, Catherine L. II. Title. III. Series.
HG3883.U7H66 1989
382'.17'0973—dc20 89-19795
CIP

Printed in the United States of America by Princeton University Press at Princeton, New Jersey.

International Standard Serial Number: 0081-8070
International Standard Book Number: 0-88165-237-7
Library of Congress Catalog Card Number: 89-19795

CONTENTS

LIST OF TABLES

LIST OF FIGURES

1 INTRODUCTION AND SUMMARY

The emergence of a massive U.S. current-account deficit has been one of the most striking and troublesome macroeconomic developments of the 1980s. This study analyzes both the initial causes of this deficit and the reasons for its persistence through 1987 despite a sharp decline in the dollar between early 1985 and late 1987.

Much has been written on the causes of the deficit and, more recently, on its persistence. We begin with a review of this literature in Chapter 2. We see several distinct perspectives on the causes and persistence that are, in fact, complementary; to a certain extent, these perceptions reflect different levels of analysis from within an internally consistent model.

At one level, a number of studies have attributed the deficit to the decline in U.S. price competitiveness (associated with the appreciation of the dollar during the early 1980s), the relative strength of domestic growth in the United States, and the international debt situation. The relative importance of these factors in explaining the origin of the deficit varies across the studies, as do the roles these factors may play in resolving the deficit.

At a more fundamental level, the origin of the deficit has been attributed to shifts in U.S. monetary and fiscal policies that reduced the national savings rate while raising real interest rates, domestic growth, and the dollar, relative to other countries. Several studies blame the U.S. fiscal expansion as the major causal factor; some even claim that the external deficit will persist until the federal budget deficit is reduced. Others stress the importance of the U.S. monetary contraction in the early 1980s and exogenous shifts in international preferences for dollar assets.

While the literature focuses predominantly on macroeconomic causes, bilateral deficits with certain countries, particularly Japan, have been exam-

---

The views expressed in the study are the authors' and do not necessarily reflect the views of the Federal Reserve Board, the World Bank, The Brookings Institution, NBER, or other members of their staffs. This study represents a major revision, updating, and extension of a paper by the same authors entitled "The U.S. External Deficit: Its Causes and Persistence," which was originally prepared for a conference on "U.S. Trade Deficit: Causes, Consequences and Cures" at the Federal Reserve Bank of St. Louis on October 23-24, 1987, and appears in a conference volume of the same title edited by Albert E. Burger and published by Kluwer Academic Publishers of Boston. We have benefited significantly from the extensive comments and suggestions of an anonymous referee, as well as from comments and suggestions by William L. Helkie, David H. Howard, Ellen E. Meade, Jaime R. Marquez, Kathryn A. Morisse, and Lois Stekler. We also thank Virginia Carper, Lucia Foster, and Kathryn A. Larin for their excellent research assistance.

ined from the microeconomic standpoint as well. These studies find microeconomic distortions, such as financial deregulation, agricultural policy, export controls, and foreign-trade barriers, to be of secondary importance as *causes* of the deficit. However, the role of trade barriers in the *persistence* of the deficit may be more important. Because so much attention is being given to microeconomic—particularly protectionist—solutions to the deficit, we devote considerable space to microeconomic reasons for the deficit and its persistence.

Chapter 3 presents our own framework for macroeconomic and microeconomic analysis, which is general enough to encompass the various perspectives outlined in the literature review. The basic macroeconomic framework is drawn from an expectations-augmented Mundell-Fleming model. We outline the partial-equilibrium net export sector, as well as various accounting identities related to the external balance, that can be extracted from the underlying macroeconomic model. We also describe the model of exchange-rate determination that is used in our empirical analysis.

In Chapter 4 we briefly review the data on the widening and persistence of the external deficit in both real and nominal terms. This review covers trends in the overall deficit and its major trade and service-account components since 1980, as well as some details on key developments in the trade account by commodity and region and by quantity and price.

Our empirical analysis of the partial-equilibrium "causes" of the deficit—that is, the roles of relative economic growth and changes in relative prices—is presented in Chapter 5. On the basis of an analysis of conventional trade equations, we find that the change in relative prices associated with the rise in the dollar between 1980 and early 1985 was the most important partial-equilibrium factor. The relatively rapid growth through 1986 of GNP and especially domestic expenditures ($C + I + G$) in the United States, as compared with the rest of the world, also contributed significantly to the widening of the deficit through 1986. In empirical tests, we find little basis for choosing between GNP and domestic expenditures as the determinant of trade volumes, and we conclude, largely on *a priori* grounds, that a combination of the two is appropriate. Using either measure of growth, the widening of the deficit between 1980 and 1986 can be more than accounted for by changes in prices and growth in the United States relative to the rest of the world.

We also find that a conventional macro trade model that reflects the experience of the past two decades (a slightly revised version of the model documented by Helkie and Hooper, 1988) performs reasonably well in predicting the persistence of the *nominal* trade deficit through 1987. That is, the persistence of the nominal deficit can be explained for the most part by normal lags in the adjustment of trade flows to exchange-rate changes. How-

ever, the model does noticeably less well in explaining the persistence of the trade deficit in *real* terms. While the trade deficit measured in constant dollars was substantially smaller in 1987 than it would have been if the dollar had not declined from its peak (*ceteris paribus*), trade *volumes* were adjusting more slowly to the fall in the dollar than the model predicted. The model's prediction error reflected in part the underprediction of import volumes owing to the overprediction of import prices. Import prices rose less rapidly than past experience would have suggested, given the magnitude of the decline in the dollar, partly because of an apparent squeezing of foreign profit margins. The sluggishness of import prices also reflected to a significant degree a reduction in foreign production costs that is not adequately picked up in movements in aggregate foreign prices, and a continued sharp decline in prices of business machines, whose share in imports has been growing rapidly. We discuss the measurement of foreign costs and the merits of alternative measures of U.S. import prices at the end of Chapter 5.

In Chapter 6 we analyze the causes of the deficit at the more fundamental level of the domestic and foreign policy mix. This chapter begins with an analysis of the contribution of changes in long-term real interest rates to movements in the dollar in real terms (based on an open-interest-parity model). We find that this primary channel through which macroeconomic policies influence real exchange rates can explain much, but not all, of the longer-term movements in the dollar in real terms. We then draw on the results of simulations with a wide range of macroeconometric models in an effort to quantify the effects of shifts in policies. The simulation results suggest that the fiscal expansion in the United States and the fiscal contraction in other industrial countries during the first half of the 1980s can explain about two-thirds of the U.S. external deficit, but that they explain a much smaller proportion of the rise in the interest differential and the dollar. According to the models, the shift in relative fiscal policies alone (holding money growth at home and abroad unchanged) would have widened the current-account deficit primarily through a greater increase in GNP growth in the United States than abroad. However, when the shifts in fiscal policies are combined with the relative tightening of U.S. monetary policy that took place in the early 1980s, we can explain roughly two-thirds of both the rise in the dollar and the widening of the external deficit. The remainder of the deficit we attribute to debt problems in developing countries, to agricultural policies, to a significant appreciation of the dollar during 1984 that was not related to economic fundamentals, and to a decline in the U.S. private savings rate.

In Chapter 7 we turn to an analysis of microeconomic factors that may have contributed to the deficit and its persistence. In particular, we examine the pricing behavior of U.S. and foreign exporters and possible structural

changes in the passthrough relationship that may help to explain the persistence of the deficit. We also investigate the contribution to the external deficit of protectionist policies and other barriers to trade at home and abroad.

We find evidence of a shift in the pricing of U.S. imports and exports that has tended to dampen the effects of the dollar's decline and prolong the deficit. We suggest that barriers to trade, both at home and abroad, probably contributed only marginally to the initial widening of the deficit. However, protection abroad, along with quantitative restraints on U.S. imports and restrictions at home on U.S. exports, may have become a more significant factor underlying the recent persistence of the deficit despite the dollar's sharp decline.

In Chapter 8 we present our conclusions, as well as the implications we draw from this study of the past and present for possible courses of action in the future.

2 LITERATURE REVIEW

The magnitude of the U.S. current-account deficit is nearly matched by the volume of material that has been produced to explain its existence. Our objective in this chapter is not so much an exhaustive review of the literature as an attempt to generalize it and place it within a common framework, which is developed further in the next chapter. From this common framework we can learn how the similarities and differences of emphasis and results yielded by these analyses can generate quite different views on appropriate and effective policy for reducing the deficit.

There are three distinct but related approaches to analyzing the causes of the deficit. Two are macroeconomic in focus; the third is microeconomic. These approaches are distinct in that they can lead to different policy prescriptions, but they are related in that they are all derived to some extent from the basic open-economy IS-LM model. The approaches are distinguished by the degree to which they (a) focus on the partial-equilibrium current account per se, (b) explain the movements in the variables that are taken as exogenous in the partial-equilibrium approach by analyzing the deficit within a full general-equilibrium model, (c) focus on accounting identities that are derived from a general-equilibrium model, or (d) factor microeconomic incentives into the analysis.

One of the key factors influencing the slow adjustment of the real trade deficit appears to be the behavior of import prices. (A complete discussion occupies the last section of Chapter 5 and Chapter 7.) Therefore, much of the literature on persistence focuses on microeconomic theories of pricing strategies and evidence from industry. Pricing strategies are found to depend on strength of market demand, degree of market competition, adjustment costs, and expectations about exchange-rate movements. We review first the literature on causes, and then the literature on persistence.

The partial-equilibrium "elasticities" approach usually ascribes the widening of the deficit to the appreciation of the dollar and the differences between growth rates of economic activity in the United States and in the other industrial countries. The debt crisis is often assigned a separate role. This is partial analysis in that the movements in the dollar, the differences in economic activity, and the debt crisis are taken as given. The theoretical foundations for this approach are outlined in Laursen-Metzler (1950), which examines the conditions for a successful devaluation, and Dornbusch (1980), for example.

Authors representing this strand of the literature do not necessarily agree on the attribution of the deficit to the two major factors, dollar appreciation and growth, and so they may not agree on policy prescriptions. For

example, even though Bergstrand (1987), Bryant and Holtham (1987), Helkie and Hooper (1988), Krugman and Baldwin (1987), Marquez (1988a), Marris (1985), Reinhart (1986), and Richardson (1987) agree that the rise in the dollar accounts for most of the deterioration in the current account, they interpret this result from different policy perspectives.

The volume equations are specified differently by Helkie and Hooper (HH), Krugman and Baldwin (KB), Marquez, and Marris, who provide perhaps the most comprehensive sets of estimates. HH use GNPs as activity variables and include a proxy for secular shifts in relative supplies (which are not adequately captured in movements in relative prices) in a model of the U.S. current account, whereas KB use domestic expenditures and do not include proxies for supply shifts in a model of the partial trade balance. The result is that HH attribute substantially less of the deficit to the income growth differentials (since the GNP growth differentials were much less than the domestic-expenditure growth differentials and since the inclusion of supply proxies tends to reduce the income elasticity of demand for imports). Nevertheless, even with their specification, KB suggest that we would still be left with a sizable deficit even if the growth gap were closed. They conclude that a trend decline in the dollar is necessary to close the deficit. Bosworth (1987), commenting on KB, notes that the importance of trend terms in U.S. trade equations has been declining over time, thereby casting doubt on KB's conclusion. Hooper (1987), also commenting on KB, notes that the supply proxy in the HH model has been decelerating over time, consistent with Bosworth's findings.

Marquez uses GNP with no supply proxies in a global bilateral model of merchandise trade and attributes about two-thirds of the U.S. deficit to appreciation of the dollar and one-third to relative GNP growth. In a model of the U.S. current account (with imposed coefficients, and in which aggregate trade-volume equations are a function of GNPs and relative prices), Marris concludes that the growth gap accounts for about a fourth of the $103 billion widening of the current-account deficit between 1980 and 1984, while the strong dollar accounts for about two-thirds. The debt crisis and the decline in net investment income account for the rest.

Bergstrand and Reinhart both estimate bilateral trade equations. Bergstrand covers bilateral trade between the United States and Canada, France, Germany, Japan, and the United Kingdom; Reinhart covers just U.S.-Japan trade. Bergstrand's results corroborate the results of HH's and KB's work. Reinhart attributes a significantly larger amount of the bilateral U.S.-Japan trade deficit to the slow growth of income in Japan relative to the United States, suggesting a greater role for jawboning the Japanese into expanding their economies.

Bryant and Holtham (BH) reflect on the results of a January 1987 Brookings workshop on the U.S. current account, which compared simulations

obtained from a number of partial-equilibrium models of the U.S. current account (including the HH model); the simulations involved changes in exchange rates and in U.S. and foreign growth. One implication they draw from the results is that only coordinated macroeconomic policy—fiscal expansion overseas and fiscal contraction in the United States—along with a moderate further decline in the dollar will significantly reduce the deficit. Excessive dependence on the dollar for adjustment is likely to result in too much inflation in the United States and in deflation abroad. Failure of the foreign economies to expand in conjunction with a fiscal contraction in the United States is a recipe for world recession.

A somewhat different tack is taken by representatives of the accounting approach to the balance of payments. Total domestic savings minus investment equals the current-account deficit. Therefore, the proximate cause of the deficit must be either booming investment in the United States relative to overseas, as suggested by Darby (1987), or a U.S. savings rate that is too low relative to foreign savings rates, especially that in Japan (a view espoused by many, including Bergsten and Cline, 1985). Mundell (1987) and McKinnon and Ohno (1986) both outline a savings-investment link to the current account that suggests the irrelevance of the exchange rate to current-account equilibrium. As KB point out, however, this result apparently rests on the strong assumption that changes in nominal exchange rates do not have a lasting influence on relative prices. Persson and Svensson (1985) also examine these linkages in a theoretical framework that focuses on how the current account evolves when shocks to the terms of trade and real interest rates are transmitted through savings and investment. They reach very different conclusions from all the authors mentioned above about the efficacy of using exchange-rate changes to achieve current-account equilibrium.

Of course, most of these authors recognize that the exchange rate, income, savings, and investment are all endogenous, and many of them either appeal to articles or have themselves written articles that link the partial-equilibrium elasticities explanation for the deficit with the general-equilibrium policy-fundamentals approach. This linking tends to focus on one or another of the proximate causes—movements in the dollar, the growth gap, or savings and investment rates—and then proceeds to explain these factors using the policy fundamentals—fiscal policy, monetary policy, or the policy mix in the United States by itself or in concert with (or in contradiction to) the policies of other major industrial countries. Within this literature there are widely varying views about the fundamental causes of the deficit. Consequently, there are very different views on the proper cure. The proliferation of literature has tended to obscure the basic question. Krugman (1987d) reminds us that virtually all empirical evidence points to the key role of exchange-rate adjustment. The issue then is how policies affect exchange-rate adjustment.

Those who lean more or less toward "budget deficit" or fiscal-policy explanations include Branson, Fraga, and Johnson (1985), BH, Elwell and Reifman (1986), Feldstein (1986a), HH (1988), Hooper (1985), Hutchinson and Piggot (1984), Laney (1984), and Marris (1985). The general idea is that the U.S. fiscal expansion (in many cases, in conjunction with fiscal contraction abroad) led to faster U.S. growth, an increase in the long-term real-interest-rate differential, and an appreciation of the dollar, all of which caused the current account to deteriorate. A good survey of the theoretical underpinnings of these and counterarguments, which essentially asks under what conditions Ricardian equivalence holds, is provided by Leiderman and Blejer (1987).

Darby (1987) points to tight money in the United States as the fundamental cause of the deficit. He argues that there has been little empirical evidence supporting the notion that budget deficits and real interest rates are linked, whereas money growth and interest rates are clearly linked. Thus, it was the tightening by the Fed that led to increases in real interest rates, which—along with tax-cut-induced declines in the cost of capital—made investment in the United States more attractive and caused the dollar to appreciate and the current account to plunge.

Some studies have stressed the role of "microincentives" to save, invest, or diversify investment portfolios. Darby, Gillingham, and Greenlees (1987) view the cut in U.S. tax rates as contributing to the attractive investment opportunities in the United States. Hayes, Hutchison, and Mikesell (HHM) (1986a) and others look to the structure of Japanese society for an explanation of high Japanese savings rates. Bergsten and Cline (1985), Friedman and Sinai (1987), HHM (1986a), and Saxonhouse (1983) suggest that changes in financial regulation affected the demand for U.S. dollar assets, contributing to the appreciation of the dollar and the deterioration of the trade balance.

Some authors reject the notion that there is only one villain, explicitly stressing the role of the "policy mix"—fiscal expansion and monetary contraction in the United States in combination with the opposite mix overseas—in leading to the speed and degree of deterioration of the deficit. Authors taking this line include Feldstein (1986b), HHM (1986b), Obstfeld (1985), and Sachs (1985).

To complete the macroeconomic viewpoints, there are the full-scale general-equilibrium models that are specified in terms of the policy fundamentals and structural attributes of the economies. One theoretical foundation for this school is in Dornbusch and Fischer (1980). Authors who use quantitative macroeconomic models to analyze the causes of the deficit include HH (1988), using the Federal Reserve Board's Multi-Country Model, among others;[1] Masson and Blundell-Wignall (1985), using the OECD's

[1] HH employed the results of simulations in a group of global macroeconometric models that were featured in a March 1986 Brookings Institution conference reported in Bryant et al., eds. (1988).

MINILINK model; and Sachs and Roubini (1987), using the McKibben-Sachs Global Model, MSG2. These models often differ in their policy conclusions, in part because of different treatments of expectations and intertemporal constraints. In part, also, these authors have tended to focus on the policy experiment they believe is most relevant to explain the existence of the deficit (for backward-looking analysis) or is the most likely to be followed (for forward-looking analysis). Sachs and Roubini (1987) focus relatively more on fiscal experiments (as do Masson and Blundell-Wignall, 1985), and their model shows the U.S. external balance to be relatively more sensitive to shifts in fiscal policy than do other models. The work of HH and Hooper, who average the results of a diverse set of models, is reviewed and extended in Chapter 6 below.

While most of the literature on the deficit has a macroeconomic focus, a growing portion addresses the microeconomic factors underlying the deficit. To a certain extent, this literature reflects the increasing interest in the effects of productivity and competitiveness on external balance. On the whole, however, studies in this area suggest that microeconomic factors contributed only marginally to the widening of the deficit.

One notable exception to that general finding is in agriculture. Thompson (1987) and Tucker (1987) both argue that the halving of agricultural exports between 1981 and 1984 (which nevertheless accounts for only about $10 billion of the $160 billion deficit) was overwhelmingly due to the price supports written into the 1981 farm bill. The support prices were set well above world price levels for much of the first half of the decade. This choice of domestic-policy instrument, along with the international debt crisis, the appreciation of the dollar, and the success of the Common Agricultural Policy, apparently doomed U.S. agricultural exports.

Trend movements in productivity and technological competitiveness are the focus of KB (1987), Krugman and Hatsopoulos (1987), and Marston (1986). These authors argue that the severity of the deterioration of the deficit was the result of macroeconomic factors combined with an underlying decline in the technological leadership of the United States and a slowdown in U.S. productivity growth relative to growth in other major industrial countries, especially Japan and Germany. In part, this catching up is to be expected as the U.S. economy matures. (Japan, itself, may be slowing down relative to Korea.) But these authors argue that general trends in productivity growth that are captured in aggregate price indexes mask a significant deterioration in relative productivity in the United States in key traded goods, particularly capital goods. Since capital goods represent more than a third of U.S. trade, any significant change in the competitiveness of these products will have a substantial effect on overall trade volumes and therefore on the deficit. These analyses suggest that the dollar must fall substantially further than is suggested by purchasing-power-parity calculations

using overall wholesale-price indexes (as in McKinnon and Ohno, 1987) before the current account will improve.

A related topic is whether the appreciation of the dollar led to a structural loss in the competitiveness of U.S. manufactured exports that can be regained only at a much lower level of the dollar. This argument, and some empirical investigation, is in Baldwin (1988), Baldwin and Krugman (1986), Krugman (1987a, 1987c), and KB (1987). United States exporters may have retreated from international markets because of the strong dollar. Because the costs of entering a market are quite high, the dollar will have to fall much lower before it is worthwhile for U.S. exporters to reenter foreign markets. A similar calculation faces foreign suppliers of imports to the U.S. market.

A number of authors have investigated the role of trade barriers; U.S.-Japan bilateral trade flows are a frequent focus. As a rule, these analyses (BC, 1985; Bergsten and Williamson, 1983; Bergstrand, 1986; Christelow, 1985-86; HHM, 1986a, 1986b; and Saxonhouse, 1983 and 1986) find only a small role for trade barriers. For example, a figure of about $10 billion is frequently mentioned as the maximum improvement in the deficit if all Japanese trade barriers were removed. Moreover, many of these authors point out that relaxing U.S. export controls, especially on certain agricultural products and crude oil, would lead to an improvement in the deficit of about the same magnitude. Another set of authors, Darby (1987) and Kaempfer and Willet (1987), argue that macroeconomic forces determine the magnitude of the deficit and microeconomic elements determine the composition of trade.

Some authors have looked to the theoretical literature on industry structure to see how external shocks might be transmitted through the economy to contribute to the deficit. Once again, these authors (Baldwin, 1988; Berner, 1987; Mann, 1986a; and Woo, 1984) find that microeconomic structure plays only a small role in causing the deficit. Pricing strategies associated with an imperfectly competitive industry structure, which may be a consequence of product type, production technology, or trade barriers (see Dornbusch, 1987), lead foreign firms to absorb exchange-rate movements into profit margins, offsetting to some degree the relative price signals that change trade volumes. While these changes were probably overshadowed by macroeconomic factors causing the deficit to widen, imperfect competition and trade barriers might play a more significant role in the persistence of the real deficit.

This persistence (in the face of a sharp fall in the dollar) is a newer issue that until quite recently has received less direct attention in the literature than the initial causes of the deficit. HH and KB both address the persistence of the deficit and conclude that it reflects for the most part normal lags in the adjustment to a depreciation of the dollar that followed a long period of appreciation. These studies also note that the deficit, while persistent in nominal terms, was considerably smaller in real terms by late 1986

than it would have been in the absence of the depreciation of the dollar, *ceteris paribus*. In addition, a number of authors point out that the dollar really had not fallen as much in real terms as some aggregate exchange-rate indexes have suggested, particularly against the currencies of key developing countries. Berner (1987) also cites various structural factors, such as the offshore migration of U.S. firms and the rapid growth of industrial capacity in certain developing countries, as reasons for the persistence of the deficit. Recent research on persistence in trade flows has focused on the link between changes in exchange rates and in U.S. import prices. (This link is often called "passthrough.") The focus derives partly from work by Mann (1986a) and from this study (see the last section of Chapter 5), which suggests that the relationship between exchange rates and import prices during the 1980s was anomalous. Baldwin (1988) subjected the exchange-rate coefficient in the import-price equation to a battery of statistical tests of structural stability that suggest that the passthrough of exchange-rate changes to import prices was lower during the 1980s. In addition, work by Marquez (1988b) shows that the speed of adjustment of U.S. trade flows to policy changes is quite sensitive to small changes in own-price elasticities.

Most research on passthrough is based on models with imperfect competition or adjustment costs. Knetter (1989) and Ohno (1988) show that Japanese and German exporters have price-discriminated between their own domestic markets and the U.S. market. In both countries, exporting firms followed a pricing-to-market strategy in the United States as the dollar depreciated, instead of allowing the depreciation to increase prices. Loopesko and Johnson (1988) also find that Japanese export prices (in yen) followed the dollar down. Gagnon (1988) explicitly tests and rejects the hypothesis of perfect competition. He finds that costs of adjusting levels of trade, perhaps associated with Baldwin's (1988) "beachhead" effect, are a key determinant of the persistence of trade flows. Froot and Klemperer (1988) suggest that this export-pricing behavior results from a desire to maintain a stable market share in the United States in combination with the belief that the dollar's movements are temporary. Baldwin and Lyons (1988) focus on the role of exchange-rate volatility in affecting the passthrough coefficient. In another line of attack, Mann (1986b) and Klein (1988) introduce the macroeconomy into the passthrough equation, examining the effect on passthrough of robust aggregate demand in the United States (Mann) and the differential effect of goods-market vs. money-market shocks on passthrough (Klein).

We turn now to a description of our own framework for analyzing the causes and persistence of the U.S. external deficit, a framework that draws heavily on the work that has been reviewed here.

3 ANALYTICAL FRAMEWORK

Our analysis of the causes and persistence of the U.S. external deficit adopts several of the approaches that were covered in Chapter 2. We consider macroeconomic factors, employing both partial-equilibrium and general-equilibrium analysis; we also consider microeconomic factors. We outline these approaches in more detail here and illustrate the extent to which they can be derived from a consistent analytical framework.

Partial-Equilibrium Analysis

Our partial-equilibrium approach involves analyzing the contributions of "proximate determinants" in a structural model of the external balance. The standard structural model includes behavioral equations for the volumes and prices of imports and exports of goods and services, plus identities defining the overall balance. An example of a fairly complete partial-equilibrium model of the U.S. external balance is provided by HH. The reduced form of this model can be written

$$X - M = f(Y, Y^*, EP/P^*, Z), \tag{1}$$

where $X - M$ is nominal net exports, Y and Y^* are home and foreign income, EP/P^* is the real exchange rate (the nominal rate times the ratio of home to foreign prices), and Z is a vector of other factors (oil prices, interest rates, asset stocks, and so on) that directly affect the value of trade in goods and services.

Analyzing the causes of the deficit under this approach entails quantifying the contributions of changes in each of the major proximate determinants on the right-hand side of equation (1), based on estimates of the structural relationships underlying this reduced-form equation. In Chapter 5 we review the calculations made by others and add our own, based on a respecification of some of the import- and export-volume equations estimated by HH and KB.

General-Equilibrium Analysis

The general-equilibrium approach involves identifying the contributions of changes in policies and other fundamentally exogenous factors through simulations with a complete model of the world economy. Our empirical analysis in Chapter 6 draws on the results of simulations with a number of multi-country macroeconomic models. A least common denominator for the

theoretical structures of most of these models is the extended (expectations-augmented) two-country Mundell-Fleming model, as described by Frankel (1988).[1] These models specify behavioral equations for the supply of and demand for goods and services, money, and other assets in the United States and the rest of the world, with varying degrees of aggregation and coverage of foreign countries. Current incomes (outputs), prices, interest rates, exchange rates, and capital stocks are determined endogenously. Thus, the behavioral relationships underlying the reduced-form equation above enter into the determination of U.S. and foreign demands for goods and services, and the major proximate determinants on the right-hand side of equation (1) are all determined endogenously.

A more thorough description and presentation of the structures of these macro models is beyond the scope of this study. It is instructive, however, to review some of the basic GNP and balance-of-payments identities pertaining to the external balance that can be derived from these models. We also briefly review the process of exchange-rate determination.

To begin with, the external balance, or net exports ($X - M$), can be viewed as the difference between domestic supply of goods and services or domestic output (Y) and domestic demand or expenditures ($C + I + G$):

$$X - M = Y - (C + I + G). \tag{2}$$

By rearranging identity (2), the external balance can also be viewed as the difference between domestic saving (income minus private and government consumption) and domestic investment:

$$X - M = (Y - C - G) - I. \tag{3}$$

This relationship can be refined by adding and subtracting from the right-hand side of identity (3) taxes (T) and transfers (TR) between the government and the private sector. The external balance can then be defined as the difference between domestic investment and the sum of government saving and private saving:

$$X - M = [(T - G - TR) + (Y + TR - T - C)] - I. \tag{4}$$

As can be seen from identity (4), in the special case where private saving ($Y + TR - T - C$) is equal to investment, the external balance will be equal to the government budget surplus.

From the balance-of-payments identity, the current account, which is

[1] Frankel (1988) analyzes the results of simulations with the same set of models that we employ in Chapter 6 and concludes that they are for the most part consistent with the predictions of the standard Mundell-Fleming model augmented to allow for varying exchange-rate expectations. Frenkel and Razin (1987) present a recent review of the Mundell-Fleming model.

essentially equal to net exports minus net unilateral transfers to foreigners (TF), equals (*ex post*) the change in net domestic demand for foreign assets (ΔFA) minus the change in net foreign demand for domestic assets (ΔDA^*):[2]

$$X - M = \Delta FA - \Delta DA^* + TF . \tag{5}$$

In a global context, U.S. net exports are the rest of the world's combined net imports:[3]

$$X - M = M^* - X^* . \tag{6}$$

Thus, the identities (2) to (4) can also be viewed from the rest of the world's perspective. By adding asterisks to the right-hand-side variables of identities (2) to (4) and reversing their signs, U.S. net exports can be defined as the excess of foreign demand or expenditure over foreign supply or output:

$$X - M = -Y^* + (C^* + I^* + G^*) , \tag{7}$$

or the excess of investment abroad over saving abroad:

$$X - M = -(Y^* - C^* - G^*) + I^* , \tag{8}$$

$$X - M = -[(T^* - G^* - TR^*) - (Y^* + TR^* - T^* - C^*)] + I^* . \tag{9}$$

In brief, U.S. net exports can be viewed as (a) U.S. excess demand (or foreign excess supply) of goods and services, (b) U.S. private and government savings net of investment (or the excess of domestic investment abroad over private and government savings abroad), or (c) U.S. net demand for foreign assets minus foreign net demand for U.S. assets. In the global general-equilibrium models we use in Chapter 6, all these factors are jointly determined by exogenous monetary and fiscal-policy variables at home and abroad, as well as by other fundamentally exogenous factors (such as autonomous shifts in private consumption or investment behavior).

Exchange-Rate Determination

Since the behavior of exchange rates is central to our analysis of the external deficit, we outline here the model of exchange-rate determination that will be used later. The model we use is real open-interest parity, which is either included explicitly or approximated fairly closely in most of the global

[2] The difference between the current-account and GNP net exports of goods and services reflects several minor differences in statistical definitions between the balance-of-payments and national-income accounts (in addition to the exclusion of unilateral transfers from the latter), as is explained in Chapter 4.

[3] This "identity" abstracts from FOB-CIF differences (transportation costs, etc.) and expresses foreign imports and exports in dollars.

models to which we will be referring.[4] The basic assumptions of this model are (a) perfect substitutability of assets denominated in different currencies, (b) absence of foreign-exchange risk (or of risk aversion), and (c) a constant expected long-run equilibrium level of the real exchange rate (q_t^e). Under assumptions (a) and (b), open-interest parity holds:

$$s_t^e - s_t = \gamma(i_t^* - i_t)\,, \tag{10}$$

where s_t = log of the nominal spot exchange rate (foreign currency/home currency) in period t, s_t^e = expected value of s γ years ahead, i_t = log of 1 plus the annual rate of interest on home-currency bonds with a term of γ years,[5] "*" = foreign variable, and e = expectations.

Under assumption (c) above, the expected value of the nominal spot exchange rate (s_t^e) in the long run (γ years ahead) is defined by

$$s_t^e = p_t^{*e} - p_t^e + q_t^e\,, \tag{11}$$

where p_t^{*e} and p_t^e are log values of expectations in the current period about the levels of foreign prices and home prices, respectively, γ years ahead. Substituting current price levels and expected average annual rates of inflation (π) for expected future prices levels in equation (11), we have

$$s_t^e = p_t^* + \gamma\pi_t^{*e} - (p_t + \gamma\,\pi_t^e) + q_t^e\,. \tag{12}$$

Substituting the right-hand side of (12) for s_t^e in equation (10) and rearranging yields

$$s_t - p_t^* + p_t = q_t^e + \gamma(i_t - \pi_t^e - i_t^* + \pi_t^{*e})\,, \tag{13}$$

which expresses the log of the real exchange rate as a function of the expected real exchange rate in the long run and the real-interest-rate differential. The horizon γ is defined as being long enough for q_t^e to be considered constant. We will return to an empirical analysis of this model in Chapter 6.

Import-Price Determination

One factor contributing to the unexpected persistence of the current-account deficit, at least in real terms, is the behavior of nonoil import prices in dollar terms. In this section we set out a simple model of price determination that decomposes U.S. import prices into foreign costs, the exchange rate, and a markup. The puzzling behavior of import prices might arise from

[4] See, for example, Shafer and Loopesko (1983) and Hooper (1985) for descriptions of this model.

[5] The interest rates in equations (10) to (13) are implicitly divided by 100, because the exchange rates are expressed as logarithms and the scale factor γ is expressed in number of years.

either an inability to measure properly or a failure to account correctly for changes in these three components of price.

Equation (14) shows, in an accounting sense, the relationship between dollar import prices, foreign prices, and the exchange rate:

$$P_i^{\$} = P_i^*/E_i \,, \tag{14}$$

where P_i^* is the foreign-currency price of a product made by a foreign firm and exported to the United States, $P_i^{\$}$ is the import price in dollars, and E_i is the product-specific foreign-currency/dollar exchange rate. If the foreign price remained unchanged, a change in the exchange rate would be fully passed through to the dollar import price.

Next, assume that the foreign-currency price of the product equals the marginal cost of production, C_i^*, in foreign currency, times a markup factor, λ_i, which is equal to 1 plus a percentage profit margin:

$$P_i^{\$} = C_i^* \cdot \lambda_i/E_i \,. \tag{15}$$

Under perfect competition, where the foreign firm faces infinitely elastic demand, λ_i equals 1.0. But perfect competition is unlikely to reflect accurately the market structure of most traded goods. Many traded goods are heterogeneous, and they may be produced with a technology characterized by economies of scale or scope. Moreover, in some cases trade restraints are an important factor in the marketplace.

Once written in this decomposition, it is clear that a change in the exchange rate need not yield a one-for-one change in the dollar import price if there are offsetting changes in either foreign costs or foreign markups.

A plausible behavioral characterization of equation (15) can be written

$$P^{\$} = C^*[I(w,r,k),E,Q] \cdot \lambda(E,Q,Y)/E \,, \tag{16}$$

where the product subscript i has been suppressed.

Marginal cost is a function of input costs I (which are a function of productivity-adjusted wages w), raw-material costs r, and capital costs k; the exchange rate E (to the extent that imported intermediates are used in the production process); and the quantity produced Q (to the extent that there are economies of scale or scope).

The markup is a function of the exchange rate E (which proxies for the degree of competition from home firms in the import market); the quantity produced (which in the presence of quantitative import restraints may differ from the equilibrium quantity demanded); and shifts in demand Y (associated with changes in income, tastes, and so on).[6]

Log differentiation of (16) yields (17), which expresses the percentage

[6] For a more formal derivation of the model, see Mann (1988).

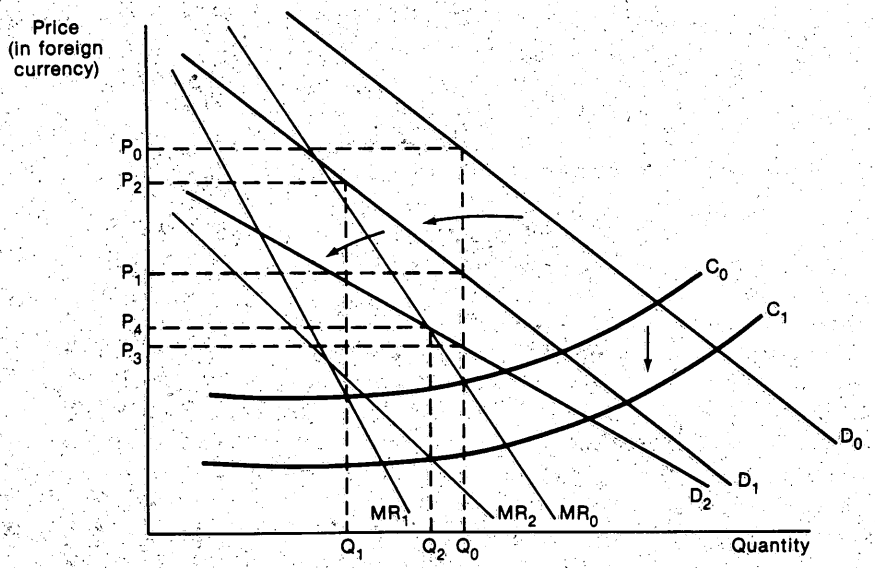
change in the dollar import price as a function of changes in the input costs, the exchange rate, the quantity produced, and exogenous shifts in demand, given the elasticities of marginal cost and the markup with respect to the exchange rate, quantity produced, and demand shifts:

$$\hat{P}_i^{\$} = (\eta_c^I)\,\hat{I} + (\eta_c^e + \eta_\lambda^e - 1)\,\hat{E} + (\eta_c^q + \eta_\lambda^q)\,\hat{Q} + \eta_\lambda^y\,\hat{Y}\,, \qquad (17)$$

where $\eta_c^I = (\delta C/\delta I)\,(I/C)$ measures the responsiveness of marginal cost to changes in input costs, which may depend on institutional structure in the labor and capital markets; $\eta_c^e = (\delta C/\delta E)\,(E/C)$ varies with the importance of imported inputs;[7] $\eta_\lambda^e = (\delta\lambda/\delta E)\,(E/\lambda)$ is the elasticity of the markup (measured in foreign currency) with respect to exchange-rate changes; $\eta_c^q = (\delta C/\delta Q)\,(Q/C)$ measures the slope of the marginal cost curve; $\eta_\lambda^q = (\delta\lambda/\delta Q)\,(Q/\lambda)$ measures changes in the markup along the demand curve;[8] $\eta_\lambda^y = (\delta\lambda/\delta Y)\,(Y/\lambda)$ measures changes in the markup as the demand curve shifts.[9]

FIGURE 1

DOLLAR DEPRECIATION AND FOREIGN PRICE DETERMINATION



[7] In the case of Cobb-Douglas production, this would be the share of imported intermediates into the production process.

[8] The elasticity of the demand curve can be affected by the number of firms in the market, which may itself be a function of the exchange rate (see Baldwin, 1988), and by the rate of change in demand for the product (see Mann, 1986b).

[9] In the case of a constant elasticity of demand, both this elasticity and the one above are 0, since by definition the elasticity of demand does not change.

This simple decomposition points to several sources of incomplete adjustment of import prices to a change in the exchange rate—which is one source of persistence in the real trade deficit.[10]

Some of these effects are illustrated in Figure 1, which shows price determination for a foreign firm selling a differentiated product in the U.S. market. Initially, the firm is selling the quantity Q_0 at a foreign-currency price P_0. Suppose the foreign currency appreciates against the dollar. This exchange-rate change shifts the U.S. demand curve facing the foreign firm to the left, from D_0 to D_1. The firm can now continue to sell the quantity Q_0 at a substantially lower price (and profit margin), P_1, or it can sell less (Q_1), with a smaller reduction in profits, at price P_2. The exchange-rate change will also induce U.S. competitors to enter the market, thereby increasing the elasticity of demand for the foreign firm's product and flattening the demand curve to D_2. This would lead to a further reduction in price (and profit margins) if the firm continued to sell quantity Q_0. The exchange-rate change may also reduce the firm's costs for raw-material input, moving the marginal cost curve from C_0 to C_1. In this case, the firm may either regain some of its lost profits or further reduce its price and regain some of its lost market share. Overall, any reduction in the foreign-currency price means that some portion of the exchange-rate change is absorbed, yielding a smaller increase in the dollar import price than would be predicted by the simple relationship in equation (14). The degree of such absorption can vary widely, depending on the circumstances.

[10] Slow adjustment of import prices would not necessarily explain persistence of the *nominal* trade deficit, since the weakness in import prices tends, if anything, to depress the nominal deficit initially. Moreover, even if import prices were rising, with a price elasticity of demand in the neighborhood of 1, volumes would eventually fall enough to offset the rise in price, leaving nominal imports little changed.

Nevertheless, the slow adjustment of import prices is an important factor underlying the persistence of the deficit in real terms. It may also be indicative of foreign pricing behavior in U.S. export markets, which has important implications for U.S. exports in both real and nominal terms.

4 THE ANATOMY OF THE EXTERNAL DEFICIT: DATA REVIEW

In this chapter we review the facts about the emergence of the external deficit and its persistence in the 1980s. The top panel of Figure 2 provides an historical perspective. After fluctuating well within a range of plus or minus 1 percent of GNP during most of the preceding three decades, the current account plunged to a deficit of more than 3½ percent of GNP during the first half of the 1980s. The rate of decline was greatest from 1982 to 1984 as U.S. growth recovered strongly from the 1982 recession. The deficit continued to widen from 1984 through 1987, although at a noticeably slower pace. As indicated in the bottom panel of Figure 2, the bulk of the decline in the current account reflected a widening of the trade deficit, but net services and transfers, the difference between the current account and the trade balance, narrowed from a comfortable surplus in the early 1980s to about a zero balance in 1986 and 1987, contributing significantly to the further widening of the current-account deficit.

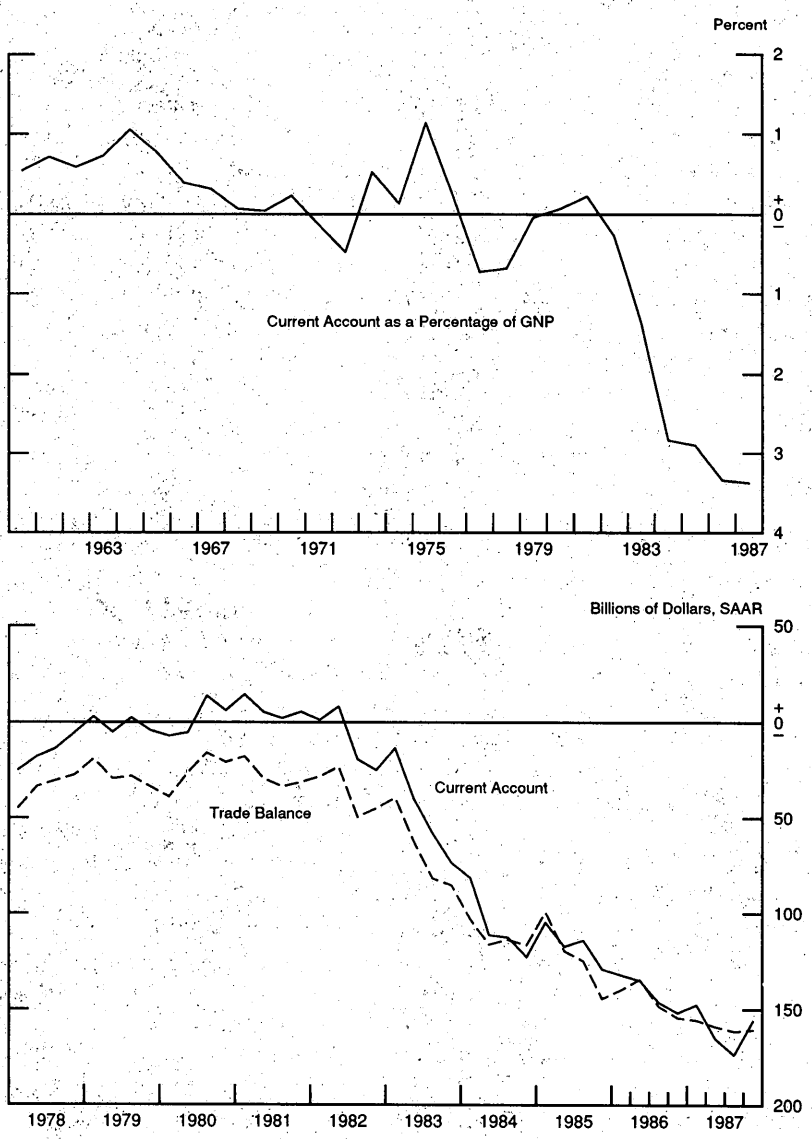
Nominal and Real Net Exports

Between 1980 and 1986, the widening of the deficit was more than accounted for by a fall in real net exports. This is illustrated in the top panel of Figure 3, which compares movements in the current account with those in nominal and real net exports of goods and services. While the difference between the current account and nominal net exports has been fairly stable over time, real net exports declined substantially more between 1980 and 1986 than either of the two nominal balances. As indicated in the bottom panel, the U.S. terms of trade improved over this period; export prices rose moderately, on average, while import prices were reduced by the sharp fall in oil prices and the additional depressing effect of the rise in the dollar on the prices of nonoil imports.

The data in Table 1 indicate that the fall in real net exports between 1980 and 1986 was accounted for by a doubling of the volume of nonoil imports (line 5), while the volume of exports (lines 11, 14, and 17) remained little changed by comparison. Of the roughly $200 billion (in 1982 prices) decline in real net exports over that period, a fall in what we call the real partial trade balance (merchandise excluding agricultural exports and oil imports) accounted for 80 percent of the total, and a decline in real net services accounted for the remainder. The volumes of agricultural exports and oil imports both declined, by about $8 to 9 billion, nearly offsetting one another.

FIGURE 2

U.S. EXTERNAL BALANCES

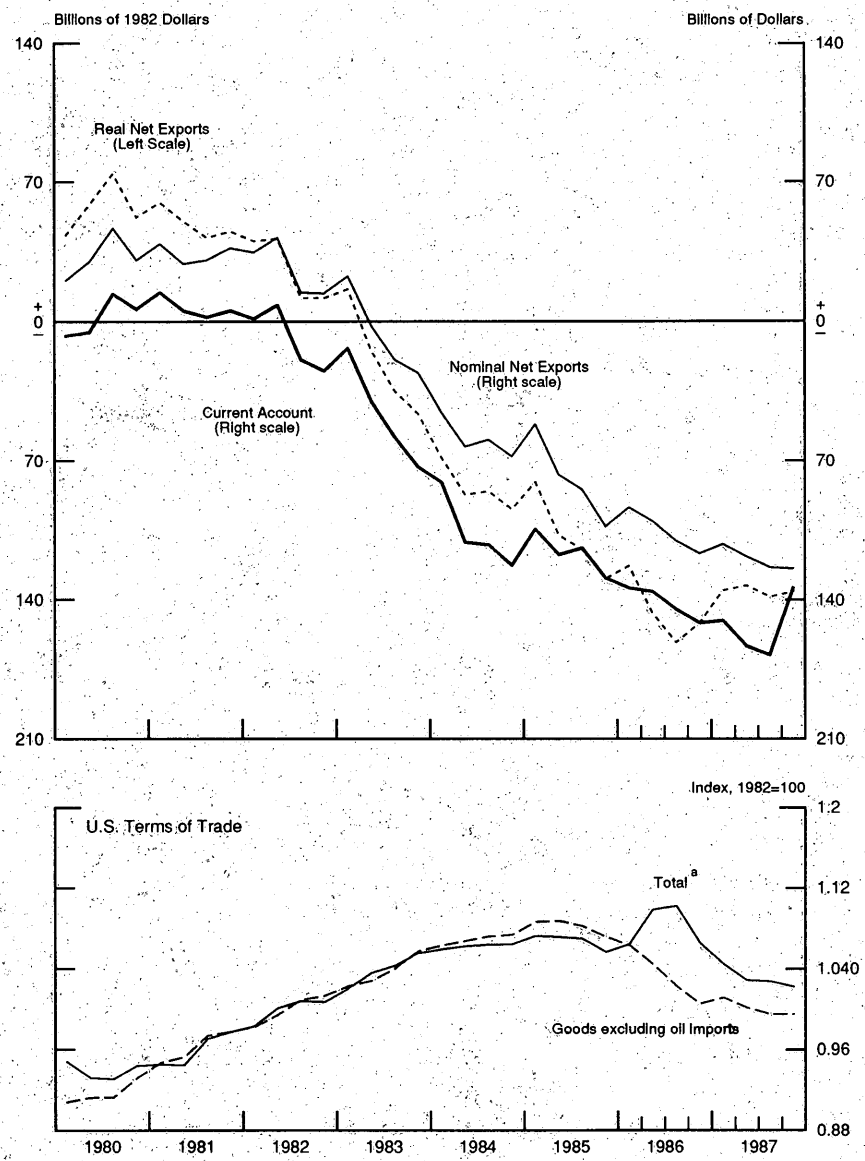


NOTE: Here and hereafter, SAAR denotes seasonally adjusted annual rates.
SOURCE: *Survey of Current Business.*

FIGURE 3

U.S. NOMINAL AND REAL EXTERNAL BALANCES

(seasonally adjusted annual rates)



[a] GNP deflator for exports of goods and services divided by the GNP deflator for imports of goods and services.

SOURCE: *Survey of Current Business.*

TABLE 1

U.S. TRADE PRICES AND QUANTITIES, BY MAJOR COMPONENT

(seasonally adjusted annual rates)

	1980	1986	1987	Change 1980-86		Change 1980-87	
				Billions of $	Percent	Billions of $	Percent
			IMPORTS				
Total goods and services:							
1. Value (bil. $)	319	483	551	+$164	+51%	+$69	+14%
2. Quantity (bil. 1982 $)	332	516	557	+184	+55	+41	+8
3. Price (1982 = 100)	96	94	99		−2		+5
Nonoil goods:							
4. Value (bil. $)	170	334	367	+164	+96	+33	+10
5. Quantity (bil. 1982 $)	173	338	358	+165	+95	+20	+6
6. Price (1982 = 100)	98	99	102		+1		+3
Oil:							
7. Value (bil. $)	79	34	43	−45	−58	+9	+6
8. Quantity (bil. 1982 $)	82	73	78	−9	−11	+5	+7
9. Price (1982 = 100)	96	47	55		−51		+17

EXPORTS							
Total goods and services:							
10. Value (bil. $)	351	378	428	+$27	+8%	+$50	+13%
11. Quantity (bil. 1982 $)	389	378	428	−11	−3	+50	+13
12. Price (1982 = 100)	90	100	100		+11		0
Nonagricultural goods:							
13. Value (bil. $)	182	197	220	+15	+8	+23	+12
14. Quantity (bil. 1982 $)	202	212	239	+10	+5	+27	+13
15. Price (1982 = 100)	90	93	92		+3		−1
Agricultural goods:							
16. Value (bil. $)	42	27	30	−15	−36	+3	+11
17. Quantity (bil. 1982 $)	39	31	−35	−8	−21	+4	+13
18. Price (1982 = 100)	108	90	84		−17		−7
NET SERVICES							
19. Value (bil. $)	55	38	35	−17	−31	−3	−8

NOTES: All value data are from the U.S. Balance of Payments Accounts. Prices are deflators from the National Income and Product Accounts. Components may not sum to totals because of rounding.

SOURCE: *Survey of Current Business.*

The real net export deficit bottomed out in mid-1986 and narrowed somewhat thereafter, whereas the nominal deficit continued to widen through 1987. This reversal, with the nominal deficit now widening more than the real deficit, reflected a reversal in the terms of trade; oil import prices rebounded from their 1986 lows and nonoil import prices began to respond to the decline in the dollar, while export prices remained virtually flat. The volume of exports began to expand rapidly after mid-1986, presumably in response to the decline in the dollar. However, the volume of imports also continued to grow at a fairly strong pace, offsetting much of the gain in exports and resulting in only a moderate narrowing of the real deficit. (The nominal and real trade deficits both narrowed substantially in early 1988, with exports continuing to expand rapidly and import growth finally slowing noticeably in both real and nominal terms.)

Trade by Area

The widening of the deficit between 1980 and 1986 was dispersed across major U.S. trading partners (see Table 2). All regions substantially increased their nonoil exports to the United States, and exports by Japan and other Asian countries (lines 10 and 12 in the table) showed the most spectacular growth. The growth of U.S. exports to most areas was stagnant by comparison; exports to Latin American and other developing countries (particularly those with international debt problems), as well as to Western Europe, showed noticeable net declines. Only in the case of trade with Canada did the growth rate of U.S. exports approach half the growth rate of imports. Exports to Japan also rose, but much of the increase between 1980 and 1986 reflected a temporary bulge in gold shipments in 1986.[1]

In 1987, the growth of imports from industrial countries slowed substantially, while imports from developing countries (particularly in Asia) continued to advance strongly and in some cases actually accelerated. This pattern is consistent with the much greater decline in the dollar in real terms against the currencies of industrial countries than against the currencies of developing countries between early 1985 and 1987. The rebound in exports in 1987 was concentrated in shipments to Western Europe and developing countries, but shipments to Canada also continued to grow steadily.

Trade by Commodity Group

Among major end-use commodity groups (Table 3), business machines was the only category of exports to show noticeable growth in real terms over

[1] In the first half of 1986, Japan transshipped nearly $5 billion (at an annual rate) in gold through the United States. These transactions had the effect of raising recorded U.S. exports of gold to Japan by that amount while raising recorded U.S. imports of gold from other countries by about the same amount.

TABLE 2

U.S. MERCHANDISE TRADE, BY REGION

(dollar figures in billions)

	Level			Average Annual Rate of Change (%)	
	1980	1986	1987	1980-86	1986-87
Nonoil imports from:					
1. All regions	$170.3	$334.1	$367.0	11.9%	9.8%
Selected industrial countries:					
2. Canada	38.6	64.9	68.6	9.0	5.7
3. Japan	31.2	80.7	84.4	17.2	4.6
4. Western Europe	42.7	84.8	91.3	12.1	7.7
Selected developing countries:					
5. Asia [a]	17.7	45.6	57.3	17.1	25.6
6. Latin America	18.9	31.1	34.5	8.7	10.9
7. Rest of world	21.2	27.0	30.9	4.1	14.4
Total exports to:					
8. All regions	224.3	224.0	249.6	0	11.4
Selected industrial countries:					
9. Canada	41.6	56.6	61.1	5.3	8.0
10. Japan	20.8	26.3	27.6	4.0	4.9
11. Western Europe	67.6	60.6	68.8	−1.8	13.5
Selected developing countries:					
12. Asia [a]	14.2	17.3	22.7	3.3	31.2
13. Latin America	38.8	30.9	35.0	−3.7	13.3
14. Rest of world	41.3	32.3	34.4	−4.0	6.5

[a] Includes Hong Kong, Korea, Singapore, and Taiwan.

SOURCE: *Survey of Current Business*, U.S. Balance of Payments Accounts.

the 1980-86 period, and it grew even more rapidly in 1987. Other export categories showed little change or actual declines in real terms over the first half of the 1980s, but consumer goods, agricultural commodities, and a variety of industrial supplies (notably paper and wood products and chemicals) rebounded strongly in 1987.

Among nonoil imports, capital goods showed the strongest growth, tripling in volume between 1980 and 1986; business machines accounted for a significant proportion of the total. Consumer goods and autos doubled in volume, while imports of food and nonoil industrial supplies grew at somewhat slower rates. The growth in real imports of all categories slowed sub-

TABLE 3

U.S. MERCHANDISE TRADE VOLUMES AND PRICES, BY MAJOR COMMODITY GROUP

	Level			Average Annual Rate of Change (%)	
	1980	1986	1987	1980-86	1986-87
	VOLUME (BILLIONS OF 1982 DOLLARS)				
Nonoil imports:					
Foods, feed, and beverages	$16.1	$23.2	$23.9	6.3%	3.0%
Industrial supplies and materials	47.2	73.6	74.3	7.7	1.0
Capital goods	31.2	82.8	99.4	17.7	20.0
Business machines	4.1	24.4	38.5	34.6	57.8
Automotive goods	33.2	66.0	68.1	12.1	3.2
Consumer goods	34.9	74.5	77.1	13.5	4.0
Exports:					
Foods, feed, and beverages	33.0	26.3	30.0	−4.1	16.7
Industrial supplies and materials	68.1	63.8	69.7	−1.1	9.2
Capital goods	87.1	92.4	109.5	1.0	18.5
Business machines	8.3	31.7	44.9	25.0	41.6
Automotive goods	21.6	22.3	23.3	0.5	4.5
Consumer goods	17.7	14.1	16.7	−3.7	18.4
	PRICE (1982 = 100) [a]				
Nonoil imports:					
Foods, feed, and beverages	112.8	105.0	103.6	−1.2	−1.3
Industrial supplies and materials	103.1	84.4	90.2	−3.3	6.9
Capital goods	100.2	100.5	109.4	0.0	8.9
Business machines	109.4	45.2	39.1	−13.7	−13.5
Automotive goods	84.1	118.3	125.1	5.9	5.7
Consumer goods	98.7	106.2	114.9	1.2	8.2
Exports:					
Foods, feed, and beverages	108.1	88.0	82.1	−3.4	−6.7
Industrial supplies and materials	99.5	91.6	95.4	−1.4	4.1
Capital goods	86.7	99.2	100.5	2.3	1.3
Business machines	109.4	45.2	39.1	−13.7	−13.5
Automotive goods	81.5	111.6	113.1	5.2	1.3
Consumer goods	95.0	103.5	107.4	1.4	3.8

[a] GNP fixed-weight deflator.

SOURCE: *Survey of Current Business*, National Income and Product Accounts. Business machines, Bureau of Economic Analysis.

stantially in 1987, although imports of capital goods and to a lesser extent consumer goods (significantly, business machines and consumer goods from Asian countries other than Japan) continued to grow fairly briskly.

Net Services

While most of the decline in real net exports is accounted for by the fall in the real merchandise trade balance, a decline in net services also contributed. In real terms, net services fell by nearly $40 billion at an annual rate between 1980 and 1986, and slightly further in 1987.[2] As indicated in line 19 of Table 1, the decline in current dollars was substantially less, and the balance on net services remained significantly positive through 1987. Movements in the major components of net services are shown in the top panel of Figure 4. The investment-income accounts showed divergent movements. Net portfolio income fell steadily between 1980 and 1987, while net direct investment income actually rose substantially, despite an $85 billion deterioration in the stock position of U.S. net direct investment over that period.[3] Changes in net direct-investment income were dominated by changes in capital gains associated with the impact of swings in the dollar's exchange rate on the valuation of assets and liabilities denominated in foreign currencies. In addition, the dollar value of U.S. income flows denominated in foreign currencies was falling as the dollar appreciated over the first half of the 1980s; it rose sharply after the dollar began to depreciate in early 1985. (Receipts of net direct-investment income fell sharply in the first quarter of 1988 from the exceptionally high levels reached in the latter part of 1987, principally because the dollar leveled off in early 1988 after having depreciated rapidly through most of 1987.)

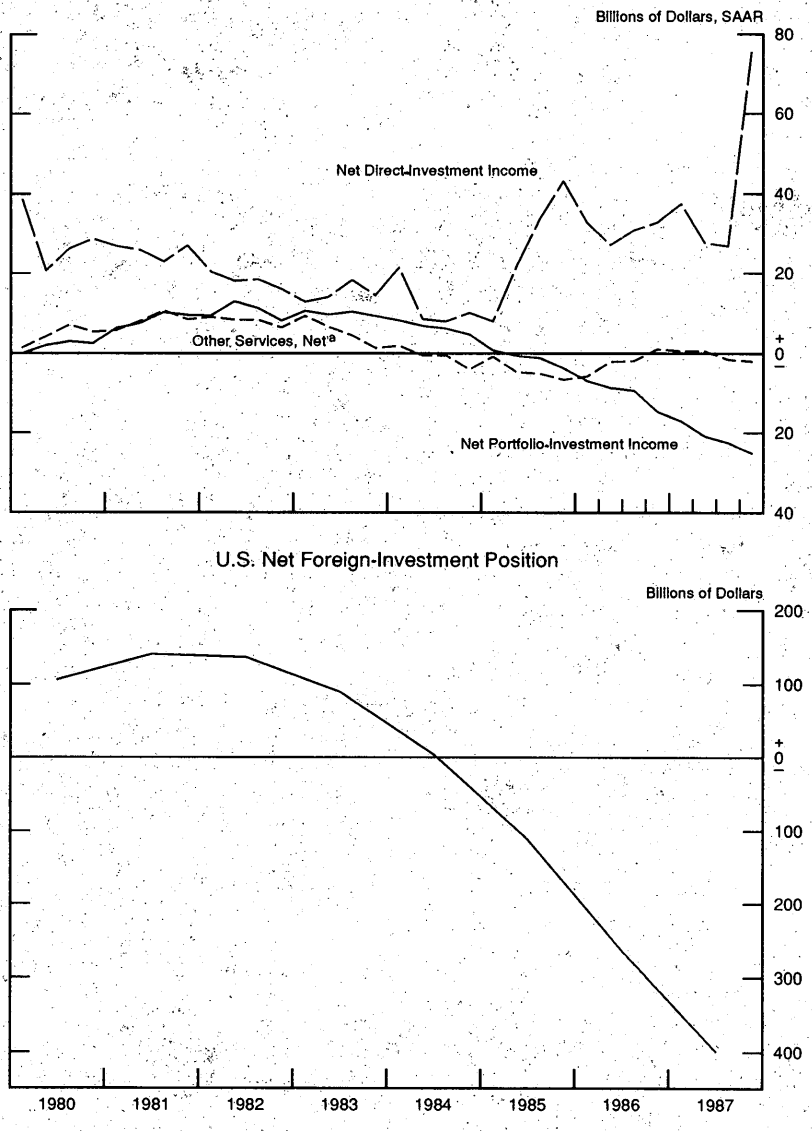
The decline in net portfolio income followed more closely the pattern of decline in the U.S. overall net foreign-investment position, shown in the bottom panel of Figure 4. Roughly three-fourths of the $475 billion deterioration in the U.S. net investment position between 1980 and 1987 reflected increasing net foreign portfolio claims on the United States. This shift occurred as U.S. banks reduced their net claims on foreigners, as foreign private residents invested heavily in U.S. government and corporate

[2] On a GNP basis, real net services were $69 billion in 1980, $30 billion in 1986, and $28 billion in 1987.

[3] Foreign direct-investment claims on the United States rose by about $180 billion between 1980 and 1987, while U.S. direct-investment claims on foreigners rose by about $95 billion on a book-value basis. At the end of 1987, the net position was valued at $47 billion (see U.S. Department of Commerce, 1988). These data probably understate the U.S. net foreign direct-investment position on a current-market-value basis by a substantial amount, because assets held abroad had been held for a longer time than foreign assets in the United States and were therefore undervalued more at book-value (original-aquisition) prices.

FIGURE 4

U.S. SERVICE-ACCOUNT TRANSACTIONS



[a] Includes net military transactions as well as travel, transportation, and other services.

SOURCE: *Survey of Current Business*.

securities, and (particularly in 1987) as foreign official agencies increased their holdings of dollar assets in the United States through intervention to support the dollar. Nevertheless, the decline in net portfolio income between 1980 and 1987 (about $20 billion at an annual rate) was less than might have been expected, given the nearly $350 billion decline in the net portfolio investment position over that period. The average recorded rate of return on U.S. portfolio liabilities to foreigners was less than that on U.S. assets held abroad, and both assets and liabilities continued to grow during this period. The combination of higher gross stocks and differential rates of return was apparently more than enough to offset the effects of a declining *net* foreign-asset position.[4]

Other services, net, including travel, transportation, military transactions, and so on, fell by about $9 billion dollars between 1980 and 1985, but they rebounded after 1985, reflecting the effects of the decline in the dollar, among other factors.

[4] The discrepancy in average rates of return reflects several factors. First, U.S. bank-reported claims and liabilities account for a significant share of gross U.S. claims and liabilities, and banks are intermediaries that make income on their portfolios by charging higher rates of interest on their loans to foreigners than they do on their liabilities to foreigners. In addition, receipts include substantial fee income earned by U.S. banks for services provided to foreigners. Second, because the recorded return on corporate stocks does not include capital gains, it is relatively low, primarily reflecting dividend payments. Foreign holdings of U.S. stocks were more than three times as great as U.S. holdings of foreign stocks. Moreover, increases in foreign holdings of U.S. stocks net of U.S. holdings of foreign stocks accounted for about a fourth of the total decline in the U.S. net portfolio-investment position over the 1980-87 period. See Helkie and Hooper (1988) or Helkie and Stekler (1987) for more on relative rates of return on U.S. international claims and liabilities.

5 MACROECONOMIC CAUSES: PARTIAL-EQUILIBRIUM ANALYSIS

We have just seen that the widening of the U.S. external deficit from 1980 to 1986 was more than accounted for by the decline in real net exports over that period. In this chapter, we first consider in a partial-equilibrium framework the factors that contributed to the decline in real net exports. We then analyze the extent to which this analytical framework can explain the persistence of the deficit through 1987, looking in particular at the behavior of aggregate import prices and volumes.

Income and Relative Prices

As we saw in Chapter 4, the major determinants of changes in real net exports are the relative growth of real income or expenditures at home and abroad and the relative prices of goods and services produced at home and abroad. Figure 5 shows a comparison of real net exports with various measures of relative growth and relative prices over the past two decades. The top panel shows two measures of relative growth in activity compared with net exports, and the bottom panel shows a measure of relative prices compared with net exports. In order to make net exports comparable with the other indicators in the chart over the entire period shown, they have been normalized by trend growth in real U.S. trade during 1969-87.[1]

The two measures of relative real activity in the top panel are GNP and domestic expenditures ($C + I + G$).[2] Foreign and U.S. GNPs (or total outputs) are the more appropriate activity variables for the nearly 50 percent of U.S. exports and imports that can be classified as intermediate goods. Total domestic expenditures (or final demand) may be more appropriate for the rest of U.S. trade, which can be classified as finished goods. As indicated in Figure 5, in the early 1970s and again in the late 1970s significant increases in real net exports coincided with substantial increases in foreign activity relative to U.S. activity. The increase in U.S. activity relative to foreign activity after 1980 contributed to the decline in real net exports over that period.

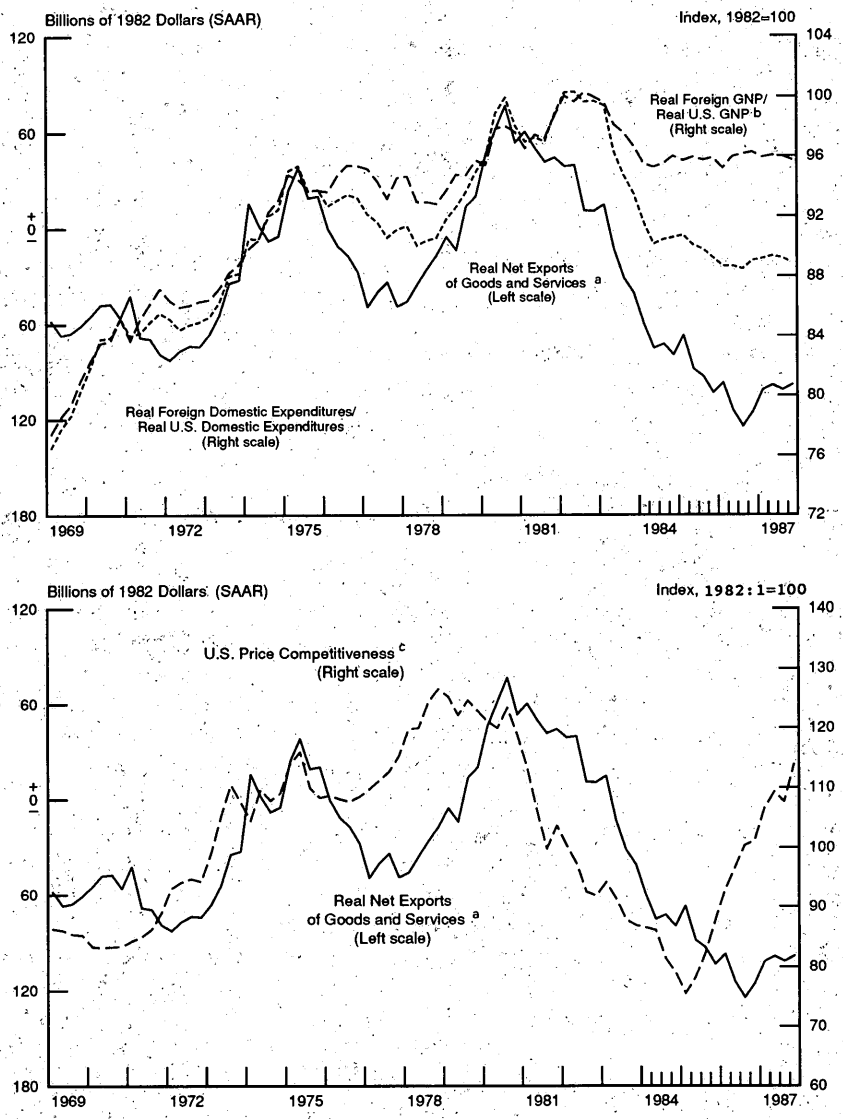
The measure of relative prices shown in the bottom panel is the ratio of

[1] Between 1969 and 1987 (the period covered in Figure 5), U.S. total trade increased by over 250 percent in real terms. Without scaling for this trend growth, a given percentage change in relative activity or relative prices would be associated with a substantially greater change in net exports at the end of the period shown than it would be at the beginning.

[2] Foreign domestic expenditures were not measured directly but were approximated by adding U.S. net exports to aggregate rest-of-world GNP.

FIGURE 5

DETERMINANTS OF U.S. REAL NET EXPORTS OF GOODS AND SERVICES



[a] Adjusted for trend growth in U.S. trade volume between 1969 and 1987.

[b] Foreign GNP includes all OECD countries, OPEC and non-OPEC countries.

[c] Ratio of consumer prices in 10 industrial countries and 8 developing countries (in dollars) to U.S. consumer prices. Foreign prices are weighted by multilateral trade shares.

SOURCE: Federal Reserve Board USIT model database.

an index of consumer prices of major foreign industrial and developing countries, expressed in dollars, to U.S. consumer prices.[3] (We will see in Chapter 6 that movements in this index of relative prices over the past two decades have been dominated by swings in the dollar's exchange rate against the currencies of the foreign Group of 10 countries.)[4] Figure 5 indicates that the increases in real net exports in both the early and late 1970s followed significant increases in this crude measure of U.S. international price competitiveness with a lag of one to two years. The decline in net exports after 1980 followed a dramatic decline in price competitiveness, which had reached its lowest point about a year and a half earlier. More recently, the apparent bottoming out of real net exports in the third quarter of 1986 came approximately a year and a half after the peak in the dollar and the low point in U.S. price competitiveness.

Figure 5 provides a qualitative indication of the relative contributions of the factors shown to the widening of the deficit after 1980. Movements in relative prices were strongly correlated with the movement in net exports (with a lag); between the activity variables, the ratio of domestic expenditures appears to have been more closely correlated with net exports than was the ratio of GNPs. The latter comparison is potentially misleading, however, inasmuch as GNPs and domestic expenditures are both influenced by net exports, and in opposite directions. A fall in net exports provoked by a decline in U.S. price competitiveness, for example, will tend to increase U.S. domestic expenditures relative to foreign domestic expenditures, at the same time reducing U.S. GNP relative to foreign GNP. In these instances, net exports will be more closely correlated with the expenditure ratio than with the GNP ratio (as it was from 1981 to 1986), but only because the direction of causation has been reversed from that intended in Figure 5. This example illustrates the pitfalls of partial-equilibrium accounting exercises to assign causation among jointly determined variables. It also signals potentially significant simultaneous-equation bias in the estimation of standard trade equations during periods when trade volumes are responding significantly to factors other than income. Having confessed our sins in advance, we now turn to quantitative analysis using these very same techniques.

Table 4 quantifies changes in the income and relative-price determinants

[3] Consumer prices are used instead of wholesale prices in this measure, partly because, in our view, available wholesale prices tend to be less comparable across countries. In some cases, WPI coverage is limited to a relatively narrow range of commodities. At the same time, CPIs may not accurately reflect movements in competitiveness for other reasons, which we discuss below.

[4] Here and hereafter, references to G-10, foreign G-10, and 10 industrial countries should be taken to denote Belgium, Canada, France, Italy, Japan, the Netherlands, Sweden, the United Kingdom, and West Germany, plus Switzerland.

TABLE 4

CHANGES IN KEY DETERMINANTS OF U.S. REAL NET EXPORTS

	Logarithmic Percentage Change	
	1980-86	1986-87
Activity variables, 1980-86:		
U.S.:		
Real GNP	15.5	3.3
Real domestic expenditures	21.0	3.0
Foreign:		
Real GNP [a]	13.8	3.2
Real domestic expenditures [b]	11.0	3.4
Relative price variables:		
Nonagricultural exports: [c]		
Current	−4.9	−14.8
Lagged [d]	20.4	−24.1
Nonoil imports: [e]		
Current	−30.8	1.6
Lagged [d]	−28.1	0.3

[a] In all OECD countries and all developing countries, weighted by country share in U.S. exports.

[b] Estimated by adding U.S. real net exports to foreign GNP.

[c] U.S. nonagricultural export deflator divided by foreign CPI in dollars (for 18 countries, weighted by U.S. export shares).

[d] For 1979-85 and 1985-86.

[e] U.S. nonoil import deflator divided by U.S. GNP deflator.

of the key components of real net exports that took place from 1980 to 1986 and from 1986 to 1987. The increase in U.S. GNP exceeded that in foreign GNP over the 1980-86 period by only 2 percentage points, whereas the difference in growth of real domestic expenditures was on the order of 10 percentage points. In 1987, U.S. growth by either measure was similar to foreign growth. The prices of U.S. nonagricultural exports relative to foreign consumer prices in dollars actually fell between 1980 and 1986, largely because of the dollar's depreciation during 1985-86. They had risen relative to foreign prices by 20 percent between 1979 and 1985 (and by nearly 30 percent between 1979 and the dollar's peak in early 1985). Because export volumes respond with a significant lag to relative-price changes, the increase in relative prices over the earlier interval is more appropriate for analyzing what happened to exports through 1986. Meanwhile, the prices of nonoil imports fell by 30 percent relative to the U.S. GNP deflator over both 1980-86 and 1979-85:1. In 1986-87 the falling dollar had a significant

impact on the relative prices of exports, but it had very little effect on the relative prices of imports, which rose only slightly as measured by the implicit deflator.

Table 5 presents estimates of the implications of the changes in relative economic activity and relative prices over the first half of the 1980s for the decline in U.S. real net exports. These estimates were obtained from the Helkie and Hooper (1988) and Krugman and Baldwin (1987) studies. HH found that the $165 billion decline in the real partial trade balance (excluding oil imports and agricultural exports) between 1980 and 1986 could be attributed largely to the decline in U.S. price competitiveness. They used GNPs as the key activity variables in their import and export equations and considered the relative contributions of the total increases in U.S. and foreign GNPs from their 1980 levels. On this basis, they found that the activity variables explained only a relatively small part of the widening of the partial trade deficit. In contrast, KB used domestic-expenditure variables and measured the effects of deviations from 2.5 percent annual growth rates in both U.S. and foreign GNPs over this period. They attributed a substantially larger amount of the deficit to the growth difference than did HH.[5] KB did find that nearly half the real trade deficit at the end of 1986 could be attributed to movements in the dollar's real exchange rate, but their quantitative estimate of that effect appears to be only a little over half as large as the HH estimate. Part of this difference might be due to the fact that KB considered a later period (1986:4, compared with HH's 1986 year-long average), in which the dollar was falling and offsetting some of the estimated contribution of its earlier rise. Moreover, the KB model has shorter lags in the response of real net exports to relative prices than the HH model. This means that in the KB estimate the depreciation of the dollar from early 1985 would have had a greater positive impact on net exports, offsetting more of the negative effect of the earlier appreciation.

GNP vs. Domestic Expenditures

The choice between GNP and domestic expenditures in this exercise is important, not just for historical accounting purposes but also for its implications for possible "cures" to the deficit. A prescription based on GNP growth targets could imply a significantly more painful adjustment process than one based on domestic-expenditure targets. A reduction in the U.S. budget deficit would not affect the external deficit directly, but only through its impact on GNP (and possibly other variables like the exchange rate). Moreover, if GNPs are what move export and import volumes, the widening

[5] Had HH used the same methodology (i.e., deviations from 2.5 percent growth paths), their estimate probably would not have changed significantly, since the HH model has roughly similar income elasticities for imports and exports.

TABLE 5

SOURCES OF THE REAL TRADE DEFICIT

(in billions of 1982 dollars)

	Real Trade Balance	
	Total	Exclusive of Agricultural Exports and Oil Imports
Helkie-Hooper (1987):		
Contribution to change in real trade balance 1980-86 of:		
Changes in levels of U.S. and foreign real GNP, 1980-86	−42	−18
Changes in relative prices of exports and nonoil imports, 1980-86	−131	−121
Changes in other (secular) supply factors	−26	−26
Lagged response to oil price shock (conservation and increased production)	+37	
Other factors	−4	0
Total change, 1980-86	−166	−165
Krugman-Baldwin (1987):		
Contribution to level of real trade balance in 1986:4 of:		
Deviation of U.S. and foreign domestic demand growth from an average annual rate of 2.5%, 1980:1-86:4		−49
Change in dollar in real terms from its 1980:1 level		−63
Other factors		−26
Total (1986:4 level)		−138

of the deficit through 1987 apparently was not to any significant degree due to a cyclical widening of the growth gap that could be readily reversed. GNPs at home and abroad were at or near cyclical peaks in 1980, and average growth rates over the next seven years were quite similar.[6] To the extent that policymakers rely on changes in relative growth rates (i.e., through a fiscal contraction) to reduce the external deficit, U.S. GNP would have to fall significantly relative to foreign GNP, and U.S. domestic expenditures would have to decline relative to domestic expenditures abroad by an even greater amount (reflecting the resulting increase in net exports).

However, if it is domestic expenditures that move trade volumes, growth factors were quantitatively important in "causing" the widening of the def-

[6] Various indicators; including unemployment rates and crude measures of potential output, do suggest that by 1987 U.S. GNP was as much as several percentage points closer to potential output than was foreign GNP. However, this gap is substantially smaller than the domestic-expenditure gap discussed below.

icit. Moreover, significant adjustment could be achieved solely by reversing the domestic-expenditure gap that emerged between 1980 and 1987, without having to change relative GNP growth rates. Of course, narrowing the gap between U.S. and foreign domestic expenditures that had opened up earlier would have implied structural adjustments at home and abroad as the U.S. economy shifted to the production of tradable goods and as foreign growth was focused inward.[7]

In view of the implications of this issue for ongoing debates about cures for the deficit, we reestimated the partial trade-balance equations reported by HH using alternative activity variables, including GNPs, domestic expenditures, and a mix of the two. *A priori*, we would expect a mix of the two to outperform expenditures alone. As noted earlier, demand for intermediate goods, which accounts for nearly half of U.S trade, is more reasonably considered a direct function of output or GNP than of final domestic demand. With respect to imports and exports of finished goods, which account for a little over half of U.S. trade, plausible theoretical cases can be made for either total incomes (GNPs) or expenditures as the appropriate determinants, although final expenditures would seem to us to be the more closely related variable.

The partial trade-balance equations from the model reported by HH are listed in Table 6 in their implicit functional form. The equations for nonoil import volume and for nonagricultural export volume both include—in addition to the activity variables—relative prices, a relative capital-stock variable (to capture shifts in the supply of traded goods that are not adequately captured by relative-price data),[8] and a variable that quantifies the trade-volume effects of dock strikes. In the import equation, the activity variables are included with a one-quarter distributed lag (both the current and lagged coefficients are reported), and in both the import and export equations the relative-price variables are included with eight-quarter distributed lags (for which only the sum of lagged coefficients is reported).

[7] Moreover, reduction of the external deficit with no change in GNPs would require significant expenditure switching (e.g., through a decline in the dollar) in addition to expenditure reduction at home and expenditure growth abroad, since the marginal propensity to import out of domestic expenditures is generally much less than unity (see Krugman, 1987d, for more on this point).

[8] The supply developments in question, including, for example, the dramatic entry of Japan and subsequently a number of developing countries into world markets for various manufactured goods over the past two decades, tend to be spuriously correlated with income variables. (HH suggest that this is largely because such supply developments are not adequately reflected in available measures of relative prices—for example, because historical price observations are not available for goods that are being introduced by new producers in the global market.) Thus, the relative-supply proxy has the effect of reducing the estimated income elasticity for U.S. imports and raising the estimated elasticity for U.S. exports. See Helkie and Hooper (1988) for a more detailed discussion of this issue.

TABLE 6

PARTIAL TRADE-BALANCE EQUATIONS

Nonoil import price:

$$P_{mno} = f[P_b^*, (E_b)_{L8}, (PC)_{L4}]$$

Nonoil import volume:

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

Nonagricultural export price:

$$P_{xna} = f[PD, (P_m^*/E_m)_{L4}]$$

Nonagricultural export volume:

$$X_{na}/P_{xna} = f[Y^*, (P_{xna} \cdot E_m/P_m^*)_{L9}, K^*/K, DS_{xna}]$$

Definitions:

CU = U.S. manufacturing capacity utilization.

CU^* = deviation from potential output in foreign G-10 countries.

DS_{mno} = dock-strike variable specific to nonoil imports.

DS_{xna} = dock-strike variable specific to nonagricultural exports.

E_b = exchange rate (foreign currency/dollar), 18 currencies, bilateral nonoil import weights.

E_m = exchange rate (foreign currency/dollar), 18 currencies, multilateral trade weights.

K = U.S. private fixed capital stock.

K^* = private fixed capital stock in foreign OECD + 10 major developing countries.

M_{no} = nonoil import volume.

P = U.S. GNP deflator.

P_b^* = foreign CPI, 18 countries, bilateral nonoil import weights.

P_m^* = foreign CPI, 18 countries, multilateral trade weights.

P_{mno} = nonoil import deflator (GNP accounts).

P_{xna} = nonagricultural export deflator (GNP accounts).

PC = world commodity prices (IMF index).

PD = weighted average of U.S. producer prices, nonagricultural export weights.

TR = index of tariff rates on nonoil imports.

X_{na} = nonagricultural export value.

Y = U.S. real GNP (or real domestic expenditures).

Y^* = foreign real GNP (or real domestic expenditures), all countries, weighted by shares in U.S. nonagricultural exports.

$( )_{L9}$ = denotes, for example, a nine-quarter distributed lag on the term inside the parentheses.

(Table 6 also shows the import- and export-price equations used by HH, which we analyze further at the end of this chapter.)

We estimated the volume equations over the period 1969:1-1984:4, in a double-log functional form. In-sample simulations were run over the period 1980:1-1984:4, and post-sample simulations were run over 1985:1-1987:2. The simulations were static (autoregressive residuals were excluded), and the percentage root-mean-squared prediction errors are reported for all the simulations.

The results of our regressions are shown in Table 7. In both the import and export equations, the domestic-expenditure variables yield slightly higher coefficients than the GNP variables, while the coefficients on the mixed-activity variables (which are fifty-fifty combinations of the two) are intermediate. These differences are not statistically significant, however. The different activity variables influence other coefficients as well. Notably, both the level and significance of the coefficients on the relative-price, capacity-utilization, and relative-capital-stock variables fall when the expenditure variable is used in the import equation. In terms of overall equation fit and recent in-sample behavior, the mix variable has at best only a slight edge over either of its two components. The differences in in-sample standard errors and corrected R-squares are small, however, reflecting the extent to which GNPs and domestic expenditures moved together over most of the sample period. In terms of post-sample prediction accuracy, the mix does slightly better than the other activity variables in the export equation, but it clearly comes in second to GNP in the import equation.

In brief, the results in Table 7 provide little empirical basis for choosing among the alternative activity variables. In constructing our own estimates of the partial-equilibrium "causes" of the deficit, we have chosen on *a priori* grounds to use the mix specification.

Partial-Equilibrium Accounting

Table 8 presents our estimates of the contributions of each of a number of partial-equilibrium factors to the widening of the partial real trade deficit, the total real trade deficit, and the deficit on real net exports of goods and services between the fourth quarter of 1980 and the fourth quarter of 1986. These estimates were calculated as in HH, using essentially the same model, but the volume equations for nonagricultural exports and nonoil imports used the "mix" version of the activity variables rather than GNP variables.[9] The difference between the first two columns reflects the impact

[9] These calculations were made in some cases by simulating the model with the contributing factors listed in Table 7 (U.S. and foreign GNP and domestic expenditures, relative prices, and relative capital stocks) each alternately held unchanged at their 1980:4 values through 1986:4. In other cases, the estimates were made judgmentally, as described below.

TABLE 7

REGRESSIONS FOR U.S. IMPORT- AND EXPORT-VOLUME EQUATIONS WITH ALTERNATIVE ECONOMIC-ACTIVITY VARIABLES

(t-ratios in parentheses)

	Nonoil Imports			Nonagricultural Exports [a]		
	Real GNP	Real Domestic Expenditures	Mix [b]	Real GNP	Real Domestic Expenditures	Mix [b]
1. Constant	−2.21	−7.28	−5.55	−2.57	−13.80	−12.59
	(−0.48)	(−1.21)	(−1.09)	(−0.52)	(−1.99)	(−1.84)
2. Activity variable	1.11	1.24	1.19	1.91	2.09	2.03
	(2.85)	(3.27)	(3.08)	(4.33)	(4.67)	(4.57)
3. Activity variable (−1) [c]	0.96	1.07	1.06			
	(2.38)	(2.45)	(2.54)			
4. Relative prices (0-7) [d]	−1.13	−0.84	−0.98	−0.95	−0.80	−0.88
	(−10.34)	(−5.73)	(−8.20)	(−6.39)	(−5.23)	(−5.90)
5. Relative capacity utilization	−0.30	−0.03	−0.13			
	(−1.41)	(−0.13)	(−0.56)			
6. Relative capital stocks	−0.84	−0.47	−0.59	0.76	1.01	0.93
	(−2.25)	(−0.98)	(−1.45)	(−1.25)	(−1.62)	(−1.50)
7. Dock strike dummy	0.80	0.83	0.81	0.75	0.75	0.75
	(5.65)	(5.90)	(5.70)	(7.73)	(7.88)	(7.80)
8. Rho	0.46	0.50	0.46	0.72	0.73	0.72
	(4.09)	(4.57)	(4.07)	(8.00)	(8.03)	(7.96)
9. Durbin Watson	1.91	1.92	1.91	2.07	2.09	2.08
10. R^2 (corrected)	0.9862	0.9858	0.9863	0.9874	0.9879	0.9877
11. Standard error (%)	3.12	3.16	3.11	2.84	2.77	2.80
Model prediction errors: [e]						
In-sample:						
12. RMSE (1980:1-1984:4) (%)	2.47	2.49	2.38	3.37	3.75	3.49
Post-sample:						
13. RMSE (1985:1-1987:2) (%)	2.66	4.61	3.70	5.79	5.72	5.60
Sample period: 1969:1–1984:4						

[a] Foreign GNP and domestic expenditures measures cover all foreign countries (see text).

[b] Calculated by equally weighting GNP and domestic expenditures.

[c] Denotes 1-quarter lag.

[d] Denotes 8-quarter distributed lag for both imports and exports; sum of lagged coefficients is reported.

[e] Based on in-sample and post-sample simulations excluding autoregressive residual. Root mean squared prediction errors are reported.

TABLE 8

CONTRIBUTION TO CHANGES IN THE REAL EXTERNAL DEFICIT, 1980:4-1986:4 [a]

(in billions of 1982 dollars, annual rates)

Contributing Factor	Component		
	Partial Real Trade Balance [b]	Total Real Trade Balance [c]	Net Exports of Goods and Services [d]
Change in U.S. and foreign GNP and domestic demand [e]	−48	−69	−77
Change in relative prices of exports and nonoil imports	−98	−105	−113
Change in relative capital stocks	−20	−20	−20
Lagged responses to oil price shock (conservation and increased production)		+26	+26
Decline in net investment income			−25
Other factors	0	−4	+5
Total	−166	−172	−204

[a] Calculated as contribution due to total change in the contributing factor over the period, except for relative prices, which are lagged.

[b] Nonagricultural exports minus nonoil imports.

[c] Total merchandise trade balance.

[d] GNP net exports in 1982 dollars.

[e] Based on 50/50 mix of GNP and domestic expenditures for both U.S. and foreign variables.

of contributing factors on oil imports and agricultural exports. The decline in oil imports resulting with a lag from the 1979-80 oil-price hike made a significant positive contribution to the real trade balance. The difference between the second and third columns reflects impacts on the various components of the service account. For example, changes in GNP influence both direct-investment income (through its impact on resource utilization and profits) and demands for other services (travel, transportation, and so on). Changes in relative prices (or exchange rates) influence both the demands for other services and the valuation of net receipts from direct-investment income. The decline in real net portfolio-investment income is due largely to the increase in U.S. net portfolio indebtedness. In principle, this decline could be allocated among the other causal factors that contributed to the increase in indebtedness (by reducing net exports), but we have not done so in the table.

The estimates in Table 8 are broadly similar to those in the previous

studies. First, they suggest that the widening of the deficit between 1980 and 1986 can be fully accounted for by partial-equilibrium macroeconomic factors. (In fact, the residual item near the bottom of the table suggests that those factors more than account for the deficit.) Second, changes in relative prices and the associated depreciation of the dollar are still the dominant contributing factors. However, the growth factor also has a substantial impact, contributing nearly $80 billion, or roughly 40 percent, of the total decline in net exports of goods and services over the period in question. These results suggest that a reversal of the GNP and domestic-demand gaps that emerged during the first half of the 1980s would contribute substantially to a resolution of the U.S. trade deficit. Nevertheless, if a resolution were to be achieved without a significant drop in U.S. GNP relative to foreign GNP, it would most likely involve a reversal of the relative-price shock that took place over the first half of the decade. In view of the substantial reversal of the dollar's earlier appreciation that *had* taken place already over the previous two and a half years, we now ask why the external deficit persisted through 1987.

The Persistence of the Deficit: Macro Explanations

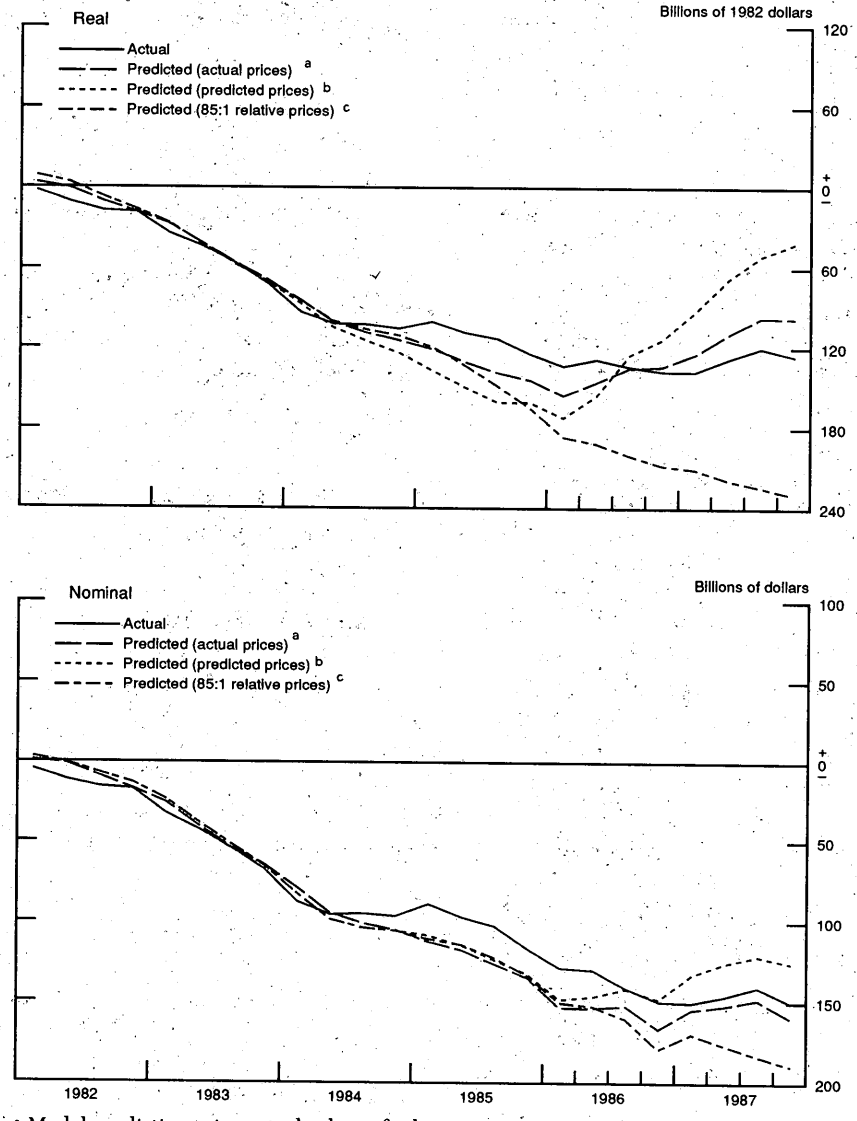
Measures of the dollar's real exchange rate generally indicate that by the end of 1987 the dollar had reversed most of its appreciation over the first half of the decade, returning to near its 1980 level. (This subject is considered in more detail in the next chapter.) Yet the nominal deficit continued to widen through the end of 1987 and did not show signs of turning around until early 1988. Meanwhile, real net exports began to grow in the latter half of 1986, but only moderately through 1987. HH and KB attributed the persistence of the deficit to the pattern of exchange-rate changes (notably the fact that the dollar was appreciating strongly before it started to fall) and normal lags (including J-curve effects) in the adjustment of the deficit to these swings in the dollar. They also noted that significant adjustment *had* taken place, in that the deficit was smaller than it would have been if the dollar had not depreciated.

Does this explanation still hold up? Our answer is partly yes (with respect to the nominal deficit) and partly no (with respect to real net exports).

Persistence of the Partial Trade Deficit. Figure 6 shows predictions of the real and nominal partial trade balance, which are derived from the price and volume equations discussed earlier. (These are basically the HH equations adjusted to incorporate our "mix" specification for activity variables.) Two predictions were made, one using actual values of nonoil import and nonagricultural export prices and a second using the model's predictions of those prices. A third simulation is also included, showing the model's prediction of where the deficit would be if the relative prices of nonoil imports

FIGURE 6

PARTIAL TRADE BALANCE



[a] Model prediction using actual values of relative prices.

[b] Model prediction using model's prediction of import and export prices.

[c] Model prediction holding relative prices unchanged at their 1985:1 values.

and nonagricultural exports had remained at their values in the first quarter of 1985 when the dollar was at its peak.

Figure 6 suggests that the decline in the dollar had a substantial impact by 1987, particularly on the real trade balance (as indicated in the top panel). The model's prediction of the real partial trade balance in 1987 (based on actual prices) was about half as large as it would have been if the dollar had not declined from its peak in early 1985.[10] The predicted real balance was below the actual balance in 1985, but it rose noticeably faster than the actual balance in 1986 and 1987, particularly when *predicted* import and export prices were used. Thus, while the real deficit did respond significantly to the fall in the dollar, it responded considerably more slowly than past experience would have predicted.

The bottom panel of Figure 6 shows that the model's prediction of the *nominal* trade balance was somewhat above the actual balance during 1987 if predicted import and export prices are used, but slightly below the actual balance if actual prices are used. The fall in the dollar had a much smaller positive impact on the model's prediction of the nominal trade balance than on its prediction of the real balance because of J-curve effects. The steady depreciation of the dollar led to a steady increase in predicted import prices (in fact, an overprediction), which offset much of the predicted gain in real net exports. In any event, the results in Figure 6 suggest that while there is no conclusive evidence that the nominal deficit was more persistent than expected, the deficit in real terms was clearly more persistent. That is, normal macroeconomic relationships (as represented in this model) can explain the persistence of the nominal deficit but not that of the real deficit.

The prediction errors of the major components of the trade-balance simulations in Figure 6 are shown in Table 9 and Figure 7. As indicated in line 4 of Table 9 and in the top panel of Figure 7, import prices were being increasingly overpredicted by the model in 1986 and 1987. When those overpredicted prices were used to predict import volumes, the result was a substantial underprediction of volumes in 1987 (line 6 of Table 9). The model also overpredicted both the prices and the volumes of nonagricultural exports in 1987, suggesting that U.S. exporters, in the aggregate, were not taking advantage of the decline in the dollar to raise their prices as much as they might have in the past, but that foreign demand for U.S. exports was

[10] The decline in the dollar had a much smaller impact on the model's prediction of the *nominal* trade balance during 1986-87 because of J-curve effects. The gradual depreciation of the dollar caused a gradual increase in import prices, which initially offset much of the gain in real net exports. Note that these simulations were run with income and other "exogenous" determinants of the partial trade balance held unchanged. Factors that might have induced the alternative relative-price paths could also have influenced the trade balance through its other determinants. For more on the J-curve, see Meade (1988).

TABLE 9

PARTIAL TRADE-BALANCE EQUATIONS: POST-SAMPLE PREDICTION ERRORS

(in percent)

	1985				1986				1987			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Volume equations using actual prices:												
1. Nonagricultural export volume	−5.9	−5.4	−5.4	−3.9	−3.7	−2.3	−1.7	0.1	6.6	8.6	8.1	5.8
2. Nonoil import volume	3.1	3.7	4.7	3.6	4.3	3.5	−0.8	−0.9	0.5	0.3	−0.8	−3.4
Price equations:												
3. Nonagricultural export price	−0.33	0.09	0.29	1.18	2.08	2.19	3.91	5.48	6.17	6.94	7.8	8.8
4. Nonoil import price	1.17	0.05	0.17	0.77	2.42	3.35	5.34	9.02	8.23	10.81	13.2	15.7
Volume equations using predicted prices:												
5. Nonagricultural export volume	−5.4	−4.9	−4.9	−3.4	−3.3	−2.3	−2.1	−0.7	5.1	6.3	5.7	3.3
6. Nonoil import volume	2.0	3.0	4.1	3.1	3.0	1.5	−4.0	−6.1	−6.0	−7.7	−8.8	−12.4

NOTE: Error = predicted minus actual.

responding less rapidly to the decline in the relative price of U.S. exports than past experience suggested.

The overprediction of nonagricultural export volumes and nonoil import prices could be explained in part by the actions of foreign competitors to reduce their export prices in terms of their own currencies in order to maintain market shares. The model's overprediction of U.S. nonagricultural export prices may also be symptomatic of more intense price competition from abroad than had been observed in the past, on average, under similar circumstances. Moreover, the model's underprediction of real net exports during 1984 and 1985 suggests the possibility that competition abroad was less intense than expected during the latter stages of the rise in the dollar. Profit margins of foreign competitors may well have been built up more during this earlier period, providing a cushion that could be squeezed later. This cause of "persistence" is the focus of much of our discussion in Chapter 7 of the microeconomic factors underlying the deficit. In the remainder of this chapter, we review the evidence on the behavior of prices and profit margins that can be gleaned from macro data.

Aggregate Data on Prices and Profit Margins. Figure 8 shows the two most important components of the import-price equation discussed earlier: the nonoil import deflator and a weighted average of foreign consumer prices expressed in dollars, which is used in the model as a crude proxy for foreign production costs. After having moved quite closely together from 1973 to 1984, the two series began to diverge in 1985 as the import deflator fell substantially relative to this particular proxy for foreign costs in dollars.[11] These data appear to support the hypothesis advanced by a number of the studies we reviewed earlier that foreign profit margins were squeezed significantly during 1985-87 as foreign firms strove to maintain their shares of the U.S. market in the face of a falling dollar. At the same time, however, Figure 8 does not support the view that profit margins on goods exported to the United States widened significantly while the dollar was rising. Thus, if foreign producers were indeed delaying the passthrough of exchange-rate changes, it appeared that they would not be able to do so indefinitely and an eventual "catch-up" in import prices was likely.

However, the squeezing of foreign profit margins is only one of several possible explanations for the emerging gaps between import prices and foreign prices shown by the aggregate data in Figures 7 and 8. Two other pos-

[11] Other measures of foreign costs, including foreign wholesale prices in dollars, show qualitatively similar pictures. We prefer to use consumer prices, because the coverage of available aggregate wholesale-price indexes is much more variable across countries. In some cases, they reflect a fairly narrow set of tradable commodities and do not adequately represent movements in domestic labor costs. Of course, CPIs have their problems too as proxies for costs, as we note below.

FIGURE 7

TRADE PRICES

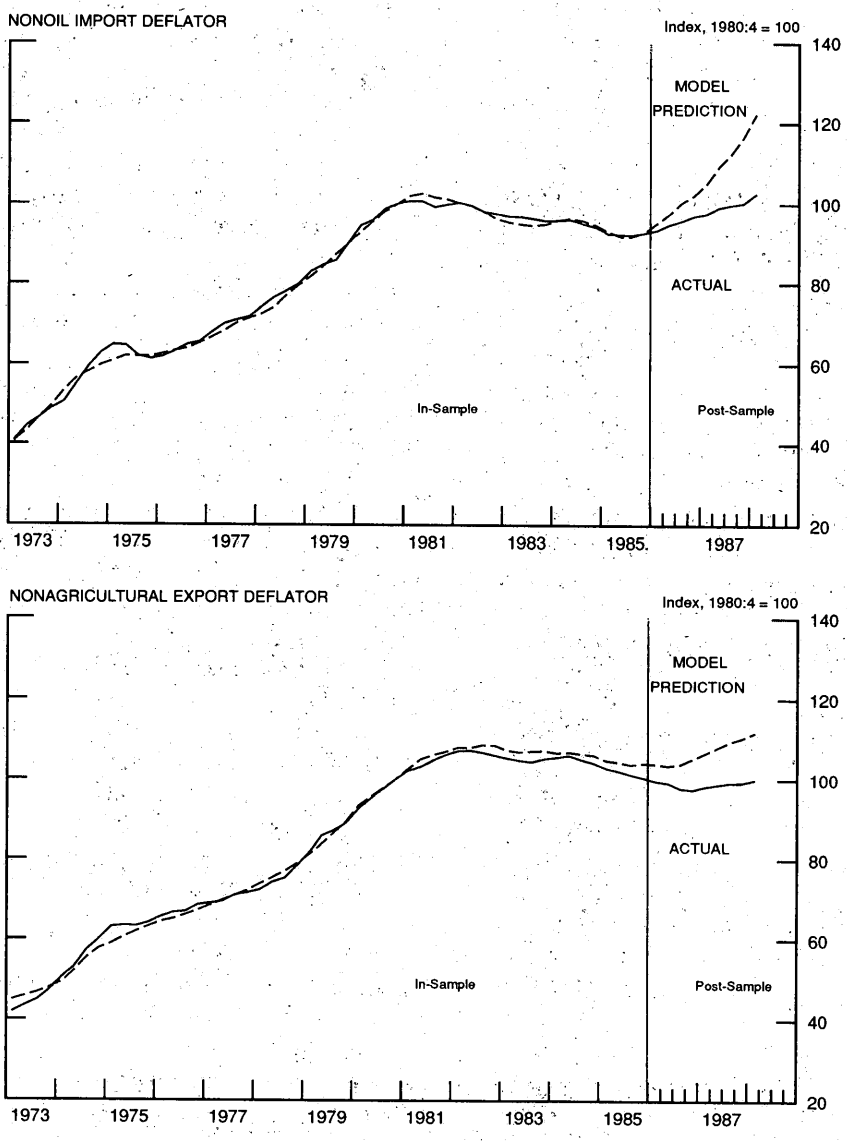
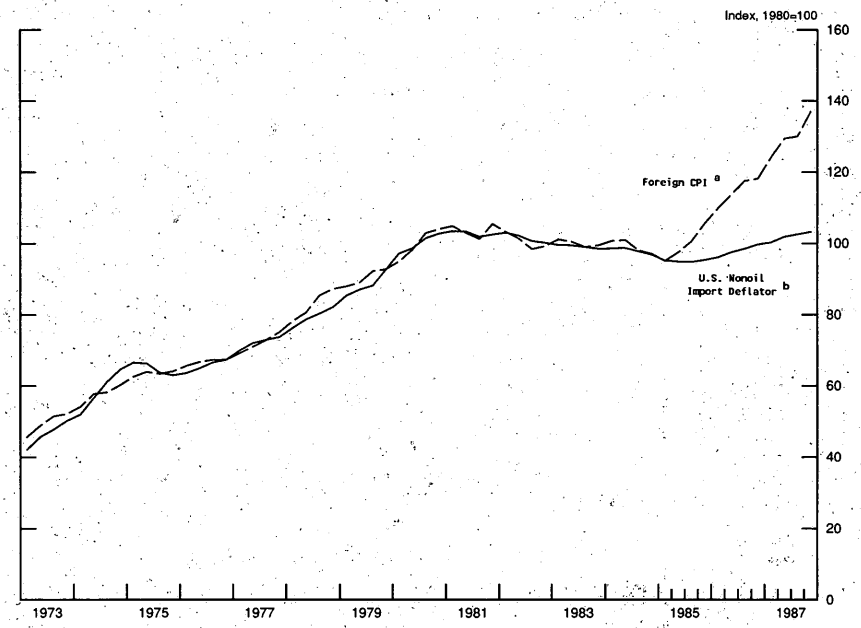


FIGURE 8

U.S. Import Deflator and Foreign Consumer Prices



[a] CPI's in dollars for 10 industrial countries and 8 developing countries weighted by shares in U.S. nonoil imports from 1978 through 1983.

[b] Implicit deflator from the GNP accounts.

Source: Federal Reserve Board USIT model database.

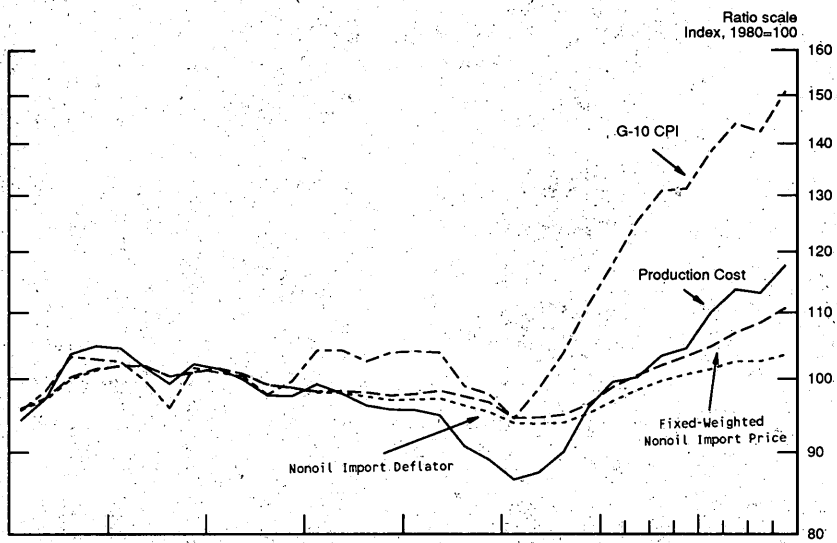
sible explanations include biases in the proxy used for foreign costs and biases in the import-price data. These alternative explanations are illustrated in the top panel of Figure 9. It shows (a) a weighted-average CPI for foreign G-10 countries,[12] (b) an index of production costs for those countries, (c) the nonoil import-price deflator, and (d) the fixed-weight nonoil import-price index. These data suggest that production costs were rising more slowly abroad than consumer prices after 1984. It is also evident that the import deflator (which is used in Figures 7 and 8) was rising less rapidly than the fixed-weight price index. A comparison of the foreign production-cost index and the fixed-weight import price suggests that foreign profit margins may have been squeezed far less on average than is commonly

[12] This differs somewhat from the CPI index in the preceding figures in excluding the eight developing countries, whose CPIs in dollars were rising less rapidly. We limit the index to the foreign G-10 countries in this case because of the limited availability of other cost measures.

FIGURE 9

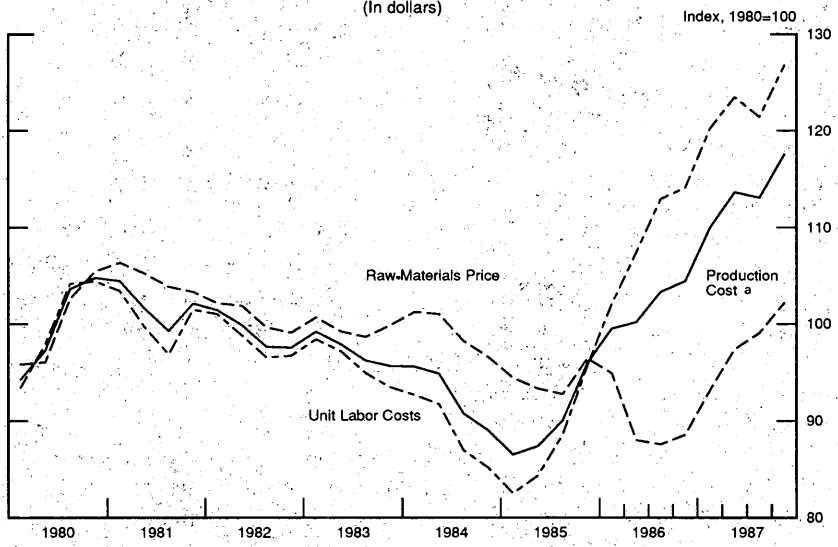
U.S. IMPORT PRICES, FOREIGN PRODUCTION COSTS, AND THEIR COMPONENTS

(all indices in U.S. dollars)



Foreign G-10 Manufacturing Cost Indexes and Their Components [a]

(In dollars)



[a] All series are weighted averages for G-10 countries weighted by shares in U.S. nonoil imports. Total production cost in each country is a weighted average of raw materials (35%) and unit labor costs (65%), based on input-output weights.

SOURCES: Unit labor cost, IMF. Raw-materials price, national sources.

believed. In the rest of this chapter, we discuss the behavior of foreign production costs, problems with import-price indexes, and the behavior of foreign profit margins based on more refined macro data.

The bottom panel of Figure 9 shows the components of the index of production costs that is used in the top panel. The index was constructed as a weighted average of unit labor costs and prices of raw materials plus energy (in dollars) in each of the ten countries included. (The weights used were based on the average shares of labor compensation and raw materials—including energy—as inputs into tradable-goods industries found in U.S., Japanese, and German input-output tables.) Unit labor costs rose strongly in dollars between early 1985 and the end of 1987, but the prices of raw materials (including energy) remained little changed on balance, and they held down the overall cost index. In local currencies, unit labor costs were flat and raw-material prices fell sharply (owing in part to the appreciation of local currencies against the dollar), whereas consumer prices continued to rise at a 3 to 4 percent annual rate.

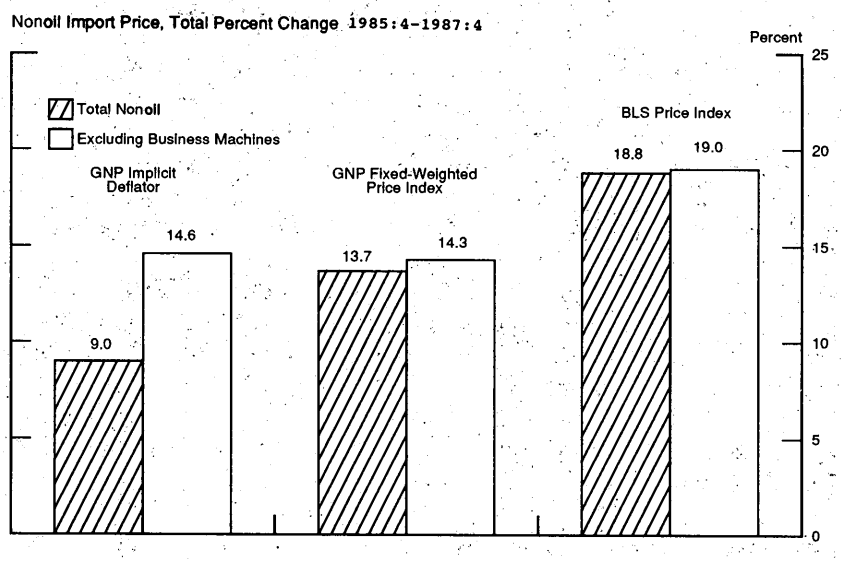
Turning to import-price measures, the implicit deflator for nonoil imports rose substantially less than the fixed-weight price index during 1985-87. (The deflator is used to derive import volumes and is often employed in empirical models of U.S. trade—including the HH and KB models.) Most of the difference between the movements in these two GNP price indexes can be accounted for by the behavior of business machines, as illustrated in Figure 10. The variable weights in the deflator give a sharply increasing weight over time to business machines, whose prices (as measured in the national-income accounts) were falling rapidly during the mid-1980s. That is, movements in the deflator reflect changes in the composition of imports, as well as changes in the prices of each good imported.[13] Excluding business machines, the GNP deflators and fixed-weight indexes moved about the same amount over the period covered in Figure 10. (The fixed-weight index gives a small and constant weight to business machines, based on their share in imports in 1982—about 3 percent, compared with a share of 15 percent at the end of 1987.) Figure 10 also shows increases in the BLS export-price index. The BLS measure, which is a fixed-weight index, differs from the GNP fixed-weight index primarily in the treatment of basic commodities (as well as business machines).[14]

[13] The price of imported business machines used in the GNP import-price indexes is the same as the price series used for domestic business machines in the GNP accounts and may understate actual import prices.

[14] We do not fully understand the reasons for the divergence between the BLS index and the GNP fixed-weight index. We do know that while the GNP index uses BLS data for most manufactured goods, it uses unit-value data for basic commodities. (Unit-value data provide relatively complete coverage for that category of goods.) The BLS index uses sample data that cover only one week out of each quarter, and the prices of commodities tend to be volatile.

FIGURE 10

NONOIL IMPORT PRICES



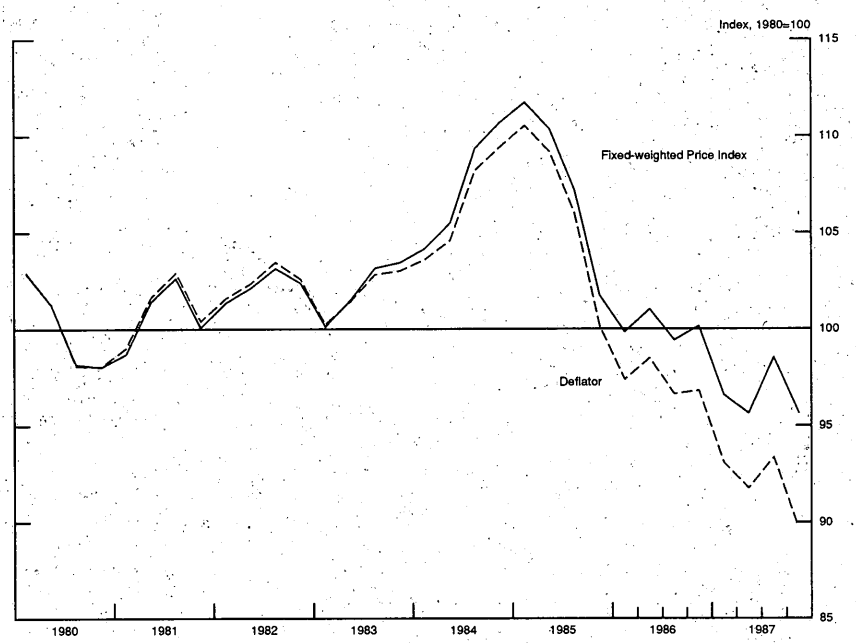
SOURCES: Bureau of Economic Analysis, Bureau of Labor Statistics, and Federal Reserve Board staff calculations.

The implications of the fixed-weight price index and our measure of foreign G-10 production costs for foreign profit margins can be seen in Figure 11, which plots the ratio of the import-price index to the foreign-cost index. (The ratio using the deflator is also shown for comparison.) This ratio suggests that foreign profit margins rose during the early 1980s as the dollar was rising, fell during 1985-87 as the dollar was falling, and reached a level in 1987 that was somewhat below their level in 1980 (before the dollar had begun to appreciate but after it had gone through several years of mild depreciation). Data for Germany and Japan, shown in Figure 12, suggest that while German and Japanese export prices to all countries rose about in line with domestic production costs, the prices of Japanese exports to the United States rose less than costs after the dollar began to fall. (Japan is the only country for which aggregate data on prices of bilateral exports to the United States are available.)

In sum, the evidence based on aggregate data suggests that average foreign profit margins on exports to the United States were squeezed noticeably following the peak in the dollar, after having widened while the dollar was rising. However, the extent of the squeezing of profit margins and the

FIGURE 11

RATIO OF NONOIL IMPORT PRICES TO FOREIGN COSTS



NOTE: Ratio based on U.S. import prices and foreign costs measured in U.S. dollars.

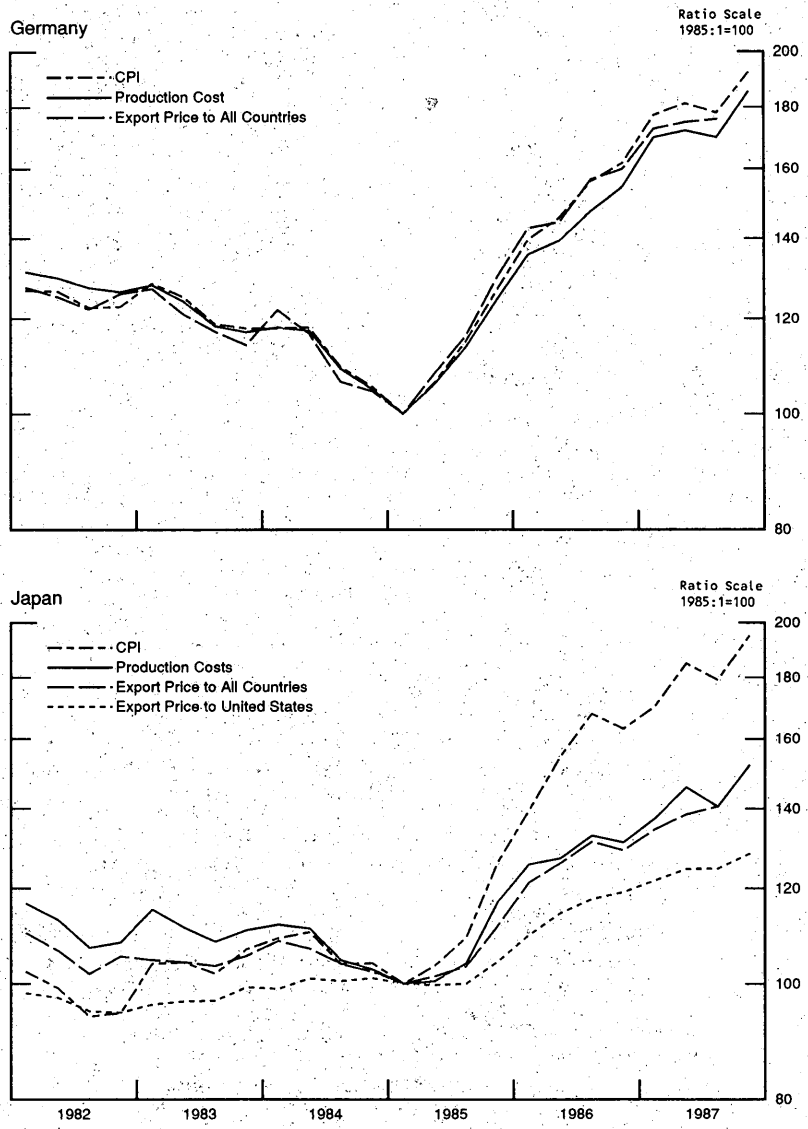
overprediction of import prices was probably overstated by the trade model we employed. To a considerable degree, the moderate response of import prices to the decline in the dollar reflected declines in foreign production costs that were taking place at the same time. Had we employed a model that incorporated a more accurate measure of foreign production costs (as well as a more refined measure of import prices), the "unexpected" persistence of the real deficit due to the overprediction of import prices and consequent underprediction of import volumes would have been reduced. However, as indicated in Figure 6, even when actual import prices were used in the model, the predicted response of the real external deficit to the decline in the dollar was well above the actual response.

In Chapter 7, where we discuss microeconomic factors, we return to the subject of foreign pricing behavior and to an analysis of the behavior of U.S. import prices at the industry level. First, however, we turn to macroeconomic causes of the deficit at a more fundamental level.

FIGURE 12

FOREIGN EXPORT PRICES AND PRODUCTION COSTS

(all indices in U.S. dollars)



SOURCE: CPI, national sources. Export prices, Bureau of Labor Statistics.

6 MACROECONOMIC FACTORS: POLICY SHIFTS AND OTHER FUNDAMENTALS

In the preceding chapter, we established that partial-equilibrium macroeconomic factors, including relative prices (or real exchange rates) and relative growth rates, can account for the widening of the external deficit between 1980 and 1986, though not for all of its persistence through 1987 (at least in real terms). We now consider the extent to which the contributions of these proximate determinants can be explained by shifts in fiscal and monetary policies at home and abroad during the 1980s. We begin with an analysis of factors underlying movements in the dollar's exchange rate. We then turn to a quantitative analysis of the effects of shifts in fiscal and monetary policy, drawing on the results of policy simulations with a number of international macroeconomic models.

Factors Underlying Movements in the Dollar

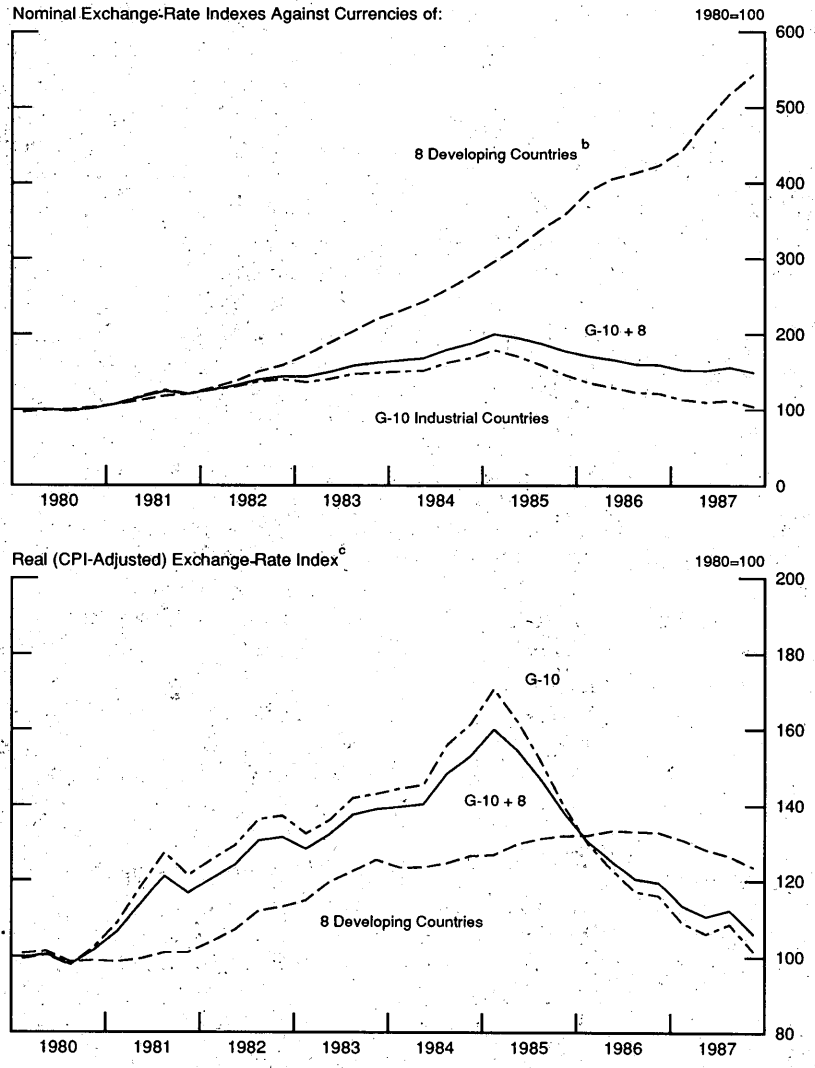
Movements in the dollar's average real (CPI-adjusted) foreign-exchange value against the currencies of several different groups of countries are shown in Figure 13. The indexes shown include 10 industrial countries, 8 developing countries, and the 18 countries combined. The currencies are weighted by each country's share in world trade. The foreign G-10 index and 8-developing-country index show divergent movements. While the dollar fell sharply against the foreign G-10 currencies after early 1985, it did not begin to fall against the currencies of developing countries, on average, until 1987. This divergence of rates has important implications for certain categories of U.S. imports. Overall, however, the 18-country index is dominated by movements in the foreign G-10 index,[1] and in this chapter we focus on factors that have led to swings in the dollar's exchange rate against the currencies of industrial currencies.

Our analysis of movements in the dollar's real exchange rate draws on the model of exchange-rate determination described at the end of Chapter 3—the long-term real open-interest-parity relationship. The essence of this model is that the dollar will move to equate the expected rate of return on assets denominated in different currencies. An empirical representation of this relationship is given in Figure 14.

[1] This is also true of indexes weighted by bilateral import shares (see Helkie and Hooper, 1988, and Pauls, 1987).

FIGURE 13

FOREIGN-EXCHANGE VALUE OF THE DOLLAR [a]



[a] Foreign currency/dollar indexes weighted by each country's share in world trade from 1978 through 1983.

[b] Includes Brazil, Hong Kong, Malaysia, Mexico, Philippines, Singapore, South Korea, and Taiwan.

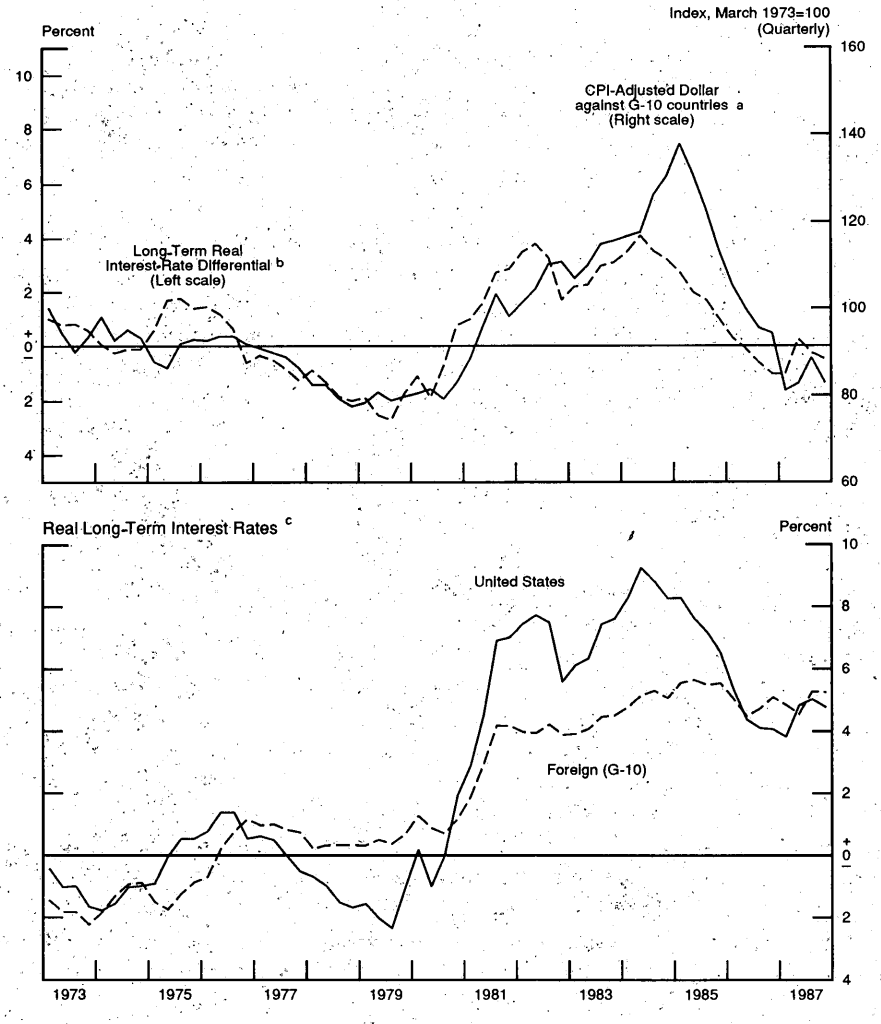
[c] CPI adjusted index is equal to nominal index times the ratio of U.S. CPI to weighted average foreign CPI (using same countries and weights as in nominal index).

SOURCE: *Federal Reserve Bulletin.*

FIGURE 14

THE DOLLAR AND REAL INTEREST RATES

(quarterly data)



[a] The CPI adjusted dollar is a weighted average index of the exchange value of the dollar against the currencies of the foreign G-10 countries plus Switzerland, where nominal exchange rates are multiplied by relative levels of CPI's. Weights are proportional to each foreign country's share in world exports plus imports from 1978 through 1983.

[b] Long-term real U.S. interest rate minus weighted average of long-term real foreign-country interest rates.

[c] Long-term government or public-authority bond rates adjusted for expected inflation estimated by a 36-month centered calculation of actual inflation. Foreign index uses the same trade weights as described in note a.

SOURCE: Federal Reserve Board macro data base.

The top panel of Figure 14 shows the real dollar against foreign G-10 currencies and a measure of the difference between U.S. and foreign (G-10) long-term real government-bond yields. The bottom panel shows the U.S. and foreign components of the real-interest-rate differential. In calculating the real bond yields, a three-year centered moving average of CPI inflation rates (i.e., ranging from six quarters in the past to six quarters in the future) was used as a proxy for inflation expectations. The countries and weights in the foreign-interest-rate index are the same as in the exchange-rate index.

It is clear from Figure 14 that movements in the dollar's real exchange rate have been at least roughly correlated with the long-term real-interest-rate differential over much of the floating-rate period. Movements in the dollar over the 1980s can be broken into three stages. The first stage, which lasted through 1983, was a rapid appreciation (with several interruptions) that followed a sharp (6 percentage point) increase in the real U.S. bond rate relative to the average foreign rate. The second stage, beginning in early 1984, was a further rapid appreciation that took place despite a sharp decline in the U.S. real interest rate relative to foreign rates. The third stage was the rapid depreciation beginning in March 1985, which coincided with a continued decline in the interest differential through early 1987.

Given the assumptions underlying the long-run open-interest-parity model (close substitutability of assets, absence of exchange-risk aversion, and a constant expected long-run equilibrium real exchange rate), a 1 percentage point increase in real U.S. interest rates relative to foreign rates on bonds maturing in X years will induce an immediate X percent real appreciation of the dollar. Thereafter, the dollar can be expected to depreciate by 1 percent per year for X years, returning to its long-run equilibrium level. The scaling of the top panel of Figure 14 is consistent with about a six-year expectations horizon. That is, a 1 percentage point increase in the interest differential (left scale) induces roughly a 6 percent appreciation of the dollar (right scale). In principle, the horizon could be significantly longer, because the interest rates used in the chart pertain to bonds with terms to maturity ranging between five and ten years. (The terms to maturity vary across countries, depending on data availabilities.) On purely empirical grounds, however, the six-year horizon appears to fit best.[2]

This relationship suggests that the roughly 35 percent appreciation of the dollar during stage 1 (1980-82) can be fully explained by the 6 percentage point increase in the interest differential over that period. During stage 3 (1985-87), however, the dollar fell considerably more than this relationship would suggest.

[2] This empirical result is confirmed by regression analysis reported in Hooper (1985) and can probably be explained by the flatness of yield curves at terms of more than five years.

The bottom panel of Figure 14 illustrates clearly that the stage 1 increase in the real-interest-rate differential reflected a very large (nearly 10 percentage points) increase in U.S. real rates that was only partly offset by an increase in average foreign rates. The later decline (into 1987) was largely the result of a decline in U.S. rates, while foreign rates were much more stable. The "consensus" explanation for the rise in U.S. real interest rates in the early 1980s that appears to have emerged in the literature includes a combination of monetary tightening, beginning with the shift in the Federal Reserve's operating procedures in November 1979, and fiscal expansion, following the passage of the federal tax cuts in 1981.[3] The later decline in U.S. real rates can be linked to both the adoption of a more accommodative monetary policy stance by the Federal Reserve after 1982 and improved prospects for a significant reduction of the federal budget deficit following the passage of the Gramm-Rudman legislation in 1985 (see Johnson, 1986).

The long-term real-interest-parity relationship and, more fundamentally, the shifts in policies underlying the changes in real interest rates still leave unexplained a significant proportion of the dollar's movement during the 1980s. Deviations between the dollar and the interest differential in Figure 14 can be traced to the failure of one or more of the assumptions underlying the interest-parity model. Consider, for example, the assumption of a constant expected equilibrium real exchange rate. The long-run equilibrium real rate is often defined as the rate that is consistent with a sustainable level of the current account in the long run (see, e.g., Krugman, 1987b). Views about the politically sustainable level of the current account (and therefore the dollar) appear to have changed over time. By mid-1985, the unprecedented level of the U.S. current-account deficit and prospects for even larger deficits had become a matter of central concern to economic policymakers. Mounting protectionist pressures in the United States and official pronouncements, such as the September 1985 Plaza Accord, that the dollar would have to be brought down may have induced a significant shift in market expectations about the equilibrium real exchange rate. Such a shift would have caused the dollar to fall faster than the rate predicted by movements in the real-interest-rate differential, as it did in stage 3.

Movements in the dollar and the interest-rate differential could also differ significantly if financial assets denominated in the different currencies are not close substitutes. In this case, the risk premium on dollar assets would rise (and, with unchanged interest rates, the dollar would fall) as the U.S. current-account deficit required foreign residents to hold increasing

[3] See Blanchard and Summers (1984) for an analysis of factors underlying the rise in real interest rates in the early 1980s. Branson, Fraga, and Johnson (1985), Feldstein (1986a), and Hooper (1985) all provide empirical analyses linking the rise in the dollar to the 1981 tax cut through its impact on real interest rates.

amounts of dollar-denominated claims. This effect could help to explain the rapid fall in the dollar after 1985, but it should also have been holding the dollar below the interest-rate differential when U.S. net external debt was beginning to rise substantially during 1983-85. In any event, a number of empirical studies have suggested that this effect has not been empirically significant in the past and that the assumption of close substitutability does hold to a reasonable approximation (see, e.g., Danker et al., 1985, and Frankel, 1982).

Finally, stage 2 (early 1984 to early 1985) remains a puzzle. The dollar rose more than 20 percent over a twelve-month period during which U.S. interest rates were falling rapidly relative to foreign rates and the current-account deficit was in excess of $100 billion. Frankel and Froot (1986) observe that survey data suggest that even market participants expected the dollar to fall during this period. They conclude that the rise in the dollar in 1984 reflected irrational speculative behavior. Other studies have suggested that financial deregulation in Japan and elsewhere loosened pent-up demand for dollar assets that contributed to the continued rise in the dollar (see, e.g., Friedman and Sinai, 1987, and Haynes, Hutchison, and Mikesell, 1986a). Whatever its cause, the rise in the dollar over this period, which had important implications for the U.S. external balance, apparently cannot be traced to the effects of shifts in macro policies through their impacts on real interest rates. We turn next to a quantitative analysis of the extent to which changes in fiscal and monetary policies *did* affect real interest rates, the dollar, and the external deficit.

The Contribution of Shifts in U.S. and Foreign Macroeconomic Policies

Table 10 presents a combination of OECD and IMF estimates of the exogenous shifts in fiscal policy that occurred over the first half of the 1980s. These data suggest that changes in U.S. fiscal policy resulted in an expansion of the structural (exogenous) federal deficit by an amount equal to about 3½ percent of GNP between 1980 and 1985. Over the same period, changes in policies in other industrial countries resulted in contractions of structural government budget deficits equal to about 2½ per cent of GNP on average. (After 1985 the United States made some progress in reducing its structural deficit, while the positions of the other countries, *on average*, remained little changed.)

Quantitative estimates of the effects of these fiscal-policy shifts can be obtained from the results of policy simulations using a group of twelve multicountry models, reported in a March 1986 Brookings conference.[4] The

[4] The conference was entitled "Empirical Macroeconomics for Interdependent Economies: Where Do We Stand?" The simulation results are reported and analyzed in detail in Bryant et al. (1988).

TABLE 10

FISCAL POLICY: CUMULATIVE EXOGENOUS CHANGES IN BUDGET BALANCES BETWEEN 1980 AND 1985

(as percent of GNP/GDP)

	IMF Fiscal Impulse		OECD Change in Structural Budget Balance
	Central/Federal Government	General Government	General Government
Canada	−2.4	−2.9	−3.4
France	0.0	3.2	0.6
Germany	2.9	4.4	3.2
Italy	−0.5	0.8	−2.8
Japan	1.5	3.5	3.6
United Kingdom	3.0	3.8	4.1
Average of 6 above	1.2	2.8	2.0
United States	−3.7	−2.3	−2.4

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

SOURCES: IMF estimates: *World Economic Outlook* (April 1986). OECD estimates: *Economic Outlook*, various issues.

models were asked to simulate the effects of sustained exogenous shifts in government spending equal to 1 percent of baseline GNP both in the United States and in other OECD countries combined, while holding the growth of monetary aggregates exogenous. They were also asked to simulate the effects of an exogenous 4 percent increase in the U.S. M-1 money stock. The average longer-run impacts on several key variables obtained from nine of these models are shown in Table 11. The data shown are averages of wide ranges of results. However, all of the estimates in the ranges were generally consistent with the qualitative predictions of conventional macroeconomic theory as embodied in the extended Mundell-Fleming model. The mean estimates suggest that the U.S. fiscal expansion causes U.S. GNP to rise and eventually leads to a half percentage point increase in the U.S. long-term real interest rate relative to foreign rates, a 2 to 2½ percent appreciation of the dollar in real terms against OECD currencies on average, and a $14 to $20 billion decline in the nominal current-account balance. The foreign fiscal contraction also leads to an appreciation of the dollar and a decline in the U.S. current-account balance. The average effect of the foreign fiscal shock on the real-interest-rate differential is negligible, however, and the

TABLE 11

SIMULATED IMPACTS OF FISCAL AND MONETARY POLICY SHOCKS, AVERAGE OF NINE MODELS

(deviations from baseline)

Impact on	U.S. Fiscal Expansion Equal to 1% of GNP		Foreign Fiscal Contraction Equal to 1% of GNP		4% Decline in U.S. M-1 Money Stock	
	After 3 Years	After 5 Years	After 3 Years	After 5 Years	After 2 Years	After 5 Years
U.S.-foreign long-term real interest rate differential (% points)	½	½	0+	0+	½	0
OECD dollar real exchange rate (%)	2	2½	1	1½	4	2½
U.S. current-account balance (billions of $, annual rates)	−14	−20	−8	−8	0	0
U.S. CPI level (%)	1	2	−½	−1	−1½	−2½
U.S. real GNP level (%)	1	½	−¼	−0	−1	−½
Foreign (OECD) real GNP level (%)	¼	¼	−1½	−1¼	−¼	−¼

NOTE: The models included in these averages are: the DRI model, the EC COMET model, the FRB Multicountry Model, Project LINK, the IMF staff's MINIMOD, the McKibben-Sachs Global model, the OECD staff's INTERLINK model, the Taylor rational-expectations multicountry model, and the Wharton model. Also participating in the exercise were the Japanese EPA World Econometric Model, the Minford Liverpool model, and the Simms-Litterman World VAR model. The latter three models are not included in the averages shown, either because they were unable to run the simulations as specified or because the results were clearly outliers.

SOURCE: Calculated from Bryant et al. (1988).

exchange-rate and current-account effects are substantially smaller than in the case of the U.S. shock. A U.S. monetary contraction raises the real-interest-rate differential and the dollar's exchange rate, but it also reduces U.S. real income. With the fall in income tending to reduce imports (raise net exports) and the rise in the dollar working in the opposite direction to depress net exports, the U.S. monetary contraction has a negligible impact on the current-account balance.

The results in the first and third columns of Table 11 suggest that the U.S. fiscal expansion (equal to 3½ per cent of GNP) and the foreign fiscal contraction (2½ per cent of GNP) accounted together for less than a third (or 3.5 × 0.5 percentage points + 2.5 × 0 percentage points = 1.75 percentage points) of the 6 percentage point increase in the long-term real-interest-rate differential between late 1979 and early 1984 that we saw in Figure 14. Similar calculations suggest that these shifts in U.S. and foreign fiscal policies accounted for about 10 percentage points, or roughly one-fifth of the rise in the dollar to its peak in early 1985, and as much as $90 billion (or nearly two-thirds) of the widening of the current-account deficit between 1980 and 1986.[5]

Thus, the combination of fiscal expansion at home and fiscal contraction abroad accounted for as much as two-thirds of the $140 billion widening of the current-account deficit between 1980 and 1986. However, these fiscal-policy shifts can explain only about a third of the rise in the real-interest-rate differential and even less of the rise in the dollar (which our partial-equilibrium analysis found to be the most important factor underlying the widening of the deficit). Evidently, the changes in fiscal policy substantially influenced the current account through their impacts on relative growth of GNP and domestic demand in the United States and elsewhere. Based on the estimates in columns 1 and 3 of Table 11, the shifts in U.S. and foreign fiscal policy raised the level of U.S. GNP by as much as 6 percentage points relative to foreign (OECD) GNP during the first half of the 1980s, which

[5] That is, the U.S. fiscal expansion led to an estimated 3.5 × 2 percent = 7 percent rise in the dollar and a 3.5 × $14 billion = $49 billion decline in the current account. The foreign fiscal contraction led to an estimated 2.5 × 1 percent = 2.5 percent rise in the dollar and a 2.5 × $8 billion = $20 billion fall in the U.S. current account. The combined effects after three years are 9.5 percent and $69 billion, respectively. As indicated in Table 11, these estimates would be somewhat larger if the five-year effects were used instead of the three-year effects. The three-year horizon is probably more pertinent to the dollar and the interest differential, both of which had peaked by early 1985. The longer horizon may be more pertinent to the current-account deficit, which continued to widen through 1987. On a five-year horizon, the current-account effects are equal to 3.5 × 20 + 2.5 × 8 = $90 billion. In any case, much of the widening of the current account in 1987, which came well after the dollar had started to fall, can be traced to J-curve effects due to the decline in the dollar, as noted in Chapter 5 (see also Meade, 1988).

was substantially more than the actual GNP growth differential during that period (see Table 4).[6]

If, by the process of elimination, we attribute the remaining two-thirds (or 4 percentage points) of the rise in the long-term real-interest-rate differential to a significant tightening of U.S. monetary policy relative to monetary policy abroad beginning in late 1979, that shift in monetary policy can explain a substantial part of the rise in the dollar. The estimates in Table 11 suggest that, in the case of a U.S. monetary tightening, the dollar rises by 4 percent in real terms for every half percentage point rise in the real-interest-rate differential (or a ratio of 8 to 1, which is somewhat greater than the roughly 6 to 1 ratio illustrated in Figure 14). Applying this 8 to 1 ratio to the 4 percentage point rise in the interest differential, we conclude that the monetary tightening would account for roughly 32 percentage points, or about half the rise in the dollar.

Despite its impact on the dollar, the U.S. monetary tightening by itself may have had little net impact on the current-account deficit (as indicated by the estimates in Table 11). This is because the monetary contraction also reduced income, which depressed imports (raised net exports), offsetting its negative effect on net exports through a higher dollar.[7]

In brief, based on the average predictions of a group of international macroeconomic models, we describe the contributions of macro policies to the widening of the current-account deficit as follows: The U.S. monetary contraction beginning in the latter part of 1979 resulted in a sharp runup in U.S. real interest rates and the dollar; it also contributed significantly to the 1982 recession. These changes in the dollar and U.S. growth had offsetting impacts on the current account, which fluctuated in a fairly narrow range around a zero balance through most of 1979-82. As the fiscal stimulus took hold in 1982 and 1983, income and domestic demand recovered strongly

[6] The estimate of a 6 percent growth gap resulting from the shift in fiscal policies was computed as follows: The U.S. fiscal expansion equal to 3½ percent of GNP was multiplied by the three-fourths of 1 percent increase in U.S. GNP minus foreign GNP, which the average model simulations shown in Table 11 indicate would be the impact of a fiscal expansion equal to 1 percent of GNP. This product was then added to the product of a foreign fiscal contraction equal to 2½ percent of GNP times the 1¼ percent increase in U.S. GNP minus foreign GNP that would be induced by a 1 percent foreign fiscal contraction (also from Table 11).

[7] A U.S. monetary contraction 8 times as great as that shown in Table 11 would have reduced the level of U.S. GNP relative to foreign GNP by 6 percent. According to the models, the positive current-account effects of this shift in relative GNPs were large enough to offset the negative effects of the rise in the dollar caused by monetary restraint. On this basis, the monetary contraction also reduced the level of U.S. consumer prices by something on the order of 20 percent below where they otherwise would have been in the mid-1980s. This estimate is equal to 8 times the five-year impact of the U.S. money shock on the CPI shown in Table 11. Since most of the models appear to show some tendency toward neutrality of money in the longer run, the full price effect of the shock may be somewhat greater in the longer run.

and further stimulated interest rates and the dollar. With the high dollar and growth now working together, the current account began to fall sharply into deficit in 1983 and beyond.

Our quantitative estimates suggest that neither the shift in monetary policy alone nor the shift in fiscal policies alone can adequately explain the changes in the U.S. external sector that took place during the first half of the 1980s. Taken *together*, however, the combined effects of these policy changes can explain nearly two-thirds of the increases in both the dollar and the current-account deficit. They also appear to have reduced U.S. GNP growth somewhat, foreign GNP growth by a greater amount, and the U.S. inflation rate by a substantial amount.[8] Explanations for the remaining one-third of the rise in the dollar and the widening of the current-account deficit may be found in exchange-market bubbles, the debt crisis (which interrupted the flow of new lending to, and therefore the growth of, major U.S. markets among developing countries), and other exogenous factors (including a decline in the U.S. private saving rate) that may have raised U.S. growth relative to foreign growth.

Some words of caution about the interpretation of these results are in order. First, with respect to our estimates of the effects of shifts in fiscal policy, there is some inconsistency between actual policy shifts and the model simulations. Perhaps most important, the model simulations were based on an increase in U.S. government spending, whereas the actual U.S. fiscal expansion was due primarily to a cut in taxes. Several of the models whose results we employ participated in a Brookings workshop in September 1985 for which they were asked to simulate a lump-sum federal tax cut and an increase in spending, each equal to 1 percent of baseline GNP. On average, the tax cut had a 15 percent smaller impact on GNP, the dollar, and the current account than the spending increase. In many of these models, moreover, a cut in tax rates could have a somewhat smaller impact than a lump-sum tax cut. Simulations with the FRB Multi-Country Model of the tax-law changes in the Economic Recovery Tax Act of 1981 and the Tax Equity and Fiscal Responsibility Act of 1982 reported by Hooper (1985) show estimated impacts on the dollar and the current account that are about two-thirds as large as estimates based on the average multipliers reported here.[9]

Second, the "unexplained" portion of the current-account deficit could be

[8] The net negative impact on U.S. GNP growth is consistent with the shortfall of GNP growth relative to potential during the 1980s. Between 1980 and 1987, U.S. growth averaged only about 2.0 percent per year, well below most estimates of potential growth.

[9] The MCM simulations took into account, *inter alia*, the effect of the tax changes on the user cost of capital, estimated to be something in the neighborhood of -1 percentage point, on average.

greater than indicated in our estimates inasmuch as developments in oil markets, including both oil-price declines and the continuing response of U.S. consumption (hence imports) to earlier price increases, were working to reduce the deficit.

Finally, the quantitative estimates outlined above are based on averages of a wide range of results obtained from a variety of models. These averages should be taken as no more than very crude indicators of the possible orders of magnitude of the effects of monetary- and fiscal-policy shifts. A recent study by Sachs and Roubini (1987), for example, finds that the U.S. current-account deficit can be fully explained by a combination of changes in fiscal policy and the reduction of lending to developing countries. The model they employ was included in the March 1986 Brookings conference, and its estimate of the current-account effects of a U.S. fiscal expansion was at the high end of the range, more than double the average estimate shown in Table 11.

7 MICROECONOMIC FACTORS: PRICING BEHAVIOR AND PROTECTION

We turn now to the microeconomic factors contributing to the widening and persistence of the current-account deficit. We have argued that macroeconomic factors could explain the initial widening of the deficit but not all of it, and some but not all of the persistence of the deficit. At the end of Chapter 5, we found evidence in aggregate data (despite significant problems with those data) that changes in the pricing and profit-setting behavior of importers and exporters were contributing to the persistence of the deficit. In this chapter, we begin by investigating microeconomic, or industry-level, evidence of changes in the behavior of prices and profit margins. Recalling the simple model of price determination presented earlier, we then select industries that illustrate how the relationship between exchange rates and dollar import prices can be affected by differences between products with respect to their sources or destinations and by specific characteristics of the products and their marketplace, including protection.

We find that through the end of 1986 industry-level evidence confirmed that foreign producers were not passing through much of the dollar depreciation experienced. In consequence, through the end of 1986, profit margins measured in foreign currency were falling and, concomitantly, increases in dollar import prices were quite modest. In some cases, especially those products sourced from or destined for areas of the world that had experienced little dollar movement through 1986 (for example, Canada and the developing countries), there was little passthrough because the exchange rate changed relatively little in real terms.

Foreign pricing behavior appears to have changed in 1987. In some cases, profit margins may have hit bottom during 1986. The further declines in the dollar experienced in 1987 were not absorbed, and dollar import prices rose much more quickly. In addition, the currencies of some of the key developing-country trading partners appreciated modestly in real terms against the dollar, giving additional impetus to price increases on those imported products.

On the export side, the rather unstrategic pricing behavior of the U.S. exporter observed in the macro data was confirmed by the industry-level data, at least through 1986. United States exporters generally seemed to price off costs and adjust profit margins very little in the face of external shocks.

As with imports, however, 1987 appears to be associated with some devi-

ation from this myopic strategy. In some cases, U.S. exporters increased profit margins under the umbrella of the rising foreign currencies, just as foreign producers had done several years earlier. In other cases, it appears that U.S. exporters were pricing strategically with respect not only to the exchange-rate change but also to prices of competing products in third markets.

Prices and Profit Margins

We have seen that the equation for the nonoil import deflator significantly overpredicted in 1986 and 1987, suggesting that import prices were adjusting more slowly to changes in the exchange rate than in the past. However, this macro analysis was clouded to some extent by data problems: foreign consumer prices, used as a proxy for costs of production, probably understate movements in costs of production, and the import deflator may understate increases in import prices due to shifts in commodity composition (particularly involving the increasing share of business machinery). In addition to the issue of input costs, our micro model suggested that the inability to measure the exchange rate properly and to account for other factors, such as trade barriers, could overstate the estimates of the pass-through of an exchange-rate change to dollar import prices. In an effort to get around some of these data problems and to examine industry pricing behavior and exchange-rate passthrough more closely, we turn now to an investigation of micro data.

Our analysis of disaggregated data uses a relatively small sample of industries (see Table 12), which accounted for about 15 percent of U.S. imports and exports in 1980. These industries were chosen because they have the longest available series for import and export transactions prices. For our analysis, we wanted to make two comparisons, between periods of appreciation and depreciation and between the current depreciation and an earlier depreciation. Thus, we wanted a sample of industries with a data series that included at least the depreciation in the late 1970s. The industries in Table 12 are the only ones that go back that far. While not a large sample, it is representative of the predominant categories of imports and exports in the United States.

In the past, an analysis of the behavior of trade prices at the industry level depended on unit-value data as proxies for price movements. Now, however, the Bureau of Labor Statistics is publishing transactions prices for imports and exports.[1] These prices, which are transactions prices obtained

[1] These prices are disaggregated to the 4-digit SIC, the 5-digit SITC, and the 4-digit end-use categories. We used the SIC disaggregation, primarily because most U.S. data at the industry level are available according to the SIC scheme. In particular, U.S. producer-price indexes are available according to the SIC. In addition, U.S. indexes of industrial production

TABLE 12

SIC CODE NUMBER AND SIC PRODUCT-CATEGORY NAME

	IMPORTS
2033	Canned fruits and vegetables
2221	Weaving mill products, synthetics, silks (certain textiles)
2311	Men's and boys' suits and coats (certain apparel)
2621	Pulp-mill products
314	Men's and women's leather footwear (3143 + 3144)
331	Rolling mill and electrometalurgical steels (3312 + 3313)
3531	Construction machinery
	EXPORTS
2611	Paper-mill products
3494	Valves and pipe fittings
3519	Internal-combustion engines
3523	Farm machinery and equipment
3533	Oil-field and gas-field equipment
3546	Power-driven hand tools
3555	Printing-trades machinery
3674	Semiconductor devices

from a survey of a selected sample of industries, are available quarterly, one observation per quarter (usually the observation is the third month of the quarter). Both the import and the export prices are indexed in dollar terms.

Constructing Indexes of Industry-Specific Profit Margins. For imports, we examine foreign-currency profit margins on the assumption that a foreign firm maximizes profits measured in its own currency. Therefore, each product's BLS import-price index must be converted to foreign-currency units. An index of nominal exchange rates weighted by import share was created for each product.[2] Multiplying this index by the BLS index of dollar import prices yields an index of import prices in foreign-currency terms. Multiplying the import-share weights by each country's proxy for the product's production costs creates an index of production costs in foreign-cur-

and some annual trade-value data are disaggregated according to the SIC. On the other hand, obtaining trade data for country-industry pairs on an SIC basis remains quite difficult. We have used several different schemes to construct matched country-industry trade data.

[2] In concept, the import-share weights are the share each foreign country has in the total U.S. imports of a particular 4-digit SIC category of product. However, disaggregated trade data by individual countries are available only on a Schedule A disaggregated basis. Therefore, the import-share weights are based on Schedule A, and a concordance between Schedule A and the SIC is used to determine which 6-digit Schedule A categories to aggregate to get the 4-digit SIC category. The share weights were calculated for the top three to five supplying countries for 1980 and 1984, interpolating for the intervening years. This technique accounted for an average of 80 percent of the imports of each 4-digit SIC category, ranging from a low of 66 percent for steel to a high of 89 percent for footwear. The average values for the exchange-rate index were used for the fraction not allocated to any particular country.

rency terms for each imported good. Since foreign countries have their own industry disaggregation schemes, there is no breakdown for foreign costs of production that exactly matches the disaggregated SIC-based import-price data. Thus, the analysis relies on the producer-price index from national sources most nearly equivalent to the 4-digit SIC scheme.[3] The ratio of the indexes of foreign-currency import prices and of foreign-currency costs of production forms an index of foreign-currency profit margins for each import.

An index of profit margins for U.S. exports of each SIC category was calculated in dollar terms, as the ratio of each product's BLS export-price index to its matched U.S. producer-price index. We used the industry-specific producer-price index as a proxy for the costs of production of the good in the United States. Since producer-price indexes include a profit margin at the wholesale level, they overstate the true costs of production. Thus, the constructed index of exporters' profit margins captures both price discrimination—the extent to which profit margins differ between exporting and selling the same product in the United States—and movements in price-cost margins, so that we are unable to distinquish between the two. To the extent that we are interested in the differential margin applied to the international market and the possible consequence of changes in this margin for international competitiveness, the extra margin embodied in the producer-price index is not a problem. It should be noted, however, that no inferences can be made from the level of this index, because the choice of base year was arbitrary.

Behavior of Prices and Profit Margins of Specific Industries. Figure 15 shows the behavior of prices and profit margins for the *imported* products. Table 13 shows the level and percentage change in the index of profit margins calculated in foreign-currency terms for the periods of dollar appreciation and depreciation over ten years.[4] The general pattern that emerges is

[3] The following sources were used: For Brazil, précos por atacado (nova classificacão), offerta global, *Conjuntura Economica, National Economic Indexes.* For Canada, industry selling-price indexes based on 1970 Standard Industrial Classification, Statistics Canada, *Canadian Statistical Review.* For Germany, priese und Priesindizer für gewerbliche produkte (erzeuger-preise), W. Kohlhammer GMBH, *Statistisches Bundesamt Wiesbaden.* For Italy, numeri indici prezzi all'ingrosso, indici per settori e branche, indici alcuri gruppi, Istitutio Centrale de Statistica, *Bollettino Mensile Da Statistica.* For Japan, wholesale-price indexes (by products and sectors), Bank of Japan, *Statistical Bulletin.* For South Korea, wholesale price indexes (by commodity by subgroup), Bank of Korea, *Monthly Statistical Bulletin.* For Taiwan, indexes of wholesale prices in Taiwan area, Executive Yuan Republic of China, Directorate-Generale of Budget Accounting and Statistics, *Monthly Statistics of the Republic of China.* For United Kingdom, index numbers of wholesale (producer) prices, price indexes of output of broad sectors of industry, Central Statistical Office, Government Statistical Service, *Monthly Digest of Statistics.*

[4] Generally speaking, 1977 to mid-1980 and 1985:2 to 1987:4 were periods of dollar depreciation, and mid-1980 to 1985:2 was a period of dollar appreciation (see Figure 13).

FIGURE 15

PRICES AND PROFIT MARGINS: IMPORTS

(1980.4 = 100)

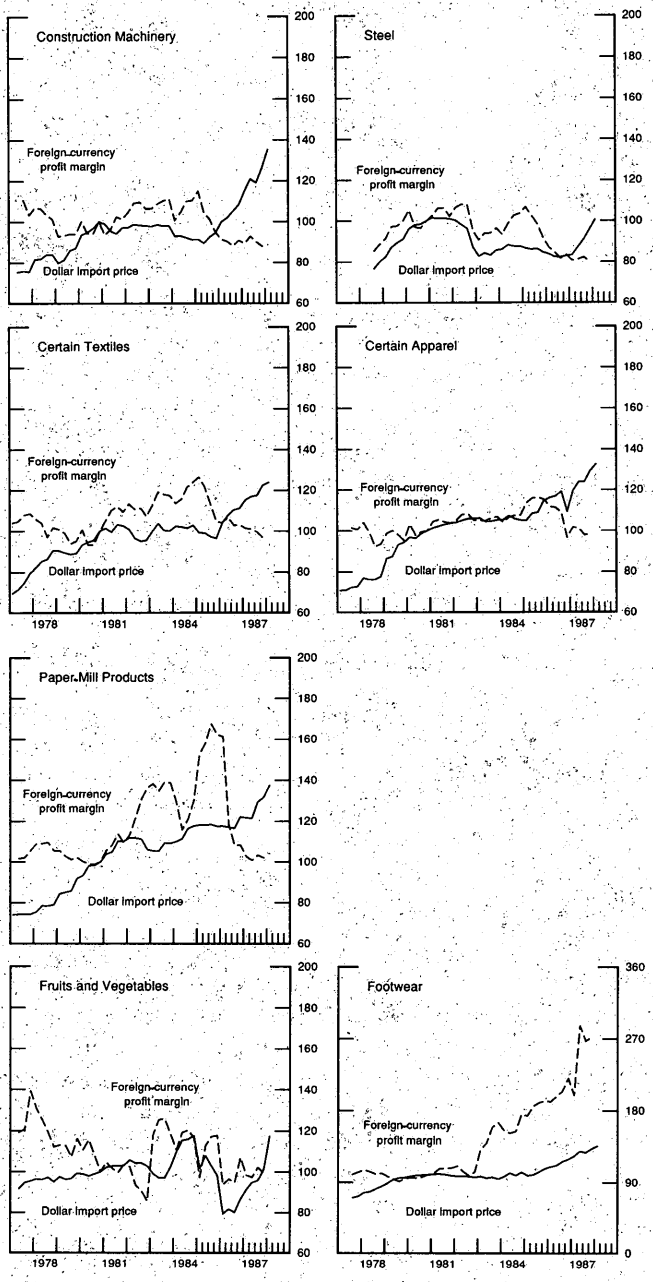


TABLE 13

INDEX OF PROFIT MARGINS: IMPORTS

(1980:4 = 100)

SIC	Name	1977 [a]	1980 [b]	1985:2 [c]	1986:4 [d]	1987 [e]
2033	fruits and vegetables	126.41	108.51	105.08	192.77	269.56
2221	textiles	106.36	96.87	124.00	106.21	98.14
2311	apparel	101.04	100.11	112.76	97.28	98.19
2621	pulp-mill	102.56	99.50	139.75	107.79	102.65
314	footwear	101.62	97.34	178.47	192.77	269.56
331	steel	87.06	99.71	104.51	85.95	81.16
3531	construction machinery	106.92	97.19	108.50	84.64	89.05

PERCENT CHANGE IN INDEX OF PROFIT MARGINS

		1977-80 [a]	1980-85	1985:2-86:4	1985:2-87:4
2033	fruits and vegetables	−14.2	−0.9	20.0	−1.0
2221	textiles	−8.9	28.0	−16.1	−21.0
2311	apparel	−1.0	12.6	−13.7	−13.0
2621	pulp-mill	−3.0	40.5	−30.5	−26.6
314	footwear	−4.2	83.3	8.0	51.0
331	steel	2.7	4.8	−17.8	−22.4
3531	construction machinery	−9.1	11.6	−22.0	−18.0

[a] Average of 4 quarters except as follows: Fruits and vegetables are an average of 1977:2, 1977:3, and 1977:4. Apparel, footwear, and construction machinery are averages of 1977:3 and 1977:4. Steel is an average of 1978:3 and 1978:4.

[b] Average of 4 quarters.

[c] Average of 1985:1 and 1985:2.

[d] Average of 1986:3 and 1986:4.

[e] Average of 1987:3 and 1987:4.

that profit margins bore the brunt of changes in exchange rates and foreign costs, leaving U.S. dollar prices of imports less variable than they would have been if prices were set simply as a markup over costs. This evidence for specific industries contrasts with the evidence from aggregate data, which suggested relatively small changes in profit margins. The difference between the aggregate and the disaggregate may be due in part to the difference between consumer-price indexes, wholesale-price indexes, and production-cost indexes, as noted earlier.

The evidence in Figure 15 and the lower panel of Table 13 also suggests that during both periods of dollar depreciation foreign producers squeezed profit margins in their own currencies, while during the long appreciation of the dollar profit margins widened. This behavior of foreigners' profit margins has been important for the persistence of the deficit. As foreign producers cut profit margins and delayed the passthrough of exchange-rate changes to increases in dollar import prices, the turnaround in the current account was also delayed.

How long did foreigners continue to squeeze margins? Has this source of persistence in the U.S. external deficit been temporary or sustained? For many of these products, 1987 data helped to answer this question. In 1987, the index of foreign-currency profit margins reached or fell below levels recorded at the end of the last dollar depreciation in the late 1970s (compare 1980 with 1987:4 in the top panel of Table 13).[5] By end-1987, import prices were rising smartly (see Figure 15), suggesting that the dollar depreciation was being passed through. In fact, margins on apparel and construction products rebounded from lows at end-1986, although the margins remained below their peak of 1985:2. This suggests that significant adjustment of real net exports to the depreciation that had already taken place was still in the pipeline.

But the evidence was mixed. While continuing to be squeezed through 1987, profit margins for certain industries (textiles and pulp-mill), had not yet reached their lowest levels, which were recorded in 1980. Moreover, a different reading of Figure 15 would suggest that margins might have stabilized, albeit at a lower level. Either of these scenarios suggests that the change in the dollar through 1987 had completed its impact on dollar import prices and that additional depreciation of the dollar would be necessary to raise import prices further.

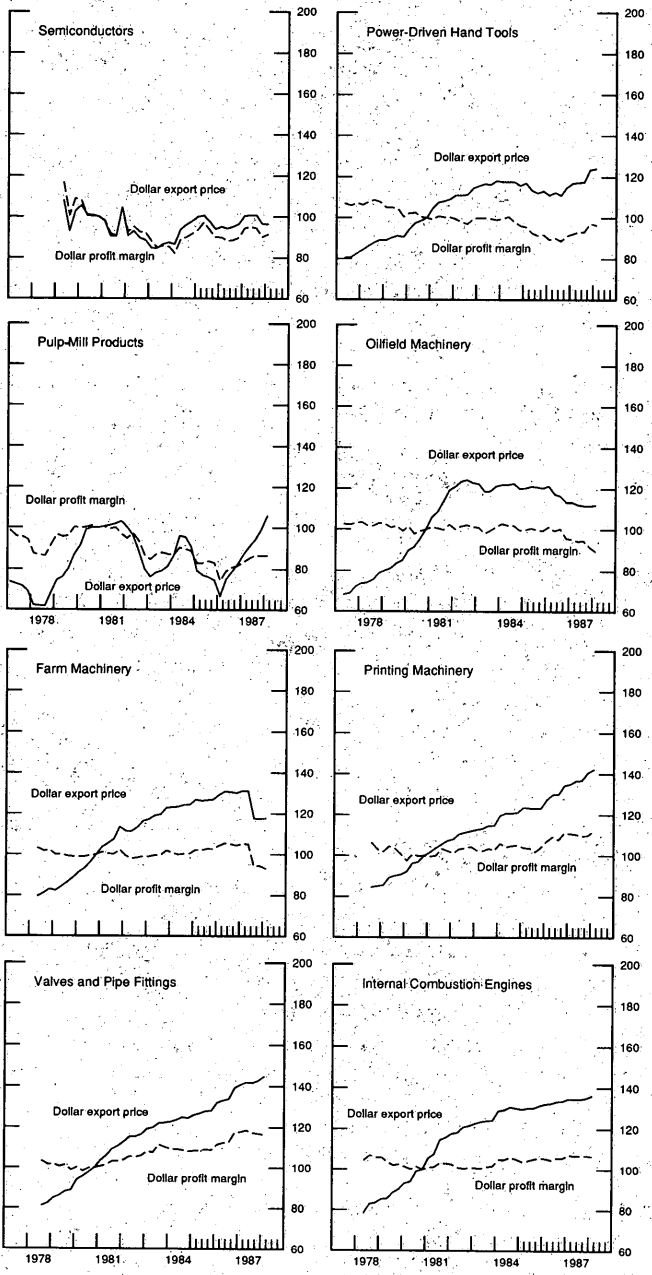
The overall picture presented by these microeconomic data shows a willingness on the part of foreign firms to reduce profit margins significantly to maintain market share. A delay in the adjustment of U.S. import prices to the dollar's decline has had important implications for real net exports, but a much smaller impact on nominal imports in the longer run (given a price elasticity in the neighborhood of unity). But if foreign firms reduced their margins on exports to third markets as well, this would affect the competitiveness of U.S. exports and could have added significantly to the persistence of the nominal deficit as well as the real deficit.

Figure 16 shows the behavior of prices and profit margins for the sample

[5] Whether the level of the index in 1980 (after the relatively mild dollar depreciation of 1977-79) represents a lower bound for margins cannot be determined from these data. But since margins overall increased during the years of appreciation, foreign suppliers were able to endure abnormally low margins for a while during the subsequent depreciation.

FIGURE 16

PRICES AND PROFIT MARGINS: EXPORTS
(1980:4 = 100)



of U.S. *exports*. Table 14 shows the level and percentage change in the profit-margin index for U.S. exports for the periods of dollar appreciation and depreciation. Profit margins were generally quite stable.[6] This corroborates the finding of a stable coefficient of 1 on the domestic price term in the equation for the nonagricultural export deflator: U.S. exporters generally have not price-discriminated in international markets, and they tend to price their exports on the basis of domestic costs.

Because profit margins did not move very much, we can infer that movements in U.S. export prices have been dominated by movements in costs of production, rising rapidly during the relatively high-inflation 1970s and then stabilizing in the 1980s. Exporters adjusted export prices and profit margins very little in the face of the significant dollar appreciation. In only two cases of heterogeneous manufactures (semiconductors and power tools) did U.S. exporters absorb any of the rise in the dollar; in more cases, the dollar export price rose as the dollar appreciated. Although no different from historical experience, this myopic behavior resulted in a significant loss of competitiveness as the foreign-currency prices of these U.S. exports shot up. This may have contributed to the widening of the deficit, especially as foreign growth sagged.

After the dollar decline, however, the pricing behavior of U.S. exporters seemed less uniform. In some cases (valves, printing machinery), it appears that U.S. producers took advantage of the dollar depreciation to increase margins (similar to the behavior of the foreign producers during the dollar appreciation). In other cases (oil-field machinery, farm machinery), U.S. producers cut profit margins as the dollar depreciated, exactly the opposite of the expected strategy. These cuts may have reflected cyclical weakness in particular industries or greater competition from foreign suppliers in third markets. The implications for export demand were mixed. On the one hand, the replenishing of margins suggested somewhat less export demand. On the other hand, more aggressive pricing strategies may have led to more robust export demand.

In summary, there are two stylized facts about the behavior of prices and profit margins. First, while foreign producers do use profit margins to buffer changes in the exchange rate (thus delaying passthrough of the exchange-rate change into dollar import prices), it appears that margins hit bottom at end-1987 and further dollar depreciation would be likely to yield increases in import prices. Second, while U.S. export prices in the past were generally unresponsive to changes in competitivness associated with movements in the exchange rate, this behavior might be changing. Put together, the pricing strategies for the two years after the dollar's peak and changes in

[6] Figures 15 and 16 have the same scales to facilitate comparison between industries.

TABLE 14

INDEX OF PROFIT MARGINS: EXPORTS

(1980:4 = 100)

SIC	Name	1977 [a]	1980 [b]	1985:2 [c]	1986:4 [d]	1987 [e]
2611	paper	96.06	100.30	82.67	95.91	86.58
3494	valves, etc.	102.32	99.57	108.24	110.71	117.09
3519	engines	105.61	100.77	104.97	105.10	106.77
3523	farm machinery	102.34	99.38	102.37	101.52	94.42
3533	oil machinery	102.65	99.61	99.98	97.93	93.15
3546	power tools	106.61	101.33	94.43	93.13	95.29
3555	printing machinery	104.55	99.51	103.78	107.92	109.81
3674	semiconductors	108.68	102.25	95.49	83.89	92.33

PERCENT CHANGE IN INDEX OF PROFIT MARGINS

		1977-80 [a]	1980-85	1985:2-86:4	1985:2-87:4
2611	paper	4.4	−17.6	16.0	4.7
3494	valves, etc.	−2.7	8.7	2.3	8.2
3519	engines	−4.6	4.2	0.0	1.7
3523	farm machinery	−2.9	3.0	−1.0	−7.8
3533	oil machinery	−3.0	0.4	−2.1	−6.9
3546	power tools	−5.0	−6.8	−1.4	0.9
3555	printing machinery	−4.8	4.3	1.9	5.8
3674	semiconductors	−5.9	−6.7	−10.3	−3.4

[a] Average of 4 quarters except as follows: Valves and printing machinery are averages of 1978:3 and 1978:4. Engines and farm machinery are averages of 1978:2, 1978:3, and 1978:4. Oil machinery and power tools are averages of 1977:2, 1977:3, and 1977:4. Semiconductors are averages of 1979:2, 1979:3, and 1979:4.

[b] Average of 4 quarters.

[c] Average of 1985:1 and 1985:2.

[d] Average of 1986:3 and 1986:4.

[e] Average of 1987:3 and 1987:4.

these strategies during 1987 suggest reasons for both the persistence of the nominal deficit during 1986 and 1987 and for the smaller than expected turnaround in the real deficit. Moreover, the 1987 evidence suggested that, absent a significant and sustained turnaround in the dollar, the U.S. trade balance would continue to improve, as indeed it did at least through the first half of 1988.

Explaining the Behavior of Prices and Profit Margins

Geographical Explanations and the "Real" Real Exchange Rate. One explanation for the behavior of prices and profit margins is that some of these imports and exports initially faced little change in real exchange rates. That is, in some cases prices and profit margins did not "respond" to real-exchange-rate changes because the real exchange rate for the product had not moved. With the continued decline of the dollar during 1987, including its depreciation against some of the currencies of key developing-country trading partners, the "real" real exchange rate for certain producers moved more, as did the corresponding dollar import price.

Table 15 shows the source of imports and the destination of exports for each for the products in the sample. These shares are used to construct product-specific nominal and real exchange rates.[7] For each imported good, we constructed a source-weighted real-exchange-rate index using IMF data for the nominal exchange rates and consumer-price indexes to convert them into real exchange rates. For each exported product, we constructed a destination-weighted real exchange rate using the same methodology. We assumed that the region "Rest of World" behaved like the simple average of all regions except Brazil.[8]

The import panel of Table 15 suggests the importance of Asia (represented by Korea) and Western Europe (represented by G-6, Germany, and U.K.) as import sources. It also suggests that the source of imports is more concentrated than is the destination for exports. Note that these weights are, in some cases, quite different from the weighting schemes used in the

[7] These shares are based on a relatively more aggregated set of Schedule A data than those used in the construction of the foreign-currency profit margins. They are based on data that are available for some individual trading partners and some regions of the world. In particular, industry-specific data are not broken out for individual trading partners in Latin America and Asia not elsewhere classified (comprised primarily of Hong Kong, Singapore, South Korea, and Taiwan). For these regions, we chose the nominal exchange rate and consumer-price index for a representative country; Brazil represents Latin America and Korea represents Asia. Data for Canada, Germany, Japan, and the United Kingdom are available, but other countries in Western Europe are not broken out. Thus, for the rest of Western Europe we used a bilateral import or export trade-weighted average of data for Belgium, France, Italy, the Netherlands, Sweden, and Switzerland, called G-6 in Table 15. The line item "ROW" is the share of trade in the product that was not allocated to any of these regions or countries. The average exchange rate and consumer-price index, less Brazil, was used as a proxy for the behavior of this category.

[8] Brazil's exchange-rate and consumer-price performance were so spectacular that we did not want to accord Brazil greater weight than was appropriate based on the share data. This also brings up the argument over multilateral vs. bilateral weighting schemes. No doubt, multilateral schemes are superior on the export side because of the importance of competition from third countries. To a certain extent, we have accounted for that through the average weighting on the residual world.

TABLE 15

SOURCES OF IMPORTS AND DESTINATIONS OF EXPORTS

(share in 1986, value terms)

SIC	Canada	Brazil [a]	Korea [b]	G-6 [c]	U.K.	Germany	Japan	ROW [d]
				IMPORTS				
2033		0.586	0.138					0.276
2221			0.270	0.240	0.050		0.300	0.150
2311		0.085	0.665	0.075				0.175
2621	0.795							0.205
314		0.148	0.463	0.220				0.169
331	0.110	0.065	0.058	0.155	0.040	0.100	0.370	0.102
3531	0.195			0.135	0.090	0.230	0.195	0.155
				EXPORTS				
2611	0.059	0.108	0.136	0.208	0.072	0.095	0.209	0.118
3494	0.299	0.126	0.065	0.088	0.059	0.041	0.123	0.199
3519	0.929							0.071
3523	0.438	0.137		0.072				0.353
3533	0.065	0.216	0.112	0.058	0.071			0.478
3546	0.254	0.148	0.050	0.130	0.083	0.058		0.277
3555	0.153	0.148		0.203	0.097	0.070		0.329
3674	0.140	0.062	0.069	0.236	0.124	0.105	0.088	0.176

[a] Represents Latin America.

[b] Represents Asia.

[c] Belgium, France, Italy, the Netherlands, Sweden, Switzerland.

[d] Rest of World.

aggregate equations.[9] The export panel shows the degree to which Canada and Western Europe are major destinations for manufactured exports. Latin America (represented by Brazil) is also a major destination.[10] In contrast, Japan is not well represented in any of the export categories—a fact frequently used to support allegations of unfair trading practices. The unallocated part of the world is quite large for certain categories—oil-field machinery, farm machinery, and printing machinery. Thus, averaging all countries to represent the residual may mask the effect of the destination-weighted exchange rate on the export price.

In Figure 13 (Chapter 6), we saw that the currencies of industrial countries had moved quite differently from those of developing countries, on average. In fact, significant differences can be observed within the foreign

[9] See Pauls (1987) for a more thorough discussion of weighting schemes.

[10] The importance of Brazil as a destination for exports may be understated somewhat because the year chosen for the fixed-share weights is 1986. In any case, the potential impact of the debt crisis is clear from the breadth of the trading relationship.

G-10 index; the Canadian dollar remained much more stable against the dollar than other currencies. Moreover, it is clear that 1987 was an important year for exchange-rate movements; the foreign G-10 index nearly returned to its 1980 level, and the currencies of the eight developing countries in the index depreciated against the dollar (in real terms) for the first time since 1980. To the extent that movement in the real exchange rate is an important determinant of the pricing strategies of foreign exporters, we may observe in 1988 changes in prices or profit margins on products sourced primarily from countries whose currencies did not rise against the dollar until 1987.

For the same reason, the competitiveness of U.S. exports in the domestic markets of Asia, Canada, and Latin America, for example, changed less over the last seven years than might be suggested by an *aggregate* real-exchange-rate index. Thus, even as some U.S. exporters became more strategic in their response to exchange-rate movements, we observed in 1987 only small changes in export prices and margins of products destined primarily for these markets.

Table 16 pulls together a variety of information on changes in real exchange rates, prices, and profit margins. It concentrates on the dollar depreciation of 1985 through 1987 in order to focus on the persistence of the deficit, looking at both the import and export sides. The first column of figures shows the change in the source-weighted real exchange rate for imports and in the destination-weighted real exchange rate for exports for the specific product. Within the import and export categories, the products are ranked according to the change in this variable. The next column shows the change in either the import or the export price. The last column shows the change in the profit margin from 1985:2 to 1987:4.

For most of the imported products, the real dollar fell about as much again during 1987 as it had from its peak through 1986. Moreover, it appears that dollar import prices rose relatively more on products sourced from countries where the dollar fell the most in real terms. The ranking of changes in import prices is similar to the ranking of changes in the real exchange rate. In particular, the prices of construction machinery and certain textiles zoomed; these products are sourced more than 70 percent from markets where the dollar depreciated the most in real terms. But profit margins in foreign-currency terms fell substantially on these same products, suggesting that producers in Europe and Japan needed to offset the loss in competitiveness resulting from the appreciation of their currencies and made the greatest effort to do so.

Dollar prices of some products sourced from countries against which the dollar stayed relatively flat in real terms (fruits and vegetables and pulp products) fell or did not rise as much. Since for these goods there was little

TABLE 16

BEHAVIOR OF PRICES, PROFIT MARGINS, AND EXCHANGE RATES BETWEEN 1985:2 AND 1987:4, IMPORTS AND EXPORTS

SIC	Name	Percentage Change in Weighted Real Exchange Rate [a]	Percentage Change in BLS Price [b]	Percentage Change in Profit Margin
		IMPORTS		
2033	fruits and vegetables	5.9	−6.2	−11.8
2621	pulp mill	−9.3	11.3	−35.4
2311	apparel	−17.2	19.2	−15.0
314	footwear	−24.5	32.8	46.5
331	steel	−47.8	11.3	−22.1
2221	textiles	−48.8	23.6	−20.5
3531	construction machinery	−53.7	41.2	−15.8
		EXPORTS		
3519	engines	−2.9	3.8	2.4
3523	farm machinery	−17.8	−7.0	−7.4
3533	oil-field machinery	−24.5	−7.8	−7.8
3494	valves, etc.	−26.6	12.5	7.8
3546	power tools	−28.2	8.9	8.0
3555	printing machinery	−37.8	14.0	6.0
2611	paper	−44.1	28.8	4.4
3674	semiconductors	−46.4	−4.0	2.2

[a] Imports source-weighted, exports destination-weighted.
[b] BLS import price and export price, respectively.

or no loss of competitiveness coming directly from changes in the dollar, there was less need to adjust prices.

The price changes for steel and apparel stand out from the ranking, steel because of soft demand and apparel because of trade restraints, about which we say more below.

Turning to exports, it appears that here, too, the ranking for price increases is similar to the ranking for the change in the real exchange rate, with the notable exception of semiconductors and engines. It is likely that contracts specific to the engines market and the 1987 recession in the computer market account for that behavior.

Information from both Figure 16 and Table 16 suggests that export prices moved substantially in 1987 after being quite stable from the peak of the dollar through the end of 1986. This shift was associated with a continued substantial change in the dollar exchange rate during 1987. But it appears that the extent of price movement depends in part on how much the dollar depreciated in real terms. That is, where U.S. exporters did not gain as much competitiveness simply on account of changes in the exchange rate,

they were trying to improve competitiveness through their export-pricing strategy. For example, it appears that export prices rose relatively less on certain products (internal-combustion engines, farm machinery, and oil-field machinery) destined for markets where the dollar had fallen relatively less in real terms. In markets where U.S. exporters gained competitiveness mainly because of movements in the real exchange rate, price increases were still relatively modest, although somewhat larger (valves and pipe fittings, power tools, and printing-trades machinery). We support this story by noting that profit margins rose only a little or were squeezed on these products where the dollar had fallen relatively little, while margins increased on these products where the dollar had fallen the most.

Explanations Based on Product and Market Characteristics. In this section, we consider the possibility that the characteristics of the product (the extent to which it is homogeneous or heterogeneous) and the characteristics of the market (the extent to which it is competitive) might help explain the pricing behavior observed earlier. Essentially, we are looking for examples where the relationship between the markup and the exchange rate might have changed. For example, movements in the exchange rate may affect the introduction into the market of new products that are good substitutes for the domestic product. Exchange-rate changes may affect the pricing behavior of other firms or alter the number of firms in the market, changing the perceived elasticity of demand of the industry in question. Protection in the United States or oligopolistic behavior by domestic firms may affect the pricing strategies of foreign firms.

The stylized fact that U.S. export prices historically have been determined mostly by movements in internal prices and very little by external events is consistent with the fact that the United States is a large domestic market where most competition occurs among domestic firms that are subject to more or less the same changes in costs of production. In this view, exports are a residual market, so that developing a separate pricing policy dependent on movements in the exchange rate is not worth the additional costs.

Deviations from this scenario might be due to a change in the importance of the international market for some U.S. industries. As these industries become more dependent on international sales, producers may become more aware of the effect of exchange-rate changes on the price of their product in overseas markets. Moreover, if the product is relatively homogeneous or does not enjoy brand loyalty, export prices might become more sensitive to exchange-rate movements as exports become a larger share of industry output.[11] Finally, as the international market becomes more impor-

[11] Aggressive export pricing leads to a greater share of domestic production sold in the export market. A greater share of domestic production sold as exports encourages aggressive export pricing. Clearly a chicken and egg problem.

tant, domestic producers must consider the pricing policies of their foreign competitors in third markets when choosing their own pricing strategy.

Table 17 shows an index of exposure of domestic producers of import-competing goods to imports and of domestic producers to export sales for each industry. The fact that *import* prices in dollar terms on the whole remained stable, with the profit margin acting as a buffer for changes in the exchange rate, is consistent with the notion that foreign producers were pricing to market in the United States or were pricing sufficiently below the market to increase market share in the United States. The importance of pricing-to-market or pricing-below-market strategies depends on the degree of heterogeneity of the product and on the current status of the product in the market. If the imported product is relatively new to the market, the foreign producer may need to price below the market to make inroads today and profits tomorrow. On the other hand, if the import has a well-established market niche, then simply pricing to the market price will be the profit-maximizing strategy.

TABLE 17

EXPOSURE OF DOMESTIC PRODUCERS TO IMPORT COMPETITION AND EXPORT SALES

SIC	Name	1977	1986	Average Annual Change
		IMPORT INDEX [a]		
2033	fruits and vegetables	91.2	181.4	9.0
2221	textiles	86.7	213.7	12.7
2311	apparel	99.6	247.2	14.8
2621	pulp mill	96.5	116.1	2.0
314	footwear	100.6	444.2	34.4
331	steel	117.3 [b]	198.8	9.1
3531	construction machinery	79.5	372.2	29.3
		EXPORT INDEX [c]		
2611	paper	78.1	96.4	1.8
3494	valves, etc.	87.8 [b]	68.7	−2.1
3519	engines	96.6 [b]	82.9	−1.5
3523	farm machinery	76.7 [b]	74.3	−0.3
3533	oil-field machinery	58.4	86.2	2.8
3555	printing machinery	76.5 [b]	66.6	−1.1
3674	semiconductors	87.7 [b]	137.6	6.2

[a] Import-volume index divided by industrial-production index.

[b] 1978.

[c] Export-volume index divided by industrial-production index.

NOTE: Since there was no industrial-production index for SIC 3546 power-driven hand tools, no export-exposure index could be constructed.

The import index in Table 17 is calculated as the ratio of the index of import volume to the industrial-production index, matched by SIC code. Consistent with the widening trade deficit, all the values for average annual changes in the right-hand column are positive; imports increased market share in all product categories. But the figures for several of these categories—apparel, footwear, and construction machinery—are quite large. If foreign producers were just pricing to market, the share of imports relative to domestic production should be about stable. But if foreign producers were pricing below the market to increase market share, imports as a share of domestic production would increase.

Distinguishing between the two pricing strategies is difficult in practice. However, some evidence in this regard is shown in Figure 17, which compares matched indexes of U.S. producer price and BLS import price, both in dollar terms. Evidence of pricing to market would show up as a relatively flat line, while pricing below market would show up as a declining relative price of the import. Keep in mind that pricing to market could result either from the foreign firm not cutting its prices or from the U.S. competition raising its prices to that of the import.

While the correlation is not completely consistent, some of the most dramatic relative declines in the price of imports are in the industries that suffered the greatest increase in import exposure. Construction machinery is the most striking. The ratio of import to domestic prices drops precipitously during the period of dollar appreciation. On the other hand, probably the best example of a pricing-to-market strategy is pulp-mill products. The ratio of domestic to import prices is virtually flat, and there is almost no change in import exposure. We might expect a relatively more homogeneous product like pulp to follow a pricing-to-market strategy.

Steel provides an interesting alternative story. The major decrease in the competitiveness of domestic steel came before the dollar started to rise. After 1982, it appears that the foreign producers followed a pricing-to-market strategy. Of course, steel is one of the more heavily protected industry sectors. The United States has employed trigger-price strategies, guaranteeing a pricing-to-market result, and in 1984 initiated bilateral voluntary export restraints, which support a stable ratio of domestic to import prices. We will have more to say about the effect of trade restraints on the pricing strategies of importers in the next section.

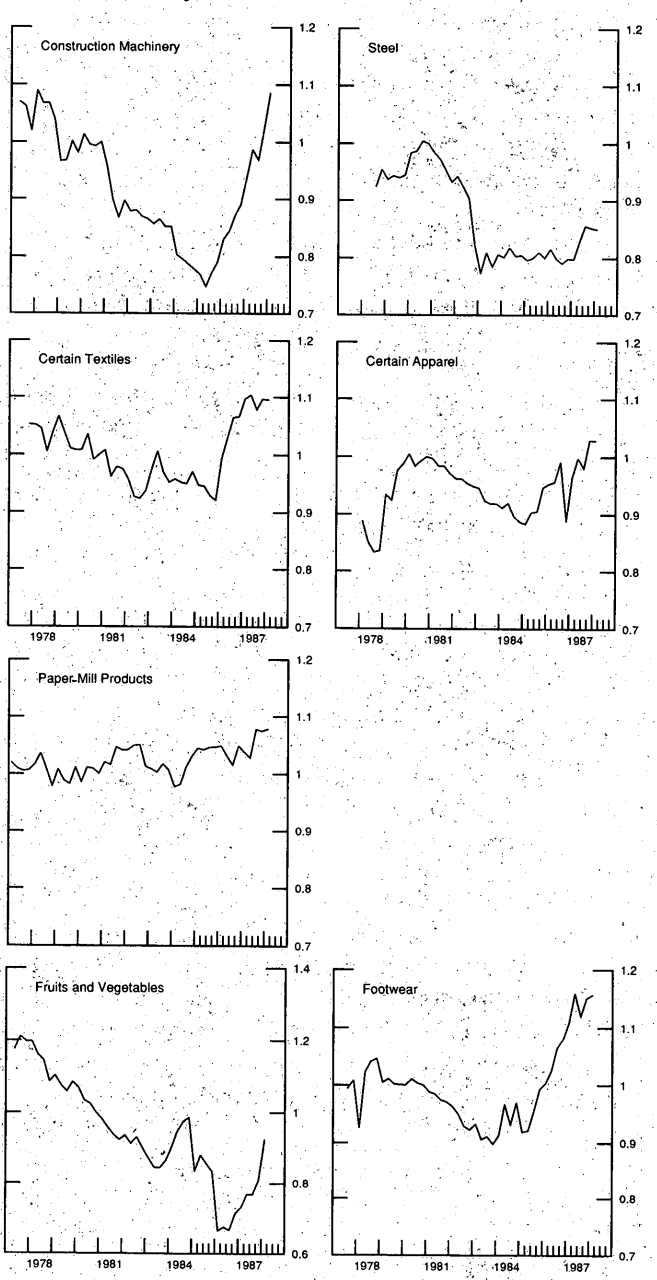
In the lower panel of Table 17, each SIC-based export-exposure index is calculated as the ratio of the SIC-based export-volume index[12] to the SIC-based industrial-production index. The last column shows the implied

[12] Trade volume is constructed from annual trade-value data available by SIC and the matched SIC-based BLS transactions-price data. Trade volume is indexed to 1980 to match the index of industrial production.

FIGURE 17

RATIO OF BLS IMPORT PRICES TO MATCHED U.S. PRODUCER PRICES

(ratio of two series indexed to 1980:4 = 100)



average annual change in the exposure index. A high average annual change suggests that the export market was consuming an increasing percentage of domestic production. (The index says nothing about whether or not export volume was increasing.) A negative average annual change suggests that the export market was becoming relatively less important as an outlet for domestic production.

Industries with high average annual increases in exposure might be expected to be relatively more aware of changes in the international environment. In particular, these industries might give more consideration to the role of the exchange rate in their pricing policies. In fact, the industries with the greatest exposure are semiconductors and oil-field machinery, which are also industries where export prices have been squeezed (refer back to Table 16).[13]

Conversely, industries where the average annual change in the index of international exposure is low or negative might be expected to remain unconcerned with movements in the exchange rate. We would expect to see stable or rising margins as export prices either keyed directly off domestic prices or rose under the umbrella of the appreciating foreign currency. Valves and pipe fittings, internal-combustion engines, and printing machinery have low or negative annual averages for changes in export exposure; they also are industries with stable or rising margins (see Table 16).[14]

For the industries where exports are becoming more important, the U.S. exporter's pricing strategy must take into account strategic pricing by existing suppliers in third markets or the introduction of new products. Figure 18 compares the dollar export prices of similar products for U.S., German, and Japanese exporters to all markets. It appears that where the export stake is high (as measured by export exposure), as in semiconductors and oil-field machinery, U.S. exporters held the line or cut prices when their competitors cut their export prices in dollar terms. Where the stakes are lower (valves, printing machinery), there appears to be less price competition.

Since Figure 18 shows only indexes and not relative prices, it cannot show in which industries U.S. exporters may now be the cheapest suppliers in dollar terms. However, Figure 18 does clearly indicate the extent to which the relative competitiveness of U.S. exports has been dominated by movements in the dollar.

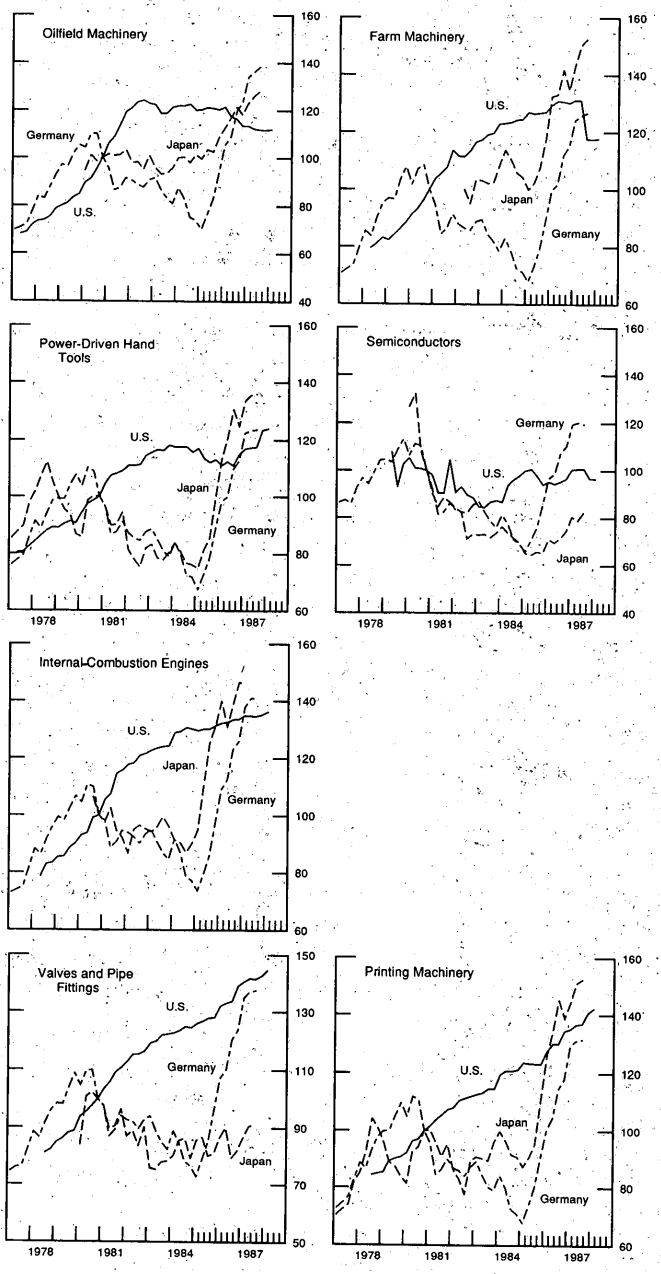
[13] There could be a spurious correlation between export exposure and export pricing. For example, the behavior of export prices for semiconductors and oilfield machinery could simply be the result of an industry slump.

[14] The stable margins and low annual change in export exposure could be the result of long-term contracts. For example, contracts or accounting issues may affect the prices of internal-combustion engines traded between subsidiaries of the major car companies in the United States and Canada more than the exchange rate or export exposure do.

FIGURE 18

U.S., German, and Japanese Export Prices

(all indices in U.S. dollars; 1980:4 = 100)



Protection. We turn now to a more detailed look at the extent to which trade barriers may have contributed to the widening and persistence of the deficit. What are the facts about trade barriers? Average tariff rates have steadily declined since the 1950s to well under 10 percent in the industrial countries. Since the early 1970s, however, both the United States and other countries have increased their use of nontariff barriers to protect domestic industry. Nontariff barriers break the link between international price and exchange-rate developments and the value or volume of trade, and they may contribute to persistence.[15]

On the import side, an increased reliance by the United States on bilateral trade restraints has contributed to the creation of world cartels. When the dollar was appreciating and U.S. demand remained robust, these policies allowed some foreign suppliers to keep prices from falling and to build up the profit margins that are now being reduced. While there is little evidence to support the view that U.S. trade restraints contributed significantly to the initial widening of the deficit, they may have added to the persistence of the deficit by slowing the process of adjustment to the fall in the dollar. Moreover, bilateral quantitative trade restraints may continue to bind as the dollar falls, preventing import volume from responding to a change in exchange rates and prices.

On the export side, trade barriers imposed by other countries and export controls imposed by the United States may have contributed to the widening of the deficit and led to its persistence by keeping the growth of export volume below what past experience would have led us to expect.

We examine the role of export barriers first. Since most analyses of trade barriers facing U.S. exporters focus on foreign barriers, the impact of U.S. export controls is perhaps less appreciated. In some cases, such as crude oil, regulations prohibit exports altogether. A variety of sources suggest that if the United States simply lifted this ban, exports to Japan alone would increase by about $8 billion.

More pervasive, U.S. exporters are subject to extensive licensing and regulation by the U.S. government. For example, $57 billion of nonmilitary manufactured goods were exported under license in 1985, representing somewhat more than a fourth of total exports. Many licenses are valid for more than one year, and products destined for Canada do not require a license. Adjusting for these two factors leaves about $31 billion in exports (about a fourth of nonagricultural products not destined for Canada) that required a new license in 1985 (see Hooper and Mann, 1989, Table 20, and NAS, 1987). License requirements act like a tax on U.S. exports, reducing the competitiveness of U.S. producers of high-technology products. While the appreciation of the dollar was surely the most significant tax on exports

[15] Consider the effect of a simultaneous change in E, Q, and Y in equation (17).

during the first half of the 1980s, as U.S. technology advanced, more products were added to the export-control list. At the margin, this may have added to the deficit.

Licensing is designed to restrict the availability overseas of nonmilitary but so-called "dual use" products that could be diverted to military purposes. The export-control problem is quite complex, however, especially when different countries possess the same technology but their governments do not follow the same export-control policies. Export controls in the United States are probably tighter than controls imposed on exports from allied Western nations. Many U.S. products must be licensed even though similar technology available from foreign suppliers need not be. In addition, U.S. licensing procedure may be more complex. For example, in 1985 license processing by the Commerce Department took fifty-four days on average. The similar procedure in Japan took two days. Small firms, high-technology products, and exports to Eastern Bloc destinations face longer delays, sometimes up to months or years (see NAS, 1987). Finally, foreign producers using U.S.-licensed exports in their products must obtain re-export licenses from the U.S. government before they sell their products abroad. No other nation requires re-export licensing.

Improvements instituted in 1987 purport to reduce significantly the delay, complexity, and uncertainty associated with the licensing process. But as U.S. exports expand with the decline in the dollar, the licensing procedure binds more tightly. More firms have applied for licenses to sell new products to new destinations, incurring the initial costs of the new license. The burden of export controls is greater on high-technology products where the U.S. still holds comparative advantage. Thus, to a certain extent, export controls offset movements in the exchange rate, contributing to the persistence of the deficit.

Increases in trade barriers overseas may also have contributed, marginally, to the widening of the deficit. Once in place, trade barriers may add to the persistence of the deficit. Moreover, U.S. exporters face a world trading environment where tariff and nontariff barriers (NTBs) are increasingly important.

Data are unavailable on NTBs facing U.S. exporters alone. But the importance of these NTBs can be gleaned from data on NTBs in the import markets of the industrial and developing worlds. NTBs covering industrial-market imports increased 20 percent from 1980 to 1986; 23 percent of the value of nonfuel exports to all industrial markets were covered by NTBs in 1986 (see Hooper and Mann, 1989, Table 21).[16] (The bulk of this increase is

[16] This statistic pertains to imports by all industrial countries. Therefore, U.S. trade barriers are included in these averages. These statistics measure only the presence of NTBs, not the degree to which they bind. The NTBs included in these statistics are: measures that control

accounted for by added quantitative restrictions, most notably on iron and steel). NTBs covering developing-world imports are slightly higher. But the average tariff rate imposed by developing countries on imports is about 10 times higher than the 3 percent average tariff rate imposed by the industrial countries. Thus, for developing countries taken as a group, tariff barriers may be the more significant deterrent to U.S. exports. However, Messerlin (1988) shows that as some of the more advanced developing countries—for example, Mexico—have joined the GATT, they have quickly learned to apply the antidumping codes, possibly to protective effect. (Of course, antidumping duties, which can be considered a type of NTB, are applied by industrial countries to protect domestic industry.)

None of the previous statistics include barriers like "health, safety, and technical standards," which may be even more important than quantitative restraints or price monitoring. Quantitative restraints are at least observable policy instruments with less opportunity for so-called "administrative guidance." For example, only 11 percent of Japanese nonfuel imports from industrial countries are covered by the standard measures of NTBs, but health, safety, and technical standards are imposed on over 50 percent of Japanese imports from industrial countries (see UNCTAD, 1986).

A greater dependence by foreign nations on NTBs to protect their domestic markets reduces the beneficial effect of the depreciation of the dollar on the competitiveness and potential growth in volume of U.S. exports. Moreover, to the extent that NTBs are relatively more frequently imposed or are tightened on those products in which the United States has a comparative advantage, U.S. export growth is further hampered, thus contributing to the widening and persistence of the deficit.

In recent years the United States, too, has depended to an increasing degree on NTBs for the conduct of its trade policy. NTBs covered about 20 percent of U.S. nonoil imports in 1986, an increase of about 23 percent from 1981. While the share of imports protected by NTBs in the United States is somewhat lower than in the average industrial market, it has increased more rapidly in the 1980s (see Hooper and Mann, 1989, Fig. 19). To the extent that the U.S. market for a product continues to grow, NTBs guarantee a limited set of importers a share of an expanding market. With import supply thus constrained, import prices would probably rise along with increasing demand for the product in the United States, especially if U.S. producers of import-competing products could not capture the unserved part of the market (because of production costs) or chose not to do so (because of short-term profit-maximizing strategies).

---

price (variable levies, countervailing duties, administered prices); measures that control volume (quotas, prohibitions, voluntary export restraints); and surveillance of these measures.

We would expect to see the strongest interaction between a measure of U.S. demand and import prices on those products most covered by NTBs. Table 18 shows the share of U.S. imports covered by NTBs in 1983 by broad product category and source. Note first that imports from the developing countries are relatively more constrained.[17] Textiles have significant NTBs, reflecting the quotas under the Multi-Fiber Arrangement (MFA) and other quantitative restraints on the textile and apparel trades. The renegotiation of the MFA in 1986 (which broadened and tightened it), as well as tighter bilateral arrangements reached in the latter part of 1986 with Hong Kong, Japan, Korea, and Taiwan, suggest that the figures in Table 18 understate the share of textiles and apparel that is covered by NTBs. Iron and steel restraints were already quite high in 1983, but they were tightened further in 1985, with bilateral voluntary restraints covering eighteen major supplying countries. Restraints on footwear from developing countries are rather high also.

TABLE 18

U.S. IMPORTS COVERED BY NONTARIFF BARRIERS

(percent of value, 1983)

Imports of	Imports from	
	Industrial Countries	Developing Countries
Nonoil goods	16.6	18.9
Agricultural goods	23.5	25.1
Manufactures:	16.5	18.6
Textiles	31.1	64.0
Footwear	0.0	16.7
Iron & steel	35.6	48.9
Electrical machinery	5.2	5.3
Vehicles	34.7	0.0
Rest of manufactures	6.4	5.4

SOURCE: Nogues, Olechowski, and Winters (1986).

Table 19 shows changes in the prices and values of steel-mill products and consumer textile products in 1986 and 1987. Despite the sharp fall in the dollar, prices of both categories rose only moderately during 1986. In the first half of 1987, however, these prices accelerated sharply. As can be inferred from the similarity of value and price changes for steel, the volume of steel imports remained fairly flat over this period. Since capacity utilization in the domestic industry was rising sharply in the first half of 1987, the

[17] While exporters in the developing countries might benefit from the U.S. restraints (if they led to higher prices), resource misallocations and unproductive activities within these countries related to the allocation of quotas would likely cause welfare losses overall.

TABLE 19

CHANGES IN IMPORTS OF STEEL-MILL PRODUCTS AND CONSUMER TEXTILES

	Average Annual Rate of Change (%)	
	1985:4-86:4	1986:4-87:2
Steel-mill products:		
Import value	5.4	11.3
Import price	4.1	10.0
Textiles and apparel:		
Import value	18.5	25.7
Import price	2.3	16.0

import restraints would appear to have been binding.[18] The continued rise in the volume of imports of textiles and apparel suggests that the import restraints on these products were somewhat less binding overall. Nevertheless, the sharp rise in the prices of textile and apparel products undoubtedly reflects the tightening of NTBs in the second half of 1986 and the fact that U.S. textile mills were running at very high utilization rates in the first half of 1987.[19]

Another approach to the question of the effect of NTBs on import prices is to model the inverse demand curve for imports more explicitly. Essentially, we would like to model equation (17). Table 20 shows the results of a simple regression of import prices in dollars against the source-weighted product-specific foreign cost of production, the source-weighted product-specific nominal exchange rate, and a product-specific component of real U.S. expenditure. We expect import prices to be positively correlated with foreign costs and negatively correlated with the exchange rate (as defined here). If NTBs are important and there is no increase in supply from the domestic market, there should be a positive sign on the demand term.

It appears that for footwear, textiles, and steel the hypothesis is borne out: import prices in dollar terms are positively affected by foreign-currency costs of production, negatively affected by movements in the dollar, and positively affected by U.S. real expenditure on the broad product group appropriate to the specific import. Despite the MFA, apparel prices do not

[18] The Federal Reserve's index of capacity utilization in the steel industry rose from 62 percent in 1986:4 to 73 percent in July 1987.

[19] The Federal Reserve's index of capacity utilization for textile-mill products reached 97 percent in 1987:2; unfilled orders were also rising sharply.

TABLE 20

REGRESSIONS FOR INDUSTRY-SPECIFIC IMPORT PRICES, 1977:1-1986:4

(t-statistics in parentheses)

SIC	Name	Foreign Costs [a]	Source-Weighted Nominal Exchange Rate	Real Expenditure Broad Product Group	$\bar{R}^2$	Rho
2221	textiles	0.359349 (2.09563)	−0.279614 (2.88496)	0.417937 (2.65659)	0.627	0.62
2311 [b]	apparel	0.410084 (1.95866)	−0.055316 (−1.35055)	−0.314462 (−1.44265)	0.222	1.0
314 [b]	footwear	0.170797 (2.56675)	−0.182013 (2.56062)	0.371729 (1.77464) [c]	0.224	0.80
331 [d]	steel	1.55485 (5.35644)	−0.017625 (0.418374)	0.300111 (2.49286)	0.567	1.0
3531 [b]	construction machinery	0.591566 (10.4882)	−0.278898 (4.85328)	−0.319724 (−7.2494)	0.860	
				Industry-Specific U.S. Producer Price		
2033 [e]	fruits and vegetables	0.133882 (2.89641)	−0.141845 (−2.8572)	1.322798 (2.48106)	0.353	0.67
2621	pulp mill	0.009167 (0.227527)	0.96071 (0.842444)	1.01313 (11.357)	0.946	0.54

[a] Source-weighted industry-specific foreign producer-price index.
[b] From 1977:3.
[c] Two lags.
[d] From 1978:3.
[e] From 1977:2.
Expenditure variables:
2221, 2311, 314: real personal consumption expenditures—clothing and shoes.
331: real business fixed investment—nonresidential structures.
3531: real business fixed investment.

appear to react to demand pressures. The World Bank (1987, Chap. 8) has described the MFA as "porous," suggesting that there is so much product upgrading and outsourcing by suppliers that NTBs are not particularly effective at restraining imports of textiles and apparel. (Note, however, that the data in Table 19, which show a substantial increase in textile import prices, with much less change in import volume, suggest that the new MFA and the bilateral agreements are binding.)

Import prices for construction machinery are affected as expected by costs of production and the exchange rate. But, without trade barriers, an

increase in U.S. real business fixed investment leads to an incipient price rise, which attracts new supply (foreign and maybe domestic) and keeps prices from rising.[20]

Pulp-mill products and fruits and vegetables, as relatively more homogeneous products, appear to follow pricing-to-market strategies. The primary determinant of pulp-mill import prices is the cost of production of the domestic substitute. In the case of fruits and vegetables, foreign costs, the exchange rate, and U.S. domestic prices are the determinants of import prices.

These simple pricing equations suggest that NTBs can play a role along with the exchange rate and production costs in the pricing strategy of the foreign producer. However, it is clear that many factors are not captured in this simple formulation. In some cases, surprisingly little of the variation in import prices is captured by movements in costs, the exchange rate, or demand factors. It appears the import prices for footwear, apparel, and fruits and vegetables are close to being a random walk. It is unclear what factor that is neither a cost nor a demand effect might be causing movements in these import prices.

[20] The strong negative sign in the domestic-expenditure variable in Table 20 suggests that importers price below market to gain a hold in an expanding market. This is consistent with the evidence in Figure 17 and Table 17.

8 CONCLUSIONS

Our empirical analysis suggests that the widening of the U.S. external deficit between 1980 and 1986 can be accounted for by macroeconomic factors. At one level of analysis, the excess of growth in both domestic expenditures and GNP in the United States relative to that in the rest of the world accounts for a little over a third of the deficit. The decline in U.S. international price competitiveness associated with the rise in the dollar through early 1985 accounts for most of the rest. At a more fundamental level, drawing on the accumulated (and averaged) wisdom of a group of global macroeconomic models, as much as two-thirds of the external-balance effects of these changes in relative growth and real exchange rates can be explained by the mix of fiscal expansion and monetary tightening in the United States in conjunction with fiscal contraction in other major industrial countries during this period. We attribute the rest of the widening of the deficit to a decline in the U.S. private savings rate (which helped to stimulate the growth of U.S. domestic demand relative to that abroad), to the unexplained rise in the dollar during 1984, to debt problems in developing countries, and to policies at home and abroad that have depressed U.S. agricultural exports.

While macroeconomic analysis can account for the initial widening of the deficit and its persistence in nominal terms through 1987, it cannot fully explain the persistence of the deficit in real terms. Import prices had risen only moderately relative to the magnitude of the decline in the dollar from its peak in early 1985, while import volumes were rising more rapidly than historical experience suggested they should be, and exports, though expanding briskly, were doing so at a pace that fell short of conventional model predictions. Our assessment of available microeconomic evidence suggests that changes in the pricing behavior of foreign exporters and the gradual spread of protectionist measures at home and abroad were slowing the adjustment of trade volumes by weakening the link between exchange rates and prices. Foreign exporters on average and foreign exporters of certain products in particular appear to have been reducing their profit margins. They were also benefiting significantly from a reduction in costs associated in part with the appreciation of their currencies. In some areas, NTBs may have further slowed the adjustment of trade volumes to changes in relative prices, even after price changes had taken place.

What implications do we draw from these results for the possible future course of the deficit? First, some of the factors underlying the persistence

of the deficit are probably transitory, and significant further adjustment seems likely (as events through the first half of 1988 confirmed). Second, increased productivity of U.S. workers, higher quality of U.S. products, and less myopic pricing by U.S. producers would help expand exports, reduce imports, and eliminate the trade deficit. Progress on the Uruguay Round of multilateral trade negotiations to open international markets to trade is a further prerequisite. Third, however, we suspect that a substantial deficit will remain for some time to come even after full adjustment of prices and volumes to the level of exchange rates prevailing at the end of 1987 (and through most of 1988) has taken place. In the absence of a significant adjustment of relative growth rates at home and abroad, the continuation of a sizable current-account deficit seems likely, in view of (1) the persistence of the growth gap in domestic demands that emerged over the first half of the 1980s and (2) the continuing decline in the U.S. net foreign-asset position and the related fall in net investment-income receipts. At a more fundamental level, the external deficit seems likely to persist until the U.S. budget deficit is reduced significantly, if not eliminated, and the U.S. private savings rate rises significantly relative to investment.

REFERENCES

Baldwin, Richard, "Hysteresis in Import Prices: The Beachhead Effect," *American Economic Review*, 78 (September 1988), pp. 773-785.

Baldwin, Richard, and Paul Krugman, "Persistent Trade Effects of Large Exchange Rate Shocks," NBER Working Paper No. 2017, Cambridge, Mass., National Bureau of Economic Research, January 1986.

Baldwin, Richard, and Richard Lyons, "The Mutual Amplification Effect of Exchange Rate Volatility and Unresponsive Trade Prices," New York, Columbia University, June 1988.

Bergsten, C. Fred, and William R. Cline, *The U.S.-Japan Economic Problem*, Washington, Institute for International Economics, October 1985.

Bergsten, C. Fred, and John Williamson, "Exchange Rates and Trade Policy," in William R. Cline, ed., *Trade Policy in the 1980s*, Cambridge, Mass., MIT Press, 1983.

Bergstrand, Jeffrey H., "U.S.-Japan Trade: Predictions Using Selected Economic Models," *Federal Reserve Bank of Boston New England Economic Review* (May-June 1986), pp. 26-37.

———, "The U.S. Trade Deficit, A Perspective from Selected Bilateral Trade Models," *Federal Reserve Bank of Boston New England Economic Review* (May-June 1987), pp. 17-31.

Berner, Richard, "The Structural Problem in U.S. Trade and the Likely Policy Response," New York, Salomon Brothers Bond Market Research, April 10, 1987.

Blanchard, Olivier J., and Lawrence Summers, "Perspectives on High World Interest Rates," *Brookings Papers on Economic Activity*, Vol. 2, 1984, pp. 273-334.

Bosworth, Barry, Comment on Krugman and Baldwin, "The Persistence of the U.S. Trade Deficit," *Brookings Papers on Economic Activity*, Vol. 1, 1987, pp. 44-47.

Branson, Richard, Arminio Fraga, and Robert A. Johnson, "Expected Fiscal Policy and the Recession of 1982," International Finance Discussion Paper 272, Washington, Board of Governors of the Federal Reserve System, 1985.

Bryant, Ralph C., and Gerald Holtham, "The U.S. External Deficit: Diagnosis, Prognosis, and Cure," Brookings Discussion Papers in International Economics No. 55, Washington, The Brookings Institution, March 1987.

Bryant, Ralph C., with Dale W. Henderson, Gerald Holtham, Peter Hooper and Steven Symansky, eds., *Empirical Macroeconomics for Interdependent Economies*, Washington, The Brookings Institution, 1988.

Christelow, Dorothy, "Japan's Intangible Barriers to Trade in Manufactures," *Federal Reserve Bank of New York Quarterly Review*, 10 (Winter 1985-86), pp. 11-18.

Danker, Deborah J., Richard D. Haas, Dale W. Henderson, Steven Symansky and Ralph Tryon, "Small Empirical Models of Exchange Market Intervention: Appli-

cations to Germany, Japan and Canada," *Board of Governors of the Federal Reserve System Staff Study*, No. 155, April 1985.

Darby, Michael R., "The Current Account Deficit, Capital Account Surplus, and National Investment and Savings," Washington, U.S. Department of the Treasury, May 1987.

Darby, Michael R., Robert Gillingham, and John S. Greenlees, "The Impact of Government Deficits on Personal and National Savings Rates," U.S. Treasury Research Paper No. 8702, Washington, U.S. Treasury, 1987.

Dornbusch, Rudiger, *Open Economy Macroeconomics*, New York, Basic Books, 1980.

———, "Exchange Rates and Prices," *American Economic Review*, 77 (March 1987), pp. 93-106.

Dornbusch, Rudiger, and Stanley Fischer, "The Exchange Rate and the Current Account," *American Economic Review*, 70 (December 1980), pp. 960-971.

Elwell, Craig, and Alfred Reifman, "The U.S. Trade Deficit, Causes, Consequences, and Cures," Report No. 86-1168, Washington, Congressional Research Service, July 1986.

Feldstein, Martin, "The Budget Deficit and the Dollar," NBER Working Paper No. 1898, Cambridge, Mass., National Bureau of Economic Research, April 1986a.

———, "Correcting the World Trade Imbalance," Cambridge, Mass., December 1986b.

Frankel, Jeffrey, "In Search of the Exchange Risk Premium: A Six-Currency Test Assuming Mean-Variance Optimization," *Journal of International Money and Finance*, 1 (December 1982), pp. 255-274.

———, "Ambiguous Macroeconomic Policy Multipliers in Theory and in Empirical Models," in Ralph Bryant et al., eds. (1988).

Frankel, Jeffrey, and Kenneth Froot, "Understanding the Dollar in the Eighties: The Expectations of Chartists and Fundamentalists," *Economic Record*, Supplement 1986.

Frenkel, Jacob A., and Assaf Razin, "The Mundell-Fleming Model: A Quarter Century Later," Washington, IMF Working Paper No. 87/46, July 2, 1987.

Friedman, Edward, and Allen Sinai, "The Dollar and the Financial Markets," Prepared for the 62nd Annual Conference of the Western Economic Association, July 9, 1987.

Froot, Kenneth, and Paul Klemperer, "Exchange Rate Pass-Through When Market Share Matters," NBER Working Paper No. 2542, Cambridge, Mass., National Bureau of Economic Research, May 1988.

Gagnon, Joseph E., "Adjustment Costs and International Trade Dynamics," International Finance Discussion Papers No. 321, Washington, Board of Governors of the Federal Reserve System, May 1988.

Haynes, Stephen E., Michael M. Hutchison, and Raymond R. Mikesell, *Japanese Financial Policies and the U.S. Trade Deficit*, Essays in International Finance No. 162, Princeton, N.J., Princeton University, International Finance Section, April 1986a.

———, "U.S.-Japan Bilateral Trade and the Yen-Dollar Exchange Rate: An Empirical Analysis," *Southern Economic Journal*, 52 (April 1986b), pp. 923-932.

Helkie, William H., and Peter Hooper, "The U.S. External Deficit in the 1980s: An Empirical Analysis," in Ralph C. Bryant, Gerald Holtham, and Peter Hooper, eds., *External Deficits and the Dollar: The Pit and the Pendulum*, Washington, The Brookings Institution, 1988.

Helkie, William H., and Lois Stekler, "Modeling Investment Income and Other Services in the U.S. International Transactions Accounts," Federal Reserve Board, International Finance Discussion Paper No. 319, December 1987.

Hooper, Peter, "International Repercussions of the U.S. Budget Deficit," Brookings Discussion Papers in International Economics No. 27, Washington, The Brookings Institution, February 1985.

———, "The Dollar, External Imbalance, and the U.S. Economy," Presented at Western Economics Association, July 1987.

———, Comment on Krugman and Baldwin, "The Persistence of the U.S. Trade Deficit," in *Brookings Papers on Economic Activity*, Vol. 1, 1987, pp. 47-51.

Hooper, Peter, and Catherine L. Mann, "The U.S. External Deficit: Its Causes and Persistence," in Albert Burger, ed., *The U.S. Trade Deficit: Causes, Consequences and Cures*, Boston, Kluwer Academic Publishers, 1989.

Hutchison, Michael, and Charles Piggot, "Budget Deficits, Exchange Rates, and the Current Account: Theory and U.S. Evidence," *Federal Reserve Bank of San Francisco Review* (Fall 1984).

Johnson, Robert A., "Anticipated Fiscal Contraction: The Economic Consequences of the Announcement of Gramm-Rudman-Hollings," International Finance Discussion Paper No. 291, Washington, Board of Governors of the Federal Reserve System, 1986.

Kaempfer, William H., and Thomas D. Willet, "Why an Import Surcharge Wouldn't Help America's Trade Deficit," *World Economy*, 10 (March 1987), pp. 27-38.

Klein, Michael, "Macroeconomic Aspects of Exchange Rate Pass-Through," Worcester, Mass., Clark University, April 1988.

Knetter, Michael, "Price Discrimination by U.S. and German Exporters," *American Economic Review*, 79 (March 1989), pp. 198-210.

Krugman, Paul, "Pricing to Market When the Exchange Rate Changes," in S. W. Arndt and J. D. Richardson, eds., *Real Financial Linkages among Open Economies*, Cambridge, Mass., MIT Press, 1987a.

———, "Sustainability and the Decline of the Dollar," Brookings Discussion Papers on International Economics, No. 57, March 1987b.

———, "Long Run Effects of the Strong Dollar," in Richard Marston, ed., *Exchange Rate Misalignment and International Competitiveness*, NBER Conference Report, Cambridge, Mass., National Bureau of Economic Research, May 1987c.

———, "Adjustment in the World Economy," NBER Working Paper No. 2424, Cambridge, Mass., National Bureau of Economic Research, October 1987d.

Krugman, Paul, and Richard Baldwin, "The Persistence of the U.S. Trade Deficit," *Brookings Papers on Economic Activity*, Vol. 1, 1987, pp. 1-44.

Krugman, Paul, and George N. Hatsopoulos, "The Problem of U.S. Competitive-

ness in Manufacturing," *Federal Reserve Bank of Boston New England Economic Review* (January-February 1987), pp. 18-29.

Laney, Leroy O., "The Strong Dollar, the Current Account, and Federal Deficits: Cause and Effect," *Federal Reserve Bank of Dallas Review* (January 1984), pp. 1-14.

Laursen, Svend, and Lawrence A. Metzler, "Flexible Exchange Rates and the Theory of Employment," *Review of Economics and Statistics*, 32 (November 1950), pp. 281-299.

Liederman, Leonardo, and Mario I. Blejer, "Modeling and Testing Ricardian Equivalence: A Survey," IMF Working Paper No. WP/87/35, Apr. 29, 1987.

Loopesko, Bonnie E., and Robert A. Johnson, "Realignment of the Yen-Dollar Exchange Rate: Aspects of the Adjustment Process in Japan," in Richard Marston, ed., *The Misalignment of Exchange Rates: Effects on Trade and Industry*, NBER, University of Chicago Press, 1988.

Mann, Catherine L., "Prices, Profit Margins, and Exchange Rates," *Federal Reserve Bulletin*, 72 (June 1986a), pp. 366-379.

———, "The Effects of Aggregate Demand and Exchange Rate Shocks on the Profit Margins of Internationally Traded Goods," presented at a conference on "Monetary Uncertainty, Financial Futures, and Economic Activity," Geneva, Switzerland, International Futures and Commodity Institute, November 1986b.

———, "Prices, Profit Margins, and Exchange Rates: After the Fall," presented at the NBER Summer Institute, "International Issues/Real Side," July 1987.

———, "The Effect of Foreign Competition in Prices and Quantities on the Employment in Import Sensitive Industries," *International Trade Journal*, 2 (Summer 1988), pp. 10-29.

Marquez, Jaime R., "International Policy Coordination and the Reduction of the U.S. Trade Deficit," *Journal of Economic Dynamics and Control*, 12 (1988a), pp. 19-26.

———, "Income and Price Elasticities of Foreign Trade Flows: Economic Estimation and Analysis of the U.S. Trade Deficit," International Finance Discussion Papers 324, Washington, Board of Governors of the Federal Reserve System, June 1988b.

Marris, Stephen, *Deficits and the Dollar: The World Economy at Risk*, Washington, Institute for International Economics, December, 1985.

Marston, Richard C., "Real Exchange Rates and Productivity Growth in the United States and Japan," NBER Working Paper No. 1922. Cambridge, Mass., National Bureau of Economic Research, May 1986.

Masson, Paul, and Adrian Blundell-Wignall, "Fiscal Policy and the Exchange Rate in the Big Seven: Transmission of U.S. Government Spending Shocks," *European Economic Review*, 28 (June-July 1985), pp. 11-42.

McKinnon, Ronald I., and Kenichi Ohno, "Getting the Exchange Rate Right: Insular verus Open Economies," paper presented at the American Economic Association, December 1986.

———, "Purchasing Power Parity as a Monetary Standard," Stanford, Cal., Stanford University, August 1987.

Meade, Ellen E., "Exchange Rates, Adjustment, and the J-Curve," *Federal Reserve Bulletin*, 74 (October 1988), pp. 633-644.

Messerlin, Patrick, "Antidumping Laws and Developing Countries," *World Bank PPR Working Paper Series*, No. 16, June 1988.

Mishkin, F. S, "U.S. Macroeconomic Policy and Performance in the 1980s: An Overview," NBER Working Paper No. 1929, May 1986.

Mundell, Robert A., "A New Deal on Exchange Rates," paper presented at Japan–United States Symposium on Exchange Rates and Macroeconomics, Tokyo, Japan, January 1987.

NAS (National Academy of Sciences), *Balancing the National Interest: U.S. National Security Export Controls and Global Economic Competition*, Washington, National Academy Press, 1987.

Nogues, Julio, Andrez Olechowski, and L. Alan Winters, "The Structure of Non-Tariff Barriers Facing the Exports of the Industrial Countries," World Bank Staff Working Paper No. 789, February 1986.

Obstfeld, Maurice, "Floating Exchange Rates, Experience and Prospects," *Brookings Papers on Economic Activity*, Vol. 2, 1985, pp. 369-450.

Ohno, Kenichi, "Export Pricing Behavior of Manufacturing: A U.S.-Japan Comparison," Washington, International Monetary Fund, June 1988.

Pauls, B. Dianne, "Measuring the Foreign-Exchange Value of the Dollar," *Federal Reserve Bulletin*, 73 (June 1987), pp. 411-422.

Persson, Torsen, and Lars Svensson, "Current Account Dynamics and the Terms of Trade: Harberger-Laursen-Metzler Two Generations Later," *Journal of Political Economy* 93 (February 1985), pp. 43-65.

Reinhart, Vince, "Macroeconomic Influences on U.S.-Japan Trade Imbalances," *Federal Reserve Bank of New York Quarterly Review* 11 (Spring 1986), pp. 1-5.

Richardson, Peter, "Tracking the U.S. External Deficit, 1980-1985: Experience with the OECD Interlink Model," OECD Working Paper No. 38, Paris, OECD, February 1987.

Sachs, Jeffrey D., "The Dollar and the Policy Mix: 1985," *Brookings Papers on Economic Activity*, Vol. 1, 1985, pp. 117-185.

Sachs, Jeffrey D., and Noriel Rubini, "Sources of Macroeconomic Imbalances in the World Economy: A Simulation Approach," prepared for the Third International Conference sponsored by the Institute for Monetary and Economic Studies of the Bank of Japan, June 1987.

Saxonhouse, Gary R., "The Micro- and Macro-Economics of Foreign Sales to Japan," in William R. Cline, ed., *Trade Policy in the 1980s*, Cambridge, Mass., MIT Press, 1983.

———, "Japan's Intractable Trade Surpluses in a New Era," *World Economy*, 9 (September 1986), pp. 239-258.

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

Thomas, Charles, "U.S. International Transactions in 1986," *Federal Reserve Bulletin*, 73 (May 1987), pp. 321-329.

Thompson, Robert L., "Agriculture in the Uruguay Round," paper presented at NBER Summer Institute, Aug. 14, 1987.

Tucker, Stuart K., "Reforming U.S. Agricultural Trade Policy," Policy Focus No. 2, Washington, Overseas Development Council, 1987.

UNCTAD, "Problems of Protectionism and Structural Adjustment," TD/B/1039 Part I, TD/B/1126 Add.1, TD/B/940, 1983, 1985.

U.S. Department of Commerce, *Survey of Current Business*, June 1988.

Woo, Wing T., "Exchange Rates and the Prices of Non-Food, Non-Fuel Products," *Brookings Papers on Economic Activity*, Vol. 2, 1984, pp. 511-530.

World Bank, *World Development Report*, Washington, World Bank, 1987.

PUBLICATIONS OF THE INTERNATIONAL FINANCE SECTION

Notice to Contributors

The International Finance Section publishes at irregular intervals papers in four series: ESSAYS IN INTERNATIONAL FINANCE, PRINCETON STUDIES IN INTERNATIONAL FINANCE, SPECIAL PAPERS IN INTERNATIONAL ECONOMICS, and REPRINTS IN INTERNATIONAL FINANCE. ESSAYS and STUDIES are confined to subjects in international finance. SPECIAL PAPERS are surveys of the literature suitable for courses in colleges and universities.

An ESSAY should be a lucid exposition of a theme, accessible not only to the professional economist but to other interested readers. It should therefore avoid technical terms, should eschew mathematics and statistical tables (except when essential for an understanding of the text), and should rarely have footnotes.

A STUDY or SPECIAL PAPER may be more technical. It may include statistics and algebra and may have many footnotes. STUDIES and SPECIAL PAPERS may also be longer than ESSAYS; indeed, these two series are meant to accommodate manuscripts too long for journal articles and too short for books.

To facilitate prompt evaluation, please submit three copies of your manuscript. Retain one for your files. The manuscript should be typed on one side of 8½ by 11 strong white paper. All material should be double-spaced—text, excerpts, footnotes, tables, references, and figure legends. For more complete guidance, prospective contributors should send for the Section's style guide before preparing their manuscripts.

How to Obtain Publications

A mailing list is maintained for free distribution of all new publications to college, university, and public libraries and nongovernmental, nonprofit research institutions.

Individuals and organizations not qualifying for free distribution can receive all publications—ESSAYS, STUDIES, SPECIAL PAPERS, and REPRINTS—by paying a fee of $30 (inside and outside U.S.) to cover the period January 1 through December 31.

ESSAYS and REPRINTS can also be ordered from the Section at $6.50 per copy, and STUDIES and SPECIAL PAPERS at $9. Payment MUST be included with the order and MUST be made in U.S. dollars. PLEASE INCLUDE $1.25 FOR POSTAGE AND HANDLING. (These charges are waived on orders from persons or organizations in countries whose foreign-exchange regulations prohibit such remittances.) For airmail delivery outside U.S., Canada, and Mexico, there is an additional charge of $1.50.

All manuscripts, correspondence, and orders should be addressed to:

International Finance Section
Department of Economics, Dickinson Hall
Princeton University
Princeton, New Jersey 08544-1017

Subscribers should notify the Section promptly of a change of address, giving the old address as well as the new one.

List of Recent Publications

To obtain a complete list of publications, write the International Finance Section.

ESSAYS IN INTERNATIONAL FINANCE

147. Edmar Lisboa Bacha and Carlos F. Díaz Alejandro, *International Financial Intermediation: A Long and Tropical View*. (May 1982)
148. Alan A. Rabin and Leland B. Yeager, *Monetary Approaches to the Balance of Payments and Exchange Rates*. (Nov. 1982)
149. C. Fred Bergsten, Rudiger Dornbusch, Jacob A. Frenkel, Steven W. Kohlhagen, Luigi Spaventa, and Thomas D. Willett, *From Rambouillet to Versailles: A Symposium*. (Dec. 1982)
150. Robert E. Baldwin, *The Inefficacy of Trade Policy*. (Dec. 1982)
151. Jack Guttentag and Richard Herring, *The Lender-of-Last Resort Function in an International Context*. (May 1983)
152. G. K. Helleiner, *The IMF and Africa in the 1980s*. (July 1983)
153. Rachel McCulloch, *Unexpected Real Consequences of Floating Exchange Rates*. (Aug. 1983)
154. Robert M. Dunn, Jr., *The Many Disappointments of Floating Exchange Rates*. (Dec. 1983)
155. Stephen Marris, *Managing the World Economy: Will We Ever Learn?* (Oct. 1984)
156. Sebastian Edwards, *The Order of Liberalization of the External Sector in Developing Countries*. (Dec. 1984)
157. Wilfred J. Ethier and Richard C. Marston, eds., with Kindleberger, Guttentag and Herring, Wallich, Henderson, and Hinshaw, *International Financial Markets and Capital Movements: A Symposium in Honor of Arthur I. Bloomfield*. (Sept. 1985)
158. Charles E. Dumas, *The Effects of Government Deficits: A Comparative Analysis of Crowding Out*. (Oct. 1985)
159. Jeffrey A. Frankel, *Six Possible Meanings of "Overvaluation": The 1981-85 Dollar*. (Dec. 1985)
160. Stanley W. Black, *Learning from Adversity: Policy Responses to Two Oil Shocks*. (Dec. 1985)
161. Alexis Rieffel, *The Role of the Paris Club in Managing Debt Problems*. (Dec. 1985)
162. Stephen E. Haynes, Michael M. Hutchison, and Raymond F. Mikesell, *Japanese Financial Policies and the U.S. Trade Deficit*. (April 1986)
163. Arminio Fraga, *German Reparations and Brazilian Debt: A Comparative Study*. (July 1986)
164. Jack M. Guttentag and Richard J. Herring, *Disaster Myopia in International Banking*. (Sept. 1986)
165. Rudiger Dornbusch, *Inflation, Exchange Rates, and Stabilization*. (Oct. 1986)
166. John Spraos, *IMF Conditionality: Ineffectual, Inefficient, Mistargeted*. (Dec. 1986)
167. Rainer Stefano Masera, *An Increasing Role for the ECU: A Character in Search of a Script*. (June 1987)
168. Paul Mosley, *Conditionality as Bargaining Process: Structural-Adjustment Lending, 1980-86*. (Oct. 1987)
169. Paul A. Volcker, Ralph C. Bryant, Leonhard Gleske, Gottfried Haberler, Alexandre Lamfalussy, Shijuro Ogata, Jesús Silva-Herzog, Ross M. Starr,

James Tobin, and Robert Triffin, *International Monetary Cooperation: Essays in Honor of Henry C. Wallich*. (Dec. 1987)

170. Shafiqul Islam, *The Dollar and the Policy-Performance-Confidence Mix*. (July 1988)
171. James Boughton, *The Monetary Approach to Exchange Rates: What Now Remains?* (Oct. 1988)
172. Jack M. Guttentag and Richard Herring, *Accounting for Losses on Sovereign Debt: Implications for New Lending*. May 1989)
173. Benjamin J. Cohen, *Developing-Country Debt: A Middle Way*. (May 1989)
174. Jeffrey Sachs, *New Approaches to the Latin American Debt Crisis*. (July 1989)
175. C. David Finch, *The IMF: The Record and the Prospect*. (Sept. 1989)

PRINCETON STUDIES IN INTERNATIONAL FINANCE

49. Peter Bernholz, *Flexible Exchange Rates in Historical Perspective*. (July 1982)
50. Victor Argy, *Exchange-Rate Management in Theory and Practice*. (Oct. 1982)
51. Paul Wonnacott, *U.S. Intervention in the Exchange Market for DM, 1977-80*. (Dec. 1982)
52. Irving B. Kravis and Robert E. Lipsey, *Toward an Explanation of National Price Levels*. (Nov. 1983)
53. Avraham Ben-Bassat, *Reserve-Currency Diversification and the Substitution Account*. (March 1984)
*54. Jeffrey Sachs, *Theoretical Issues in International Borrowing*. (July 1984)
55. Marsha R. Shelburn, *Rules for Regulating Intervention under a Managed Float*. (Dec. 1984)
56. Paul De Grauwe, Marc Janssens, and Hilde Leliaert, *Real-Exchange-Rate Variability from 1920 to 1926 and 1973 to 1982*. (Sept. 1985)
57. Stephen S. Golub, *The Current-Account Balance and the Dollar: 1977-78 and 1983-84*. (Oct. 1986)
58. John T. Cuddington, *Capital Flight: Estimates, Issues, and Explanations*. (Dec. 1986)
59. Vincent P. Crawford, *International Lending, Long-Term Credit Relationships, and Dynamic Contract Theory*. (March 1987)
60. Thorvaldur Gylfason, *Credit Policy and Economic Activity in Developing Countries with IMF Stabilization Programs*. (Aug. 1987)
61. Stephen A. Schuker, *American "Reparations" to Germany, 1919-33: Implications for the Third-World Debt Crisis*. (July 1988)
62. Steven B. Kamin, *Devaluation, External Balance, and Macroeconomic Performance: A Look at the Numbers*. (Aug. 1988)
63. Jacob A. Frenkel and Assaf Razin, *Spending, Taxes, and Deficits: International-Intertemporal Approach*. (Dec. 1988)
64. Jeffrey A. Frankel, *Obstacles to International Macroeconomic Policy Coordination*. (Dec. 1988)
65. Peter Hooper and Catherine L. Mann, *The Emergence and Persistence of the U.S. External Imbalance, 1980-87*. (Oct. 1989)

* Out of print. Available on demand in xerographic paperback or library-bound copies from University Microfilms International, Box 1467, Ann Arbor, Michigan 48106, United States, and 30-32 Mortimer St., London, WIN 7RA, England. Paperback reprints are usually $20. Microfilm of all Essays by year is also available from University Microfilms. Photocopied sheets of out-of-print titles are available on demand from the Section at $9 per Essay and $11 per Study or Special Paper, plus $1.25 for postage and handling.

13. Louka T. Katseli-Papaefstratiou, *The Reemergence of the Purchasing Power Parity Doctrine in the 1970s*. (Dec. 1979)
*14. Morris Goldstein, *Have Flexible Exchange Rates Handicapped Macroeconomic Policy?* (June 1980)
15. Gene M. Grossman and J. David Richardson, *Strategic Trade Policy: A Survey of Issues and Early Analysis*. (April 1985)

REPRINTS IN INTERNATIONAL FINANCE

22. Jorge Braga de Macedo, *Exchange Rate Behavior with Currency Inconvertibility*. [Reprinted from *Journal of International Economics*, 12 (Feb. 1982).] (Sept. 1982)
23. Peter B. Kenen, *Use of the SDR to Supplement or Substitute for Other Means of Finance*. [Reprinted from George M. von Furstenberg, ed., *International Money and Credit: The Policy Roles*, Washington, IMF, 1983, Chap. 7.] (Dec. 1983)
24. Peter B. Kenen, *Forward Rates, Interest Rates, and Expectations under Alternative Exchange Rate Regimes*. [Reprinted from *Economic Record*, 61 (Sept. 1985).] (June 1986)
25. Jorge Braga de Macedo, *Trade and Financial Interdependence under Flexible Exchange Rates: The Pacific Area*. [Reprinted from Augustine H.H. Tan and Basant Kapur, eds., *Pacific Growth and Financial Interdependence*, Sydney, Australia, Allen and Unwin, 1986, Chap. 13.] (June 1986)

ISBN 0-88165-237-7